Economic Issues, Problems and Perspectives

The Impact of the COVID-19 Pandemic on International Oil Markets

ALEXANDER G. TVALCHRELIDZE

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ECONOMIC ISSUES, PROBLEMS AND PERSPECTIVES

THE IMPACT OF THE COVID-19 PANDEMIC ON INTERNATIONAL OIL MARKETS

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ABSTRACT

The “oil market” is an extremely complex and multi-layered notion, understood by different stakeholders according to their philosophy, psychology, and professional skills.

Formally, the oil market may be considered as a semi-closed bivariant dynamic system, which is characterized by two degrees of freedom. System’s stability is determined by two external factors: amount of oil to be contracted, and number of contracts signed, which are assured by this amount. The model of such system represents an exponential equation meaning that the added value created within the market is limited by the exponent. As long as the values of two external parameters (amount of oil to be contracted and number of contracts signed) do not exceed a critical level, the system is stable and in equilibrium. Within such conditions, the system is self-regulated and tries to immediately suppress any external shocks and to regain equilibrium. However, if imposed shocks exceed values of external parameters, the system loses possibilities of self-regulation, and outside intervention becomes necessary. In its modern shape the oil markets were formed only in the globalized world, after collapse of the USSR and “colored revolutions” in East Europe. From this point of view, essential modernization of the oil markets commenced by the end of the recent century, when the first roots of oil “financialization” originated. Due to their unique role in the globalized world, oil markets represent the main driver of geoeconomic stability. Because at all markets oil is quoted in U.S. Dollars, and oil price depends on the strength of this currency, the USA may ensure the needed international oil price and this way, firstly, impact on oil markets, and secondly, achieve geopolitical and geoeconomic goals. This is the most appropriate implication of the “oil weapon.”

Impact of COVID-19 novel coronavirus pandemic on global economy, in general, and on international oil markets, in particular, was enormously vulnerable. Statistical analysis and modelling have shown that: (i) COVID-19 novel coronavirus pandemic may be divided into two periods: 21 January to 20 April 2020, and after 20 April till today. (ii) The dramatic failure of crude oil prices from January 21 to April 20, 2020 was determined by negative expectations of investors and speculators at the commodity markets and, correspondingly, by sharply diminished volume of oil futures contracts. Within this period a significant and strong negative correlation existed between weekly world coronavirus infection cases and average weighted crude oil price. Simultaneously, correlation between the world oil price and Euro to U.S. Dollar exchsnge rate disappeared demonstrating drastic equilibrium breakage at international oil markets. (iii) After 20 April 2020 situation radically changed: oil prices were led by the COVID-19 mortality rate, which started to diminish gradually followed by step-by-step increase of oil prices. Negative correlation between these two indices is so strong that allowed us to draw the statistical model of such an interdependence expressed by a quadratic regression equation. Therefore, analysis of coronavirus comparative mortality rate provides investors with a tangible tool to assess oil markets in a medium-term run and, consequently, to return to commodity exchanges. (iv) Starting from late April – early May 2020 oil markets began to recover, and this is proven by the restored correlation between oil prices and Euro to U.S. Dollar exchange rate. (v) However, 2020 was economically the worst year of the new Millennium: in 2020 4.89 times less oil derivatives contracts were signed than in 2019. (vi) Correspondingly, the world COVID-19 pandemic has had a huge impact on the world economy but oil exporting states found themselves in the worst situation. In-depth analysis of social & economic environment in Russia and Iran demonstrated that economic recession in these states was extremely vulnerable. However, both countries have avoided the finance bankruptcy using different strategies. Russia was able to survive due to aggressive positioning of its leading hydrocarbon companies at international oil markets whereas Iran has used peculiarities of both its social & political structure and unusual features of political economy. Hence, neither of them will be able to stand against new challenges if international oil markets are not significantly improved.

Coronavirus pandemic highlighted contradictions between the main geoeconomic playmakers of the world – the USA, the EU, China and partly Russia. Experts of the European Parliament believe that the geopolitical influence of the EU, partly China and Russia will significantly increase versus the USA, however, neither of them has corresponding economic vehicles and instruments for ruling international oil markets and, consequently, the world economy.

PREFACE

"Prudens quaestio dimidium scientiae"
(To ask the proper question is half of knowing)
Roger Bacon
Opus Majus, 1267

COVID-19 novel coronavirus pandemic is the most severe global challenge after the Second World War. In early spring 2020 out of a blue sky our habitat, our Ecumene, which only few days before embraced the entire globe, was drastically squeezed to a minor space limited by external walls of our apartments and houses. All expectations for our personal career, business strategies, trip plans perished; bookings of air tickets and hotels were cancelled; we had no right to visit theater performances; all meetings, seminars, congresses were postponed indefinitely, social events were banned. We lost the possibility to meet with friends and to drink coffee in cafes and restaurants; teaching in schools and universities was performed online, and during the last semester I have seen faces of my master students only on the screen of my laptop. The list may be endlessly continued.

Of course, social networks immediately became overcharged with suspense – a lot of people denounced a second Deluge, a certain kind of Armageddon. Others were sure in global conspiracy but all of us felt with every fiber of our bodies that *something happened* (according to wording and philosophical interpretation by Joseph Heller, 1974).

We have realized from the very beginning of the pandemic that irreversible changes occurred, and not only in the social and economic order of the world but also in our souls and spirits; we became different; we will never be the same as only few days before.

And all of us were asking the same question, what was happening? The question was simple but no ultimate answer existed and still does not exist.

And I decided to split this simple question into a number of other, let say, adjusting questions and search for answers. In my opinion, some answers were found, other questions remained unanswered, and I hope that somebody else will find adequate responses.

You will see some answers in this book. You may like or dislike them. In both cases I will be happy because you will have a specific opinion on my ideas and, therefore, *cogito ergo sum*.

Alexander G. Tvalchrelidze
March 9, 2021.

ACKNOWLEDGMENTS

I would like to express my deep gratitude to Professor Amiran Gamkrelidze, MD, General Director of the Georgian National Center for Disease Control and Public Health (NCDC), and to his deputy, Professor Paata Imnadze, MD who provoked me to undertake this investigation.

I am also sincerely thankful to Academicians, Professors Vladimer Papava and Avtandil Silagadze; I work with them with great pleasure and discuss some of my findings.

I feel the benevolence and support of more than one hundred of my colleagues, Academicians of the Euro Mediterranean Academy of Arts and Sciences headed by its President Professor Paata Kervalishvili and Chief Academician Secretary Professor Konstantinos Spentzas, and I will never forget their goodwill.

INTRODUCTION

"Whoever controls oil controls much more than oil".
John McCain, McCain's Energy and Climate Speech, 17 July 2008

"Those who control oil and water will control the world".
John Gray, *The Guardian*, 30 March 2008

World economy rapidly recovered after the 2008-2009 global economic crisis, and starting from 2010 fast increase of the world GDP was fixed. In 2019 the world's GDP was as high as US$ 87,798.52 billion [1]. However, the world economic growth was unexpectedly hampered by COVID-19 coronavirus pandemic.

The first registered symptom of pneumonia caused by a novel coronavirus was registered on 1 December, 2019 in Wuhan City, China and, correspondingly, the disease was initially called "Wuhan Pneumonia" [2]. In the beginning, on 12 January 2020 the World Health Organization (WHO) temporarily named virus "2019 Novel Coronavirus" (2019-nCoV) but later, on 12 February termed the decease "Coronavirus Disease 2019" (COVID-19). In early spring, the International Committee on Taxonomy of Viruses (ICTV) officially gave to the virus name SARS-CoV-2 [3].

On 5 January 2020 WHO published the First Decease Outbreak News with risk assessment and recommendations [4]. On 23 January the World Health Organization published a report where a danger of global pandemic

was predicted [5]. On 11 March the pandemic was declared [6]. In late January 2020 Worldometer launched a website "COVID-19 Coronavirus Pandemic", with live update where statistics starting from 22 January 2020 is available [7].

According to Worldometer, by 6 pm GMT of 18 January 2021 there were 95,683,835 coronavirus infection cases in the world with 25,295,082 active and 70,388,753 closed cases, of which 68,345,025 people recovered and 2,043,728 persons died. COVID-19 pandemic spread to 219 countries and two cruise ships - *MS Zaandam* (with 9 infected of which 2 died) and *Diamond Princess* (712 infected and 13 deaths). Figure 1 demonstrates 20 countries where coronavirus pandemic is the most vulnerable.

It should be noted that in several countries like North Korea statistics on COVID-19 disease and deaths is classified [8] though severe measures are kept including even murder of a South Korean fisheries officer in compliance with COVID-19 emergency orders [9]. In Turkmenistan the word "coronavirus" is banned and people may be arrested for wearing masks or mentioning the word "pandemic" [10]. Thus, the real distribution of the disease is vaster than statistically registered.

Within 1 month after the pandemic was officially announced, the world economy froze, industries and budgetary incomes fall down to a critical level, employment collapsed, investor activities distorted and so on. The first months of the pandemic brought back to memory the period of the Great Depression, when the liberal economic doctrines failed, and governmental interventions became necessary [11].

COVID-19 novel coronavirus pandemic immediately has had a huge negative impact on the world economy. Firstly, it was outlined that the COVID-19 novel coronavirus pandemic in February 2020 dramatically decreased world investments including portfolio investments, and the negative effect of the pandemic was twice greater than that of 2008-2009 world economic crisis [12].

Secondly, the pandemic has instantly provoked sharp increase of unemployment worldwide, and the global economy is estimated to take years for recovering the 2019-level labor market [13].

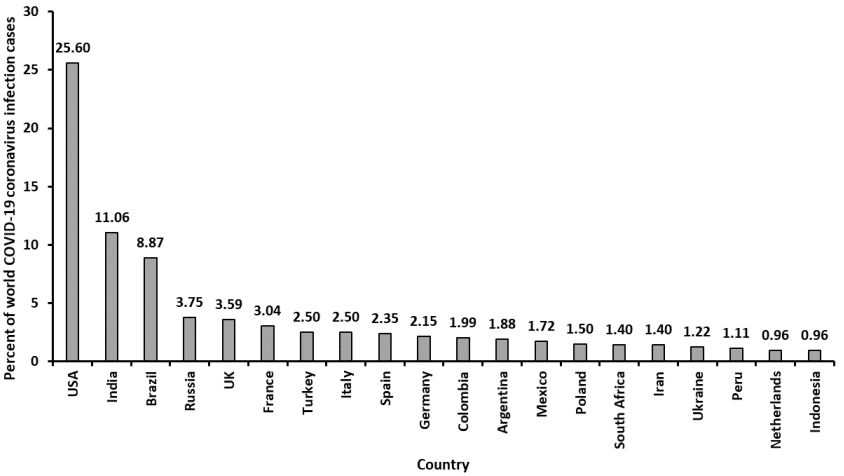

Figure 1. The Most Affected by COVID-19 Coronavirus Pandemic 20 Countries.

Thirdly, exponential spread of the disease rose uncertainty in population dramatically diminishing consumption of goods [14].

Fourthly, the pandemic from the very beginning has had a huge negative impact on the manufacturing industry throughout the world but mostly in the Latin America [15], China [16] and poor countries [17].

Fifthly, the COVID-19 disease deteriorated international economic relations, and created roots of national egoism challenging this way globalization itself [18].

Sixthly, the lockdown as a measure against the pandemic in a lot of countries damaged international trade [19] as well as retail trade, transport and hospitality businesses and almost entirely stopped international tourism [20].

This list may continue endlessly. Of course, strict and rigid measures should be kept after the COVID-19 novel coronavirus pandemic is over to recover the economic situation and restore the corresponding conditions of world economic development [21, etc.].

However, our opinion is that the most challenging is the impact of world COVID-19 novel coronavirus pandemic on international oil markets, and this idea has it objective reasons. In our recent publication [22] we have explored interrelation between world energy consumption and GDP. Here

the information is updated by 2019 data – the year before COVID-19 coronavirus pandemic spread. Figure 2 demonstrates such an interrelation, where the world GDP is cited according to the World Bank Group data [1] and energy consumption is borrowed from BP's Statistical Review of World Energy [23].

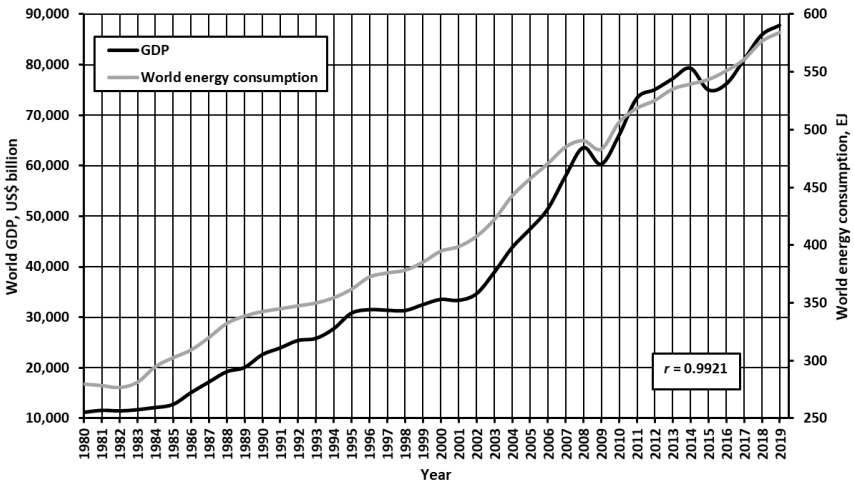

Figure 2. Interrelation between World GDP and Energy Consumption. Here and Below: r = correlation coefficient.

On the graph energy consumption is expressed in exajoules (EJ); 1 EJ = 10^{18}J. Extremely tight correlation between the explored two indices is observed meaning that the world economic development is dully followed by energy consumption growth.

Figure 3 demonstrates world energy consumption by types. It is clear that oil is the most consumable energy source and will remain as such in the medium-term run [24].

Specific position of oil at international commodity markets is determined by different reasons. Primo, oil is a mostly consumed commodity in the world. According to our calculations, world oil consumption value equaled to US$ 1.507 trillion in 2019, exceeding by 54.14% those of coal (second rank) and by 54.29% those of natural gas (third rank). Note that consumption value, according to the methodology

elaborated before [25], was calculated as consumption volume published by BP [23] multiplied on average annual world crude oil and other commodities price calculated as a mean of monthly prices released by IMF [26].

Secondo, demand on oil determines development of the world infrastructure, namely refining business, production of fuel and combustibles, construction and management of pipelines, maritime cargo, newbuildings in tanker fleet, etc. According to the CIA Factbook [27], by 2020 the accessed total length of oil pipelines in 107 countries equaled 529,210 km. Total capacity of world tanker fleet was about 601 million DWT [28]. Refining capacity of world oil refineries corresponded to 101.34 million barrels daily [23].

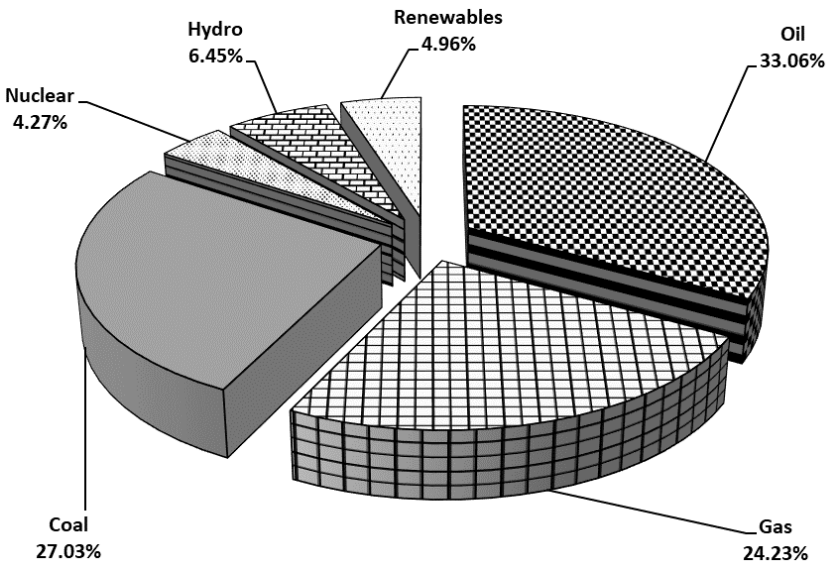

Figure 3. World Energy Consumption by Types in 2019 [23].

Tercio, oil represents a tangible tool in geopolitical games. For the first time oil as a political weapon was used in October 1973, when the King of Saudi Arabia Feisal initiated oil export embargo to NATO countries by the Organization of Arab Petroleum Exporting Countries (OAPEC) after Arab's defeat in Yom Kippur War [29, etc.]. Hence, the most picturesque example of "oil weapon" is President Reagan's policy towards the USSR.

In 1981 President Reagan declared: "we [e.g., the USA] have an oil weapon, too. The strategic reserve should be used to bloody…" the enemy [30]. Correspondingly, his administration abandoned the "policy of détente" versus the USSR and persuaded Saudi Arabia to flood the world market with cheap oil at the same time providing inner market with petroleum from strategic reserves. These measures, known as "a new political economy of oil" [31], according to a large number of investigations [32-34, etc.] ultimately lead to collapse of the USSR. In the new millennium "oil weapon" was used, at least, three times, and we will consider these cases in subsequent chapters.

That is why I entirely agree with citations in the epigraphs to this Introduction and sincerely think that whoever controls oil rules economy of the globalized world. We will consider in Chapter 3 those financial and economic instruments, which are used for controlling oil markets.

Quartum, oil is the basic commodity traded at international commodity markets. I have explored earlier the speculation chain at commodity exchanges and measures kept to diminish added value derived from pure speculations [25].

That is why when impact of COVID-19 novel coronavirus pandemic on global economy is analyzed, first of all oil markets shall be taken into consideration. Such publications appeared already in spring 2020. In the first of them [35] the author concluded that pandemic influence was minor, and oil price trend followed its immanent regularities. However, in March 2020 available statistical material was insignificant, and econometric equations' coefficients were not correctly proven. In other publications [36, 37], on the contrary, the pandemic impact is suggested to be huge. Moreover, the COVID-19 coronavirus pandemic touched the maritime sector and oil tanker shipment, as well. Already in late January the demand on tankers dramatically decreased, and such situation became even tighter in February and March [38]. The published prospects for the end of the year and for 2021 happened to be also pessimistic [39].

Surprisingly, however, in neither of available publications a real statistical analysis of interdependence between COVID-19 coronavirus disease indices and oil market characteristics was undertook. That is why

already in May 2020 together with Avtandil Silagadze I have processed all the available worldwide statistics and have concluded that in mid-summer the situation will improve [40]. This statement has been confirmed in autumn 2020 [41].

Today, the entire statistics of the year 2020 is available, and this book is dedicated to its thorough analysis. Also, I performed two case studies, for Russia and Iran, e.g., those states who do not obey international regulations of oil trade agreed upon between OPEC member and other stakeholder countries and approved by the OPEC meeting.

The book hereto is practically the first attempt of in-depth statistical analysis of the interdependence between international oil prices and basic indices of the world COVID-19 coronavirus pandemic (dynamics of weekly infected people, weekly mortality rate, etc.). The analysis brought to novel findings, which allow medium and long-term forecast and modelling of international oil markets.

The cutoff date for the statistical analysis is 31 December 2020.

In my opinion, the book will be interesting for academic researchers in macroeconomy & commodity markets throughout the world, master students in international economics, economic analysts, policy makers, specialists in geopolitics and geoeconomics, just for general public.

Chapter 1

BASIC STATISTICS ON WORLD COVID-19 CORONAVIRUS PANDEMIC

1.1. METHODOLOGY OF THE STATISTICAL ANALYSIS

Worldwide statistical information on COVID-19 disease is published and released by enormous number of governmental, medical and private agencies in a lot of countries including WHO [42], the USA Centers of Disease Control and Prevention [43], departments of health of all the USA states [see, for instance 44], the UK governmental agency NHS [45], the Oxford University via the online publication portal Our World in Data [46], governments of Canada [47], France [48], and a lot of other countries. However, the most appropriated source of information is Worldometer [7], which processes official, government provided information on 219 countries and updates it once an hour, 24 hours a day, 7 days a week. Worldometer releases:

1. General worldwide information including:
   1.1. Total coronavirus cases
   1.2. Deaths
   1.3. Active cases divided into cases in mild conditions and serious and critical

1.4. Closed cases including number of recovered/discharged and number of deaths
1.5. Daily new cases, which may by processed as a histogram or a graph either in linear or logarithmic scales at a choice
1.6. Daily new deaths, which may be processed similarly to daily new cases

2. Data on each of 219 countries, which includes number of:
2.1. Total cases
2.2. New cases
2.3. Total deaths
2.4. New deaths
2.5. Total recovered
2.6. Active cases
2.7. Serious & critical cases
2.8. Total cases per 1 million of population
2.9. Total deaths per 1 million of population
2.10. COVID tests
2.11. COVID tests per 1 million of population, and
2.12. Population.

According to the WHO guidelines, the mortality rate is calculated as number of deaths in closed cases, e.g., a percent of deaths versus the sum of recoveries and deaths. However, such an approach, important for epidemiologic and health care studies, is useless in economic statistical analysis due to the following reason: Coronavirus disease duration is uneven in different cases. As well, disease complicity does not depend on sex and/or age group: it may be serious and/or critical for youths, who were absolutely healthy before being infected, and vice versa, often it happened to be mild and even asymptomatic in elder groups with serious underlying diseases. Thus, either a favorable or a tragic outcome of the coronavirus infection occurs in different time for different patients, and therefore disease duration is not directly related with the date when the infection was identified. Consequently, if the mortality rate is computed according to the proposed

method, it will not represent an ad hoc situation but will be indefinitely time-shifted. In other words, such a mortality rate could not be compared with the new infection cases.

Hence, for the statistical analysis of interdependence of the COVID-19 coronavirus pandemic indices with, for instance, oil prices, an ad hoc situation should be described. Such a picture may be displayed by registration of infection cases and deaths within a chosen period, for instance, within a week. Such a time interval is appropriated for analysis of both epidemiologic and economic indices.

Thus, in this book the mortality rate is referred to a percent of deaths versus infection cases within a week. The end-of-week of the investigated period was fixed the day for which Statista has published average weekly oil prices for the OPEC Basket, Brent and West Texas Intermediate (WTI) blends [49].

Interdependence between epidemiologic and economic indices was investigated, firstly, by correlation and then by regression analyses.

Correlation coefficients were computed in Excel software according to the standard equation proposed by Pearson [50]:

$$r_{XY} = \frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sqrt{(X-\bar{X})^2(Y-\bar{Y})^2}}, \quad (1)$$

In each case correlation coefficient value was tested by 2-tailed Pearson correlation critical values' matrix with freedom degree N-2 and probability of 99% [51].

Statistical modelling of interdependence between two indices has been performed according to the methodology elaborated [25] and slightly updated [52] earlier. Modelling was based on the following simple regularities: Statistical interrelation between dependent y and variable x in two-dimensional space $(\bar{x}_i, \bar{y}_i)$ may be determined by a regression equation:

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_p x_{ip} + \varepsilon_i, \quad (2)$$

where ε_i = residual of equation (3):

$$\vec{x} = \begin{pmatrix} x_{11} & \dots & x_{1p} \\ \dots & \dots & \dots \\ x_{n1} & \dots & x_{np} \end{pmatrix}, \tag{3}$$

and coefficient β is determined by least squares method meaning that deviation of squares of points in space $(\bar{x}_i, \bar{y}_i)$ should be minimum. It is reached by an extremum

$$F(\vec{\beta}_n) = \sum_{n=1}^{p} [\bar{y}_n - B(\bar{x}_n, \vec{\beta}_n]^2 . \tag{4}$$

In none-linear cases it is possible to compute the values of coefficients, standard errors and residue ε_i. To do so, we need to know mean values of $\bar{x}$ and $\bar{y}$, the standard deviation of *x*, the standard deviation of *y*, and the correlation between them. Such computation was realized in the SPSS software using ANOVA (Analysis of Variance) technology [53]. Experience has shown that practically in all cases quadratic regression equations describes better the outcropped regularities.

1.2. BASIC DATA AND THEIR PROCESSING

Table 1 represents a data bank on the world COVID-19 coronavirus pandemic completed and processed according to the methodology described above on the weekly basis. Note that the end-of-week, which in certain cases does not correspond to 7-days-interval, is fixed the day for which the weekly oil prices were released.

Table 1. Data Bank on World COVID-19 Coronavirus Pandemic

Date	Weekly coronavirus infection cases	Weekly deaths	Mortality rate, % of infected	Date	Weekly coronavirus infection cases	Weekly deaths	Mortality rate, % of infected
21 Jan	580	17	2.93	13 Jul	1,499,504	35,623	2.38
27 Jan	4,001	89	2.22	20 Jul	1,601,789	36,718	2.29
03 Feb	16,022	320	2.00	27 Jul	1,792,716	39,876	2.22
10 Feb	22,496	592	2.63	03 Aug	1,813,165	47,190	2.60
18 Feb	32,085	991	3.09	10 Aug	1,819,787	35,535	1.95
24 Feb	4,903	690	14.07	17 Aug	1,830,351	47,403	2.59
02 Mar	10,356	418	4.04	24 Aug	1,798,936	49,265	2.74
06 Mar	11,607	376	3.24	31 Aug	1,842,832	34,579	1.88
10 Mar	16,900	804	4.76	08 Sep	2,122,371	47,099	2.22
16 Mar	63,490	2,883	4.54	14 Sep	1,712,854	31,393	1.83
24 Mar	240,674	11,977	4.98	21 Sep	2,033,992	29,874	1.47
30 Mar	366,016	20,177	5.51	28 Sep	2,046,312	35,845	1.75
07 Apr	640,852	46,699	7.29	05 Oct	2,103,351	34,865	1.66
14 Apr	562,921	46,568	8.27	12 Oct	2,348,440	37,472	1.60
20 Apr	413,883	40,676	9.83	19 Oct	2,617,210	37,108	1.42
28 Apr	727,006	48,159	6.62	26 Oct	3,105,675	46,177	1.49
04 May	507,018	30,804	6.08	02 Nov	3,532,617	42,262	1.20
11 May	612,960	34,893	5.69	09 Nov	3,920,223	57,457	1.47
18 May	635,834	32,782	5.16	16 Nov	4,895,858	62,451	1.28
26 May	799,711	33,671	4.21	23 Nov	4,207,322	69,471	1.65
01 Jun	693,700	25,729	3.71	30 Nov	4,071,876	71,855	1.76
06 Jun	854,044	31,458	3.68	07 Dec	4,352,828	76,553	1.76
15 Jun	927,748	29,075	3.13	14 Dec	4,432,497	70,993	1.60
22 Jun	1,044,842	36,338	3.48	21 Dec	4,524,043	102,013	2.25
29 Jun	1,221,888	32,603	2.67	28 Dec	3,952,920	61,200	1.55
06 Jul	1,346,914	32,663	2.43	31 Dec	2,126,773	27,570	1.30

In addition to the generalized world data, we have analyzed country raking according to total COVID-19 coronavirus infection cases (see Figure 1), ad hoc mortality rate as percent of deaths versus total number of infected, as well as infection cases, deaths, and COVID-19 test number as percent of population.

Results of the analysis are provided below.

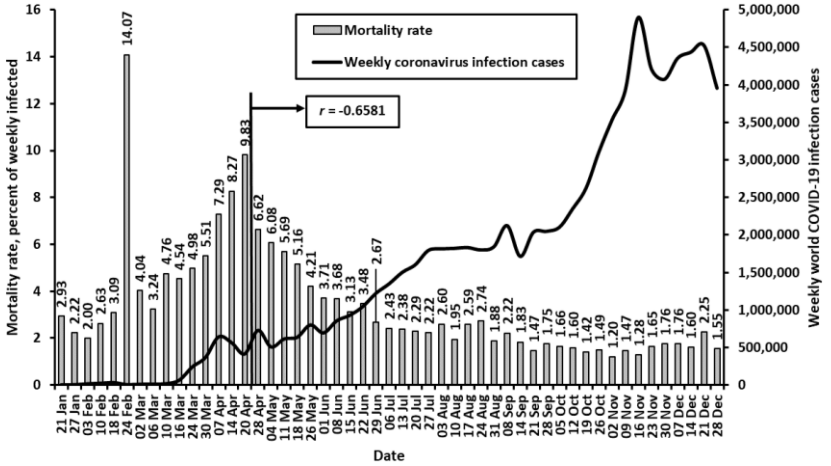

Figure 4. Basic Statistics on World COVID-19 Coronavirus Pandemic in 2020.

Figure 4 displays the weekly number of coronavirus infection cases worldwide and the mortality rate for the same period. It may be seen that from 21 January to 20 April slight growth of infection cases was followed by significant increase of the mortality rate. Within this period the average mortality rate computed as a mean of average weekly mortality, was as high as 5.29% of weekly infected people. After 20 April the situation dramatically changed: exponential increase of weekly infection cases followed by the worldwide spread of the pandemic occurred at the background of gradually diminishing mortality. Within 20 April – 31 December 2020 the mean mortality rate equaled to 2.56% of weekly infection cases. There is a significant negative correlation between these two indices during this period. Though the correlation is not very strong, as we will see in the next chapter, it is extremely important for economic analysis.

Figure 5 displays an ad hoc mortality rate as percent of total deaths versus total COVID-19 coronavirus infection cases in the world and in the most affected countries on 31 December 2020. It may be seen that the mortality, excluding Mexico and, partly, Iran, does not depend on economic development of the countries. Several states with incomparably weaker health care system are distinguished by the mortality rate less than in rich

nations. For instance, the mortality is lower in India than in the USA, and in Colombia – than in the UK.

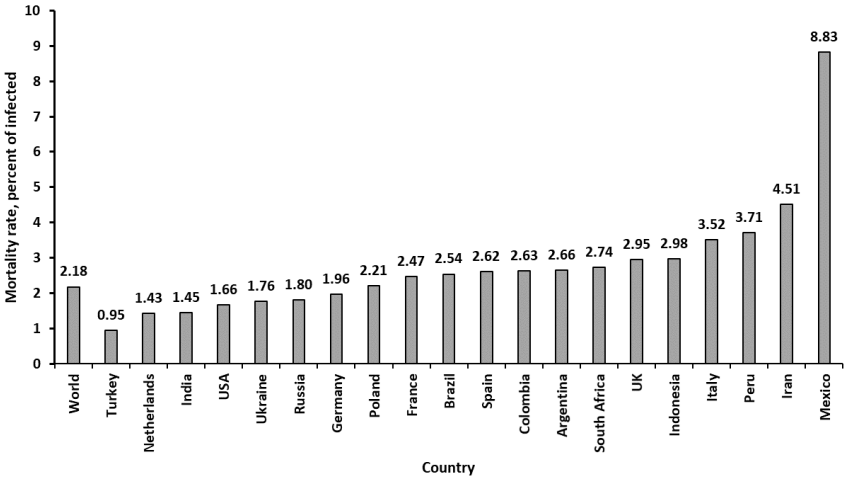

Figure 5. Ad Hoc Mortality Rate on 31 December 2020 in the World and in 20 Top Coronavirus Affected Countries.

For interpreting these data, we have processed some additional indices:

1. Mortality rate in these states as percent of population
2. Country ranking according to number of SARS-CoV-2 tests
3. Interrelation between number of infection cases and quantity of SARS-CoV-2 tests.

For performing this study, we were obliged to process data as released by Worldometer for 4 pm GMT of 20 January 2021 as far as it isn't possible to get correct information on SARS-CoV-2 tests for December 2020: these data are live updated and no archived material is available for each of 219 countries affected by COVID-19 coronavirus pandemic.

Figure 6 shows mortality rate in top coronavirus affected 20 countries as a share of population headcount. The histogram displays a radically different picture than those on Figure 5. Surprisingly, the mortality rate is higher in developed countries than in poor states. For understanding this

feature, we have explored interdependence between the relative number of SARS-CoV-2 tests and infection cases in the mentioned nations (Figure 7).

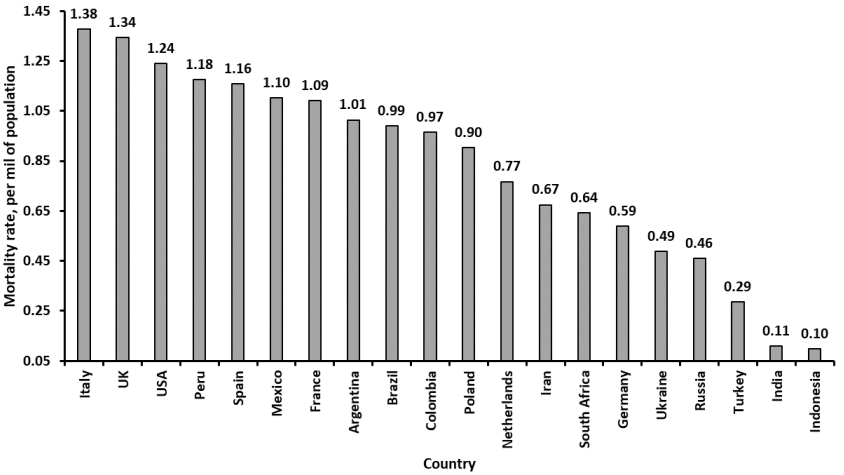

Figure 6. Ad Hoc Mortality Rate on 20 January 2021 in 20 Top Coronavirus Affected Countries as a Share of Population.

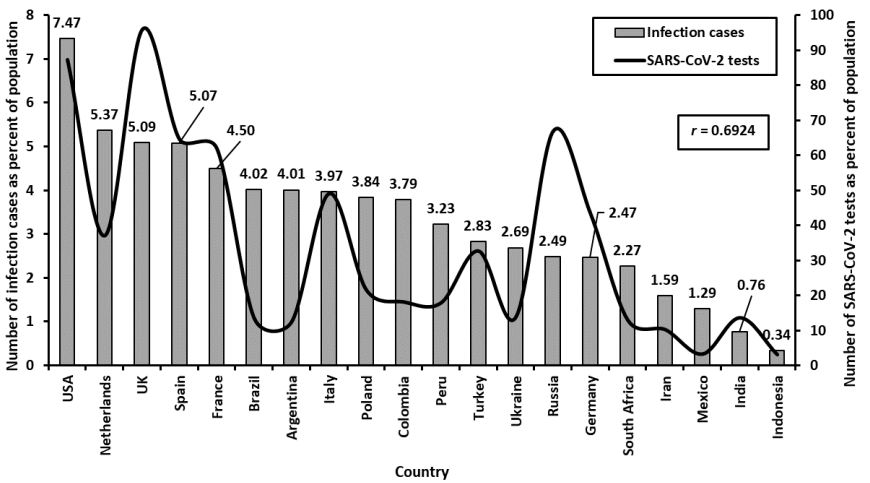

Figure 7. Interdependence between COVID-19 Infection Cases and Number of SARS-CoV-2 Tests.

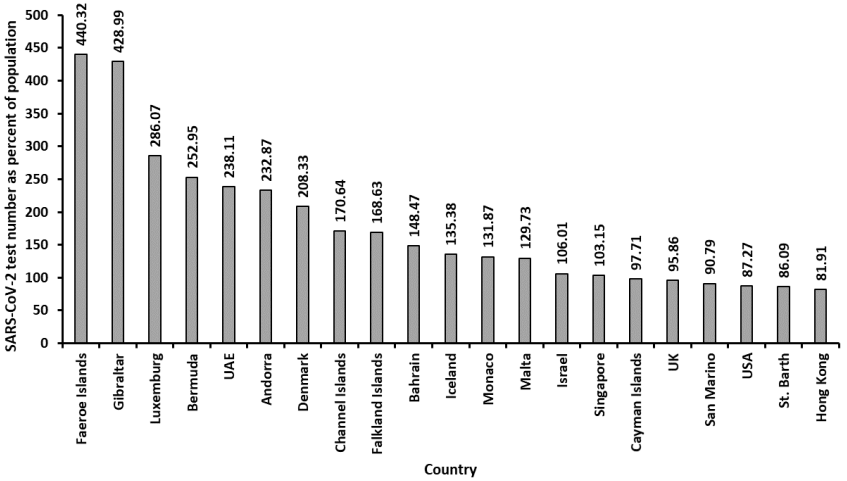

Figure 8. Top 20 Countries According to Relative Number of SARS-CoV-2 Tests.

Existence of a significant correlation is fixed. Detailed interpretation of regularities cropped out is given in the next paragraph. Hence, it must be noted that the major world economies are not leaders in SARS-CoV-2 testing. As it could be seen on Figure 8, in countries with small population test number largely exceeds population headcount, meaning that practically each citizen performed testing two-four times.

1.3. Results of the Statistical Analysis

World COVID-19 coronavirus pandemic is bitterly divided into two periods:

1. 21 January – 20 April 2020, when the virus was less known, and
2. After 20 April, when the mortality rate started to gradually diminish.

Within the first period the mean mortality rate, as mentioned above, was as high as 5.29% of weekly infected. Coronavirus disease started to spread worldwide unexpectedly and suddenly, and the globe was not yet ready to

meet pandemic challenges: population in the majority of developed countries was overtaken with panic. All of us were witness of empty supermarkets shown by the basic TV channels; in late winter and early spring there was a total lack of masks, hygienic tools, SARS-CoV-2 tests. No experience of the disease treatment existed yet, and the sole response to the pandemic was a total lockdown in the majority of developed countries. Sharp and sudden lockdown caused, as outlined in Introduction, cancelling of international flights, closure of schools and tertiary education entities like universities, and teaching was carried out online, banning of civil transport, curfew in a lot of European states, shutting down of restaurant & beauty businesses, retail trade excepting food and pharmaceutical production, prohibition of sport events, etc. Olympic Games and other championships were postponed. Uncertainty in future determined investors' negative expectations at commodity and capital markets, and commodity prices started to dramatically decrease. Pessimistic expectations lead to spike in unemployment worldwide.

Hence, at the same time, the first period of the pandemic provoked extensive development of online businesses and education determining this way development of IT technologies, improve of data shearing quality, spread of Internet coverage, etc. [54, 55]. As well, IT technologies were and are widely implied in management of the pandemic itself [56, etc.].

COVID-19 coronavirus pandemic caused irreversible changes in our behavior and psychology. There is a number of articles, where different aspects of these changes are discussed [see, for instance, 57-60] but, at our opinion, the most important seems the idea that the globalized world will pay much more attention to different aspects of civil security in future.

By 20 April the world rapidly adapted to the pandemic conditions. Launching of fast masks & hygienic tools production and accelerated provision of cities and metapolicies with medicaments and nutrition filled the gap and diminished fair of citizens. Hundreds of millions of SARS-CoV-2 tests produced in dozens of countries became available worldwide. Medical institutions including emergency facilities significantly improved, mortality rate gradually and sustainably started to diminish, curfews were canceled, businesses step-by-step reopened. It is true that in a lot of countries

secondary and even tertiary prohibitions were imposed, however, they were unable to significantly deteriorate the social environment. By autumn it became clear that a number of efficient vaccines were created and in December 2020 vaccination commenced in few countries. Figure 9 displays vaccination results by 20 January 2021 [61].

According to WHO, by the end of 2021 about 70% of the world population will be vaccinated. For doing this, countries shall get equitable access to COVAX vaccines [62] but, at the same time, their readiness for vaccination shall be improved [63]. With this respect, the United Nations High Commissioner on Human Rights called for protection of human rights in global COVId-19 vaccination process, and distributed eight key messages as follows [64]:

1. COVID-19 vaccines should be treated as global public goods
2. The COVID-19 pandemic is a global health emergency which demands a global response
3. Unfair distribution of vaccines across countries, or hoarding of vaccines, disregards international legal norms and undermines the achievement of the Sustainable Development Goals
4. COVID-19 vaccines should be affordable to all and accessible without discrimination
5. Prioritization of vaccine delivery should be done through transparent protocols and procedures that respect human rights
6. Private profit should not be reprioritized over public health
7. Non-discriminatory access to accurate health information is essential, and
8. Pharmaceutical companies, like all companies, have a responsibility to respect human rights.

Thus, according to all existing expectations according to official document by WHO, cited above, by the end of 2021 the COVID-19 coronavirus pandemic shall be over.

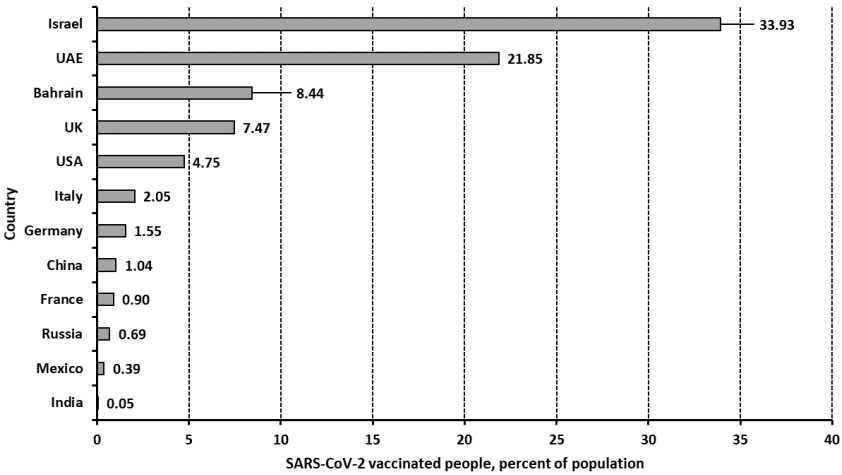

Figure 9. SARS-CoV-2 Vaccination Results Worldwide by 20 January 2021.

It is interesting to note that the great majority of the world pandemics generally extends over 3 years maximum. The Spanish flu, which infected about 500 million people or one third of the world population by that time and has extinguished, according to different assessments, from 17 to 100 million lives, was widespread in 1918-1920 [65]. Of course, immediately parallels between the two pandemics were analyzed [66]. The Great Plague of London raged throughout the city in 1965-1966 whereas the first registered epidemic of plague, according to historical documents, occurred in 1348-1349 [67]. This list may be continued. It is a duty of epidemiologists and historians of medicine to explain these facts; however, for our point of view these precedents confirm expectations that COVID-19 coronavirus pandemic will terminate at the end of 2021.

Now, comparing Figures 5, 6, and 7, some important conclusions as follows may be made:

1. In the predominant majority of COVID-19 disease affected countries, number of the identified infection cases directly depends on quantity of SARS-CoV-2 tests. For instance, in Iran, where only 10.21% of population has been tested, by 31 December 2020 1,225,143 infection cases were identified, hence, already in mid-

July President Rouhani said that about 25 million Iranians may have been infected with coronavirus [68]. According to our appraisal, there are two statistical cutoff hot spots in coronavirus testing: In case if more than 40% of population has been tested, probable number of undiscovered infected people is assessed to be 3-4% of total infection cases. When testing rate is between 40 and 20% of population, the mentioned probability increases to 20%; below this least cutoff spot the probability is ineradicable and may reach even to 200% of the identified infection cases. Now, analyzing Figure 7 one may see that the even correlation between number of infection cases and quantity of SARS-CoV-2 testing is disturbed by economically developed countries in great majority of which relatively low spread of disease at the background of intense testing is determined by efficient management of the pandemic. The sole exception of this rule is the U.S., where President Trump's approach to pandemic management was subject to huge critics [69, 70, etc.]. Figure 10 provides such information in countries where disease management is suggested to be poor.

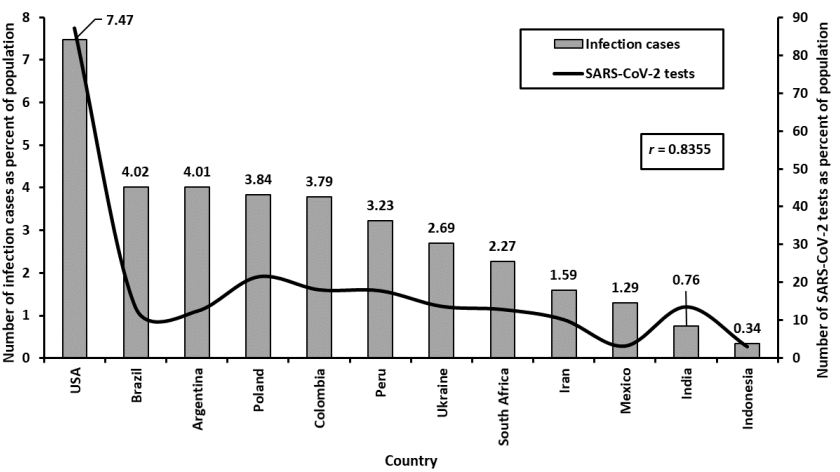

Figure 10. Interdependence between COVID-19 Infection Cases and Number of SARS-CoV-2 Tests in Countries Where Pandemic Management is Assessed to be Poor.

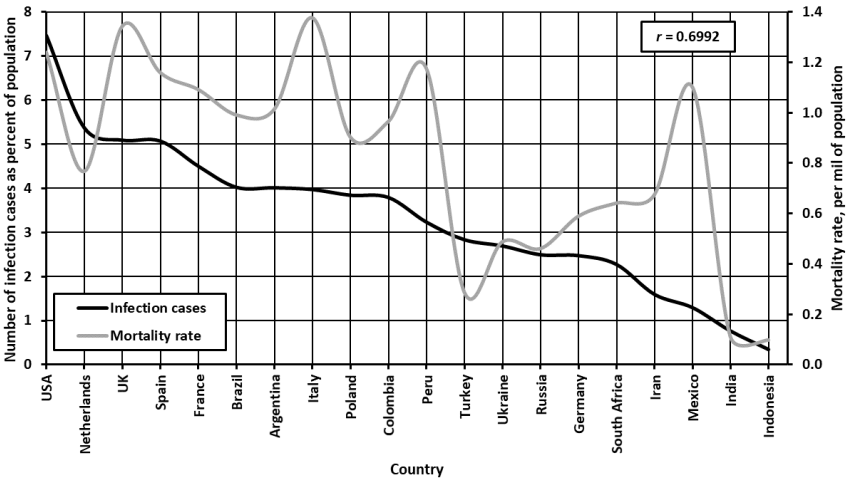

Figure 11. Interrelation between Relative Number of Infection Cases and Relative Mortality Rate in Top 20 COVID-19 Coronavirus Affected Countries.

2. Analysis of the infection cases and the mortality rate in top COVID-19 coronavirus affected countries (compare Figures 6 and 7) shows that in common both infection cases and mortality rate depends on population headcount. Figure 11 explores the interrelation between relative number of infected and the relative mortality rate and discovers a significant correlation between these indices. Undulations on the mortality plot without any doubt is determined by national features of the disease management.
3. The performed statistical analysis clearly shows that in spite of disease mismanagement in diverse countries, which is determining local increase of infected and/or of the mortality rate, the pandemic is characterized by global regularities of coextensive development in time and space. That is why its impact on our civilization has a cumulative character, which has practically the same effect in all countries despite their level of economic development, culture, faith, ethnical identity, geographic framework, climate and other essential features. The COVID-19 coronavirus pandemic has boldly demonstrated that this challenge may be combated only in worldwide scale, when efforts of all countries and international

organizations are synergistically united to achieve the goal of global importance.

4. COVID-19 coronavirus pandemic has irreversibly changed our world. It became clear that global security of population has no alternative. From this point of view, globalization is the sole answer to global challenges.

Results of the analysis performed in this chapter clearly demonstrate that the statistical indices explored above may be used for analysis of the world economy including oil markets.

Chapter 2

OIL PRICE DYNAMICS IN 2020 – STATISTICAL MODELS

2.1. TENDENCIES OF OIL PRICES BEFORE COVID-19 CORONAVIRUS PANDEMIC

The theory of commodity pricing was elaborated in 80ies of the recent century and, strange as it may be sound, represents the less-explored branch of economics. First of all, it should be clearly outlined that the commodity price does not follow the fundamental rule of economics – interrelation between supply and demand, and that price fluctuations are rapidly stabilized [71]. That is why there is no interdependence between price and either commodity strategic reserves (holdings) or volume of their production [72]. Any investigation on such interrelation despite the appropriated mathematical approach brought to a negative result [73-75, etc.].

On the other hand, starting from 1990ies in a number of publications co-variance and co-movement of commodity prices were described [see, for instance, 76, 77]. In 2011 [25] and in 2016 [78] we have supported this theory with correlation analysis.

Thirdly, in the last decade some extremely interesting publications appeared [see, for example, 79], which proved that from the economic point of view commodities are regulated by the same rules as financial instruments

and currencies rather than goods. From this point of view, idea of commodity currencies [80-83, etc.], seems to be quite correct. Indeed, commodities and namely crude oil are traded at commodity exchanges according to standard contracts. According to the U.S. Commodity Futures Trading Commission (CFTC) [84], by 2008 at NYMEX swap and speculator interest has risen to 70%, compared with 37% in 2000. Such speculations lead to significant increase of crude oil prices in summer 2008 [85, etc.]. It was noted [25] that much of the rise was due to the so-called "Enron loophole" by former Texas senator Phil Gramm, who allowed energy futures to avoid CFTC oversight. As a result, on May 29, 2008, CFTC announced "Multiple Energy Market Initiatives" as a tool to expand international surveillance information for crude oil trading [86]. The CFTC announcement stated it has joined with the UK Financial Service Authority and ICE Futures Europe in order to expand surveillance and information sharing of various futures contracts. Rigid supervision, as a result of those initiatives, determined diminishing of speculations to a level, which allows commodity exchanges to sustain liquidity, and maintain reasonable oil prices, which never reached the mid-2008 level.

In a number of publications [see 25, 78] I have proven that because oil prices at practically all top commodity exchanges are quoted in U.S. Dollars, they greatly depend on the US$ exchange rate. Figure 12 explores the interrelation between world crude oil prices and Euro to U.S. Dollar exchange rate. The diagram was drawn for the period before the COVID-19 coronavirus pandemic embraces the globe because, as it will be shown below, pandemic is distinguished by specific oil pricing rules.

Two additional features must be analyzed as well.

First of all, because oil pricing is governed by the same instruments as currencies, world-scale social & economic events have huge impact on it. We have analyzed these tendencies earlier [25], hence, during the last decade new realities of global importance happened. Correspondingly, in spite of the fact that such investigations were performed by a number of researchers [see, for instance, 87], we nonetheless have processed the new statistical material because, at our opinion, influence of some events has not been considered. For doing this, first of all, we have analyzed oil prices in current

and 2020 inflation-adjusted U.S. Dollars. Inflation rate is cited according to InflationData.com materials [88]. However, because the provided by this Website data concern only the U.S. domestic oil prices, world prices, as mentioned above, were analyzed based on information released by IMF [26]. Correspondingly, Figure 13 displays crude oil prices in 1980-2020 expressed in current and 2020 inflation-adjusted U.S. Dollars.

Figure 14 contains information on world oil prices at the background of important geopolitical events.

The Iranian Revolution in late 1978 have had a huge impact on oil prices [89] as far as starting from October 1978, after permanent strikes at oil wells in Iran, the production of about 6 million barrels per day decreased to less than 1 million (the inner needs in oil), and Iran became unable to export 5 million barrels daily. Such a framework created a world oil deficit, which was covered by other OPEC countries in exchange of extra oil prices [90].

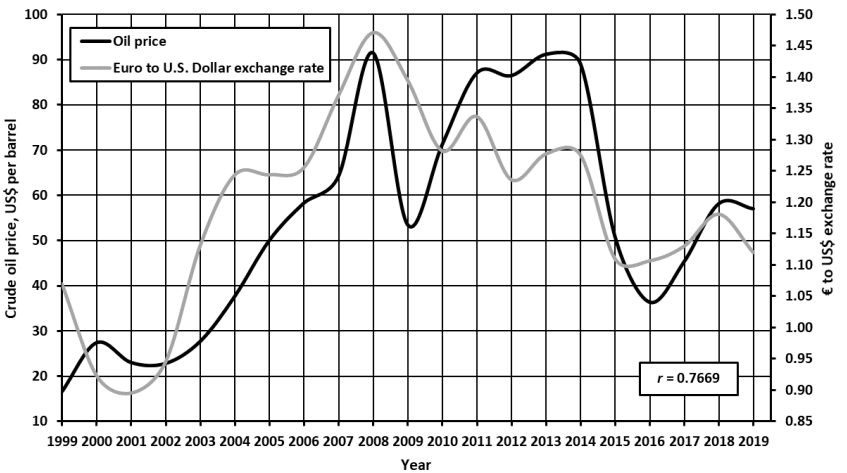

Figure 12. Interdependence between World Oil Prices and Euro to U.S. Dollar Exchange Rate before the COVID-19 Coronavirus Pandemic.

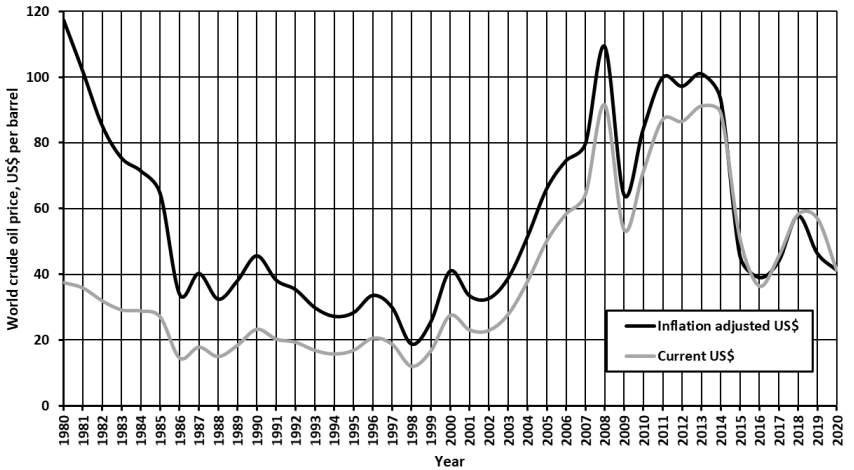

Figure 13. World Crude Oil Prices in 1980-2020.

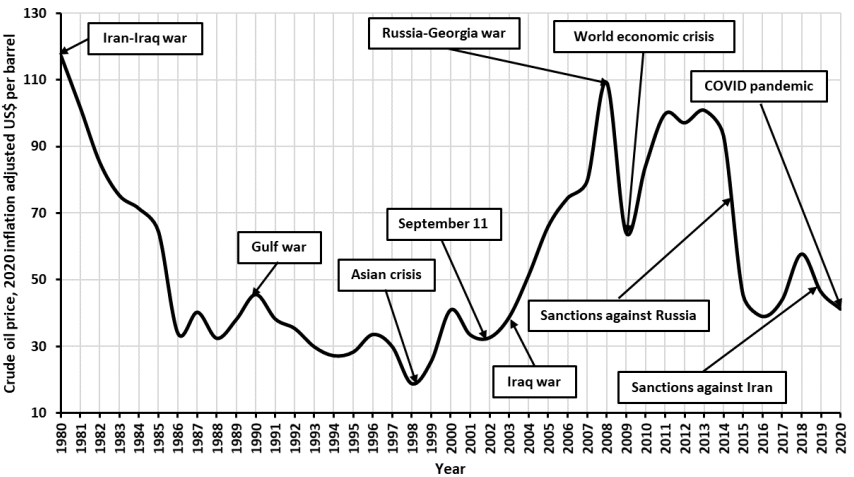

Figure 14. Crude Oil Prices at the Background of Important Geopolitical Events.

However, the hugest impact on oil pricing has had the Iran-Iraq war. Within 1981-1987 both countries extensively attacked oil tankers belonging to each other. In addition, Iran started attack tankers belonging to any country supporting Iraq [91].

The Gulf War also caused increase of oil prices due to cessation of petroleum supply from Iraq but already in January 1991 the Iraq pipeline infrastructure was restored and oil exports renewed [92].

The Asian economic crisis (1997-1999) has caused significant increase of unemployment and bankruptcy of several top banks in South East Asia. Simultaneously, it led to significant decrease in petroleum demand in the entire region and determined 41.79% decrease of world oil prices. Due to the World Bank and IMF efforts, the crisis was combated by the beginning of 1999 [93].

After September 11, 2001 till summer 2008 oil prices sustainably increased and have reached its maximum of US$ 135 per barrel in June. After the second half of September they started to drastically crush down and by 1 January 2009 equaled US$ 32 per barrel. As we have proven earlier [25], the dead line separating two oil pricing policies corresponds to the late August 2008. The about face of the policy of high oil prices was caused by Russia-Georgia war. Detailed analysis of this policy, financial instruments used for decreasing oil prices, and global consequences will be discussed in the next chapter.

In spring 2014, immediately after closing ceremony of the Sochi Winter Olympic Games, Russia annexed Crimea and declared the peninsula the inseparable part of the Federation. President Obama's attempts of civilized relations with Russia failed. The USA Canada, Japan, and the European Union imposed sanctions against Russia [94]. Sanctions were divided into three stages and gradually became more and more rigid. They had both political and economic components [95].

Simultaneously, special financial instruments, described in the next chapter, were used to cut down oil prices during the second half of 2014 and the whole 2015 year. Consequences of this oil pricing policy for the Russia's economy are described in Chapter 4. However, after inauguration President Trump abandoned policy of cheap oil prices till the autumn 2018, when he decided to impose new sanctions on Iran.

It should be noted that from the very beginning, after Iran hostage crisis [96], sanctions against Iran referred to an embargo on dealings with Iran by the United States, and a ban on selling aircraft and repair parts to Iranian

aviation companies [97]. However, after signing on 14 July 2015 the Iran Nuclear Deal or the Joint Comprehensive Plan of Action (JCPOA), these sanctions were cancelled [98]. In August 2018 unexpectedly, President Trump restored these sanctions and imposed penalties on companies, which tried to avoid them [99]. Moreover, U.S. administration aimed to reduce Iranian oil exports to zero [100]. In response, the United Nations International Court of Justice ordered the United States to stop the sanctions, based on the 1955 U.S.-Iran Friendship Treaty that was signed with the government overthrown by the 1979 Islamic Revolution [101]. Hence, United States withdrew from both international agreements [102]. Huge consequences of this politics for both Iran and the civilized world are described in Chapter 5.

The second feature to be described is influence of oil prices on world oil consumption.

It is quite clear that consumption value of any commodity depends on two indices: consumption volume and commodity price. According to the methodology elaborated earlier [25], we are using average annual world oil prices calculated as described in Introduction. Similarly, as mentioned, consumption value equals consumption volume multiplied on these prices.

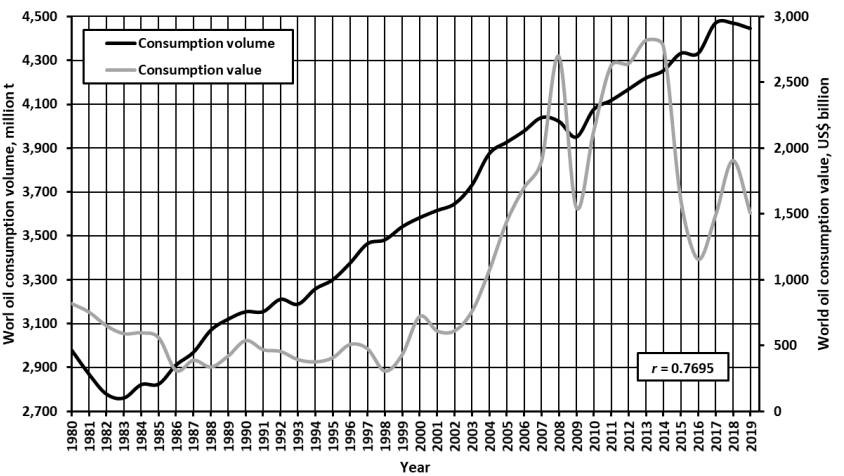

Figure 15. World Oil Consumption Volume and Value in 1980-2019.

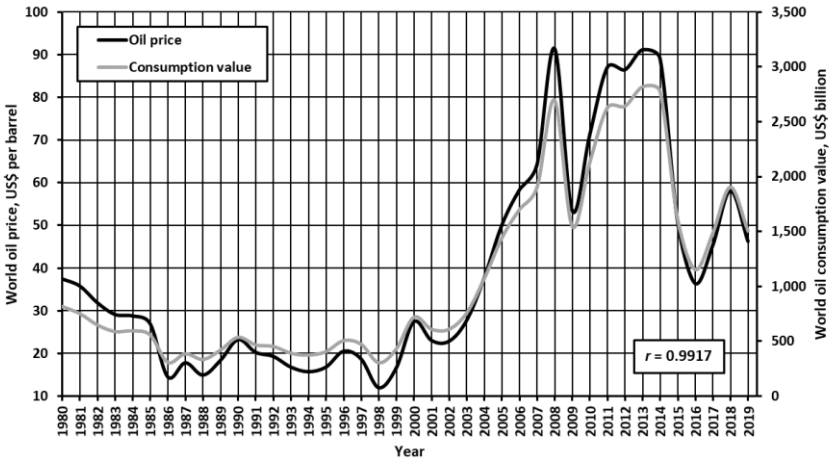

Figure 16. Interdependence between Oil Prices and World Oil Consumption Value.

Figure 15 displays world oil consumption volume and value in 1980-2019.

It may be seen that though the correlation coefficient is significant but not extremely strong, consumption value is characterized by significant undulations at the background of relatively even increase of consumption volume. Without any doubt, this phenomenon must be explained by peculiarities of world oil pricing as it is proven on Figure 16.

Just this particularity of oil pricing makes it an extremely powerful tool for political pressure and represents an "oil weapon", according to wordings of President Reagan [30]. In the next chapter we will see how this "weapon" was used in our century.

Now, we have proven earlier [25, 78] that the world GDP is determined by commodity consumption. The reason for such a feature is as follows.

Gross domestic product may be described in terms of commodities [25], according to equation (5):

$$GDP = \sum_i \left(P_i S_i\right) + \sum_i \left(P_i^n F_n\right) + A_s \,, \tag{5}$$

where GDP = gross domestic product, P_i = average weighted annual market price of the i^{th} commodity, S_i = annual volume of exported commodity, P_i^n

= price of the i^{th} commodity processed up to the finished product n, F_n = volume of sold n^{th} product, A_s = added value of all services (governmental, insurance, bank, education, etc.). It may be seen that foreign trade balance indirectly participates in the equation.

Because oil is the most consumable commodity in the world, as it was mentioned in Introduction, its impact on GDP prevails shares of other commodities, and this reality allowed me to perform modelling of the interdependence between the world GDP and oil consumption value, as it is shown on Figure 17.

Tables 2 and 3 characterize parameters and coefficients of the quadratic regression equation. Parameters and coefficients correspond to those in equations (2) – (4).

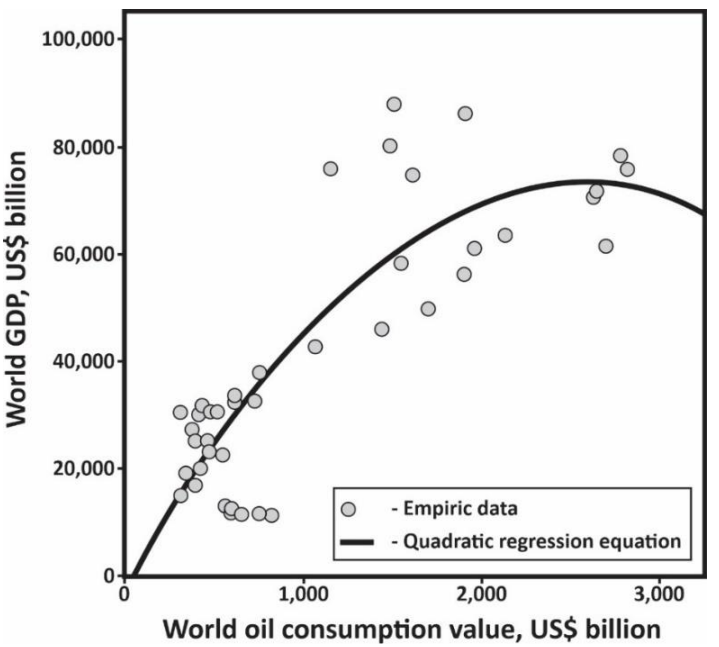

Figure 17. World GDP Model Based on Oil Consumption.

Table 2. ANOVA Parameters of the Quadratic Regression Equation on Figure 17

Parameter	Sum of Squares	*dF*	Mean Square	*F*	*ε*
Regression	17,270,198,669.7	2	8,635,099,334.9	50.787	0
Residual	6,290,895,849.6	37	170,024,212.2		
Total	23,561,094,519.3	39			

Variable x_i is world oil consumption, US$ billion; y_i is world GDP, US$ billion

Table 3. Coefficients of the Quadratic Regression Equation on Figure 17

Coefficients	*B*	*S*	*β*	*t*	*ε*
x_i	58.14	12.057	1.903	4.822	0
x_i^2	-0.011	0.004	-1.107	-2.804	0.008
β_0	-2182.999	6539.601		-0.334	0.74

S is standard error, *t* is Student's coefficient.

Figure 18 demonstrates comparison of the real and model GDP graphs, the latter being calculated from world oil consumption, according to the equation described on Figure 17 and in Tables 2 and 3.

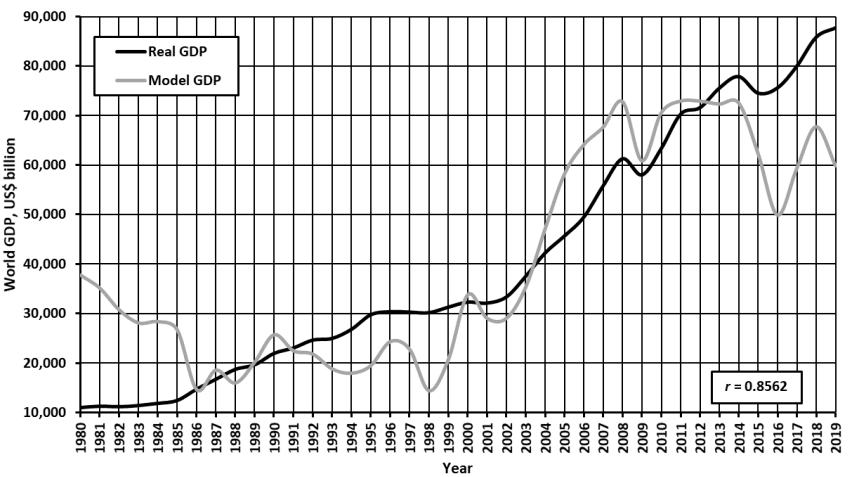

Figure 18. Comparison of Real and Model World GDP.

Two features of the model hereto shall be outlined. Firstly, Figure 18 demonstrates that the correlation coefficient between the real and the model world GDP is significant and strong. So, the world GDP may be described and forecasted with the ± 15% accuracy based on oil consumption value. Secondly, the equation graph has a semi-parabolic character (see Figure 17), and this, in my opinion, means three things: (i) world has almost achieved its oil consumption maximum, and further sharp increase in oil demand will happen only if irreversible and unpredictable economic paroxysms embrace the globe; (ii) increase of oil consumption value will not significantly augment the world GDP; (iii) within the framework of global economic equilibrium, in coming years world crude oil consumption volume will have an undulating character (see data for years 2017-2019 on Figure 15), and possible increase of world oil usage will be latent.

Let see now how the COVID-19 coronavirus pandemic has changed the discussed regularities.

2.2. Dynamics of Weekly Oil Prices of Basic Oil Blends in 2020 and Their Statistical Analysis

Table 4 and Figure 20 introduces OPEC Basket, WTI and Brent blend prices during the COVID-19 coronavirus pandemic in 2020, as released by Statista [49]. The most enigmatic feature displayed by the table and the figure is a negative price of the West Texas Intermediate blend on April 20. And this means that WTI suppliers paid money to consumers to get rid from crude oil stocks.

Of course, this one-day outlier price shall be mitigated aiming obtaining correct statistical array and because probability of such pricing repetition is extremely low and practically negligible. For such statistical cutoff we have processed daily WTI prices in April 2020 as released by the Federal Reserve Bank of St. Louis [103]. These data are shown in Table 5. It may be seen that negative West Texas Intermediate price was fixed only one day, on 20 April. For cutting off this price, a corresponding histogram was drawn and

processed as expressed on Figure 20. The histogram clearly demonstrates that the outlier negative price is atypical and random and shall be corrected. Based on the histogram, I have assigned to it value of zero.

Table 4. OPEC Basket, WTI, and Brent Blends Prices in 2020, US$ per Barrel

Date	OPEC basket	Brent	WTI	Date	OPEC basket	Brent	WTI
21 Jan	65.26	64.59	58.34	13 Jul	43.38	42.72	40.10
27 Jan	61.98	59.32	51.14	20 Jul	43.03	43.28	40.81
03 Feb	55.49	54.45	50.11	27 Jul	43.14	43.41	41.60
10 Feb	54.17	53.27	49.57	03 Aug	44.02	44.15	41.01
18 Feb	56.68	57.75	52.02	10 Aug	45.01	44.99	41.94
24 Feb	56.11	56.30	51.43	17 Aug	44.94	45.37	42.89
02 Mar	51.65	51.90	46.75	24 Aug	45.19	45.13	42.62
06 Mar	48.33	45.27	41.28	31 Aug	46.27	42.61	45.28
10 Mar	35.73	37.22	34.36	08 Sep	40.29	39.78	36.76
16 Mar	30.63	30.05	28.70	14 Sep	38.96	39.61	37.26
24 Mar	26.53	27.15	24.01	21 Sep	41.49	41.44	39.31
30 Mar	21.66	22.76	20.09	28 Sep	41.61	42.43	40.57
07 Apr	22.67	31.87	23.63	05 Oct	39.08	41.29	39.22
14 Apr	19.70	29.60	20.13	12 Oct	40.57	41.72	39.43
20 Apr	14.19	25.57	-37.63	19 Oct	41.38	42.62	40.83
28 Apr	12.41	20.46	14.22	26 Oct	39.22	40.46	38.56
04 May	18.36	27.20	20.39	02 Nov	35.89	38.97	36.81
11 May	22.71	29.63	24.14	09 Nov	39.97	42.40	40.29
18 May	28.21	34.81	31.82	16 Nov	42.93	43.62	41.34
26 May	29.75	35.53	34.35	23 Nov	44.75	46.06	43.06
01 Jun	33.68	38.32	35.44	30 Nov	46.43	47.59	45.34
08 Jun	38.89	40.80	38.19	07 Dec	47.77	48.79	45.76
15 Jun	35.09	39.72	37.12	14 Dec	49.65	50.29	46.99
22 Jun	38.96	43.08	40.46	21 Dec	49.57	50.91	47.74
29 Jun	37.34	41.71	39.70	28 Dec	50.10	50.86	47.62
06 Jul	43.57	43.10	40.63	31 Dec	50.73	50.98	47.62

Table 5. WTI Prices in April 2020 at Cashing, Oklahoma

Price fixing day	Price, US$ per barrel	Price fixing day	Price, US$ per barrel
02 Apr	25.18	17 Apr	18.31
03 Apr	28.36	20 Apr	-36.98
06 Apr	26.21	21 Apr	8.91
07 Apr	23.54	22 Apr	13.64
08 Apr	24.97	23 Apr	15.06
09 Apr	22.90	24 Apr	15.99
13 Apr	22.36	27 Apr	12.17
14 Apr	20.15	28 Apr	12.40
15 Apr	19.96	29 Apr	15.04
16 Apr	19.82	30 Apr	19.23

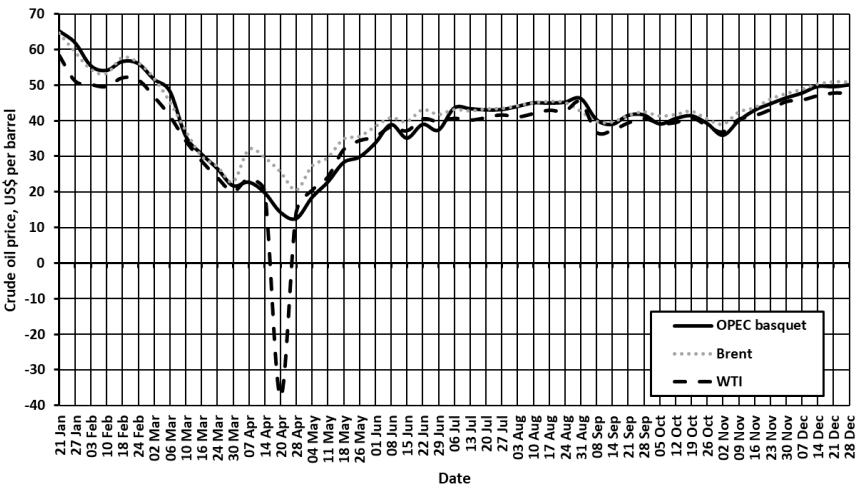

Figure 19. Crude Oil Prices within the Framework of COVID-19 Coronavirus Pandemic in 2020.

Table 6 contains statistical analysis of OPEC Basket, Brent, WTI, and average weighted world crude oil prices during the coronavirus pandemic in 2020. Low values of skewness and kurtosis indicate that all the four arrays display normal distribution, and therefore values of average weighted prices are quite applicable.

Table 6. Statistical Analysis of Oil Prices within the Framework of COVID-19 Coronavirus Pandemic in 2020

OPEC	OPEC Basket	Brent	WTI	Average weighted
N valid	52			
N missing	0			
Mean, US$ per barrel	40.29	42.17	42.17	40.30
Median, US$ per barrel	41.55	42.62	42.62	41.58
Mode, US$ per barrel	38.96	20.46	20.46	13.25
Std. Deviation	11.62	9.24	9.24	10.35
Variance	135.00	85.37	85.37	107.07
Skewness	-0.46	-0.17	-0.17	-0.59
Std. Error of Skewness	0.33	0.33	0.33	0.33
Kurtosis	0.17	0.27	0.27	0.49
Std. Error of Kurtosis	0.65	0.65	0.65	0.65
Minimum, US$ per barrel	12.41	20.46	20.46	13.25
Maximum, US$ per barrel	65.26	64.59	64.59	62.73
Percentile 25, US$ per barrel	35.25	38.48	38.48	36.16
Percentile 50, US$ per barrel	41.55	42.62	42.62	41.58
Percentile 75, US$ per barrel	47.44	47.21	47.21	46.08

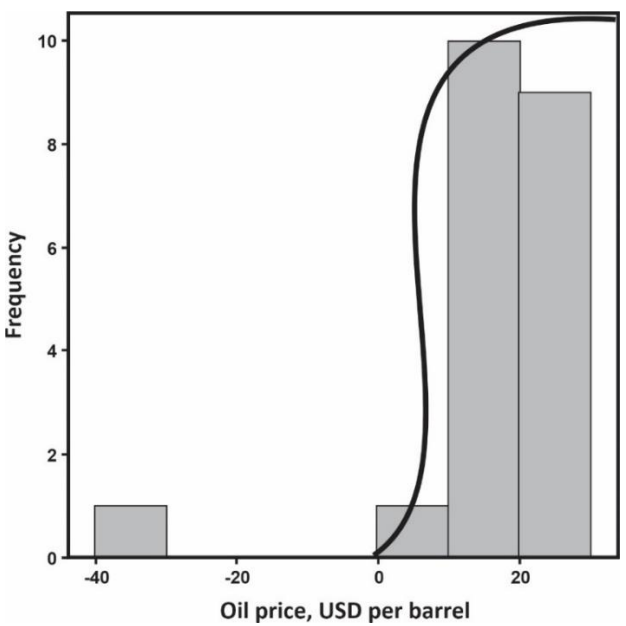

Figure 20. Histogram of WTI Prices at Cashing, Oklahoma, in April 2020.

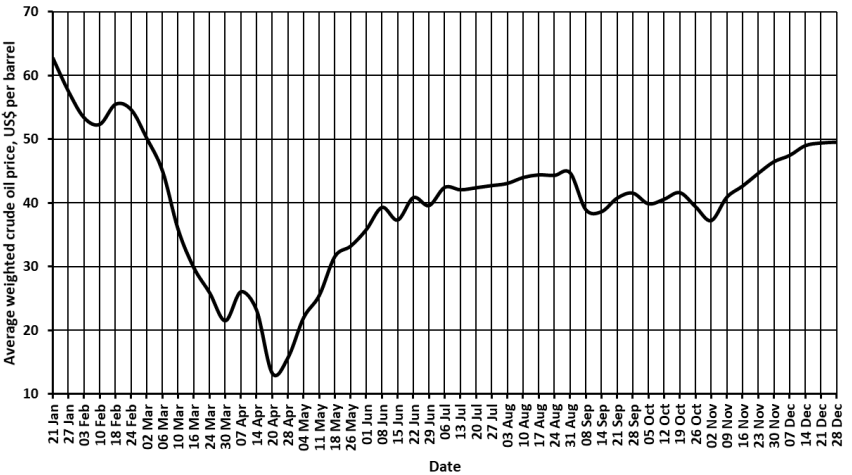

Figure 21. Average Weighted Crude Oil Prices within the Framework of COVID-19 Coronavirus Pandemic in 2020.

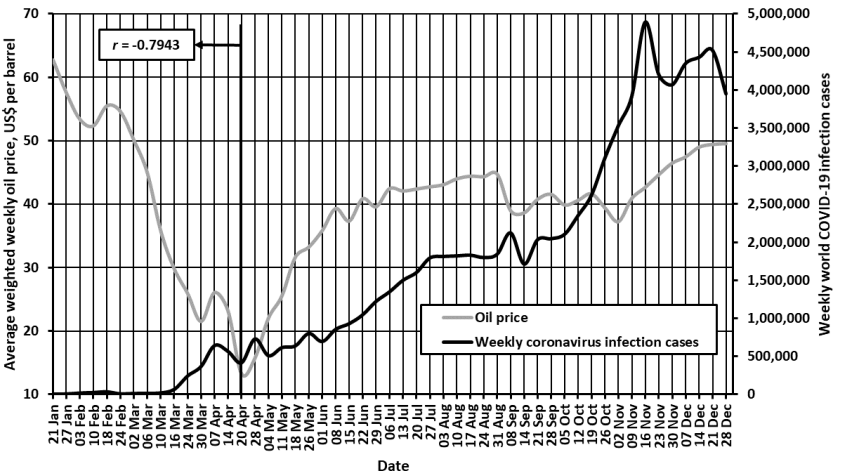

Figure 22. Interrelation Between Average Weighted Weekly Crude Oil Price and Weekly World COVID-19 Coronavirus Infection Cases.

Figure 21 displays dynamics of average weighted crude oil prices, and just these data were used in further analysis.

Figure 22 contains information on interdependence between average weighted weekly world oil prices and weekly world COVID-19 coronavirus

infection cases. It is clearly visible that two different stages of the pandemic identified by us and described in the previous chapter, have an important economic sense. In 21 January – 20 April worldwide increase of weekly infection cases was followed by sharp decline of crude oil prices, and the correlation between these independent and, at the first glance, unbound indices was negative and significant. After 20 April this correlation bitterly disappeared, and both weekly oil prices and infection cases followed their own trends.

This regularity becomes clearer if weekly average weighted oil prices are compared to the worldwide COVID-19 coronavirus weekly mortality rate, calculated as it was described in the previous chapter (Figure 23).

In this case, the interdependence is just vice versa: Within the period from 21 January to 20 April correlation, though negative, is insignificant. After 20 April correlation becomes so strong that allows modelling of this interrelation according to the methodology described above. Figure 24 displays the quadratic regression equation graph whereas Tables 7 and 8 characterize its parameters and coefficients.

Figure 25, which compares real and model weekly crude oil prices, proves that the accuracy of the model is ± 5%.

Another tangible indicator of the crude oil markets' behavior is interrelation between oil prices and Euro to the U.S. Dollar exchange rate. As it was shown on Figure 12, within the stable economic framework there is a significant and strong positive correlation between these two independent economic indices. Hence, as Figure 26 proves, immediately after the SARS-CoV-2 disease started to spread worldwide, the correlation was rudely disturbed.

Within the first period of pandemic, till 20 April, as it was shown above, oil prices started to dramatically fall down whereas Euro to U.S. Dollar exchange rate was subject to sharp undulations. Immediately after 20 April the situation drastically altered. Both oil prices and Euro to U.S. Dollar exchange rate started to gradually grow. The significant, strong and positive correlation restored.

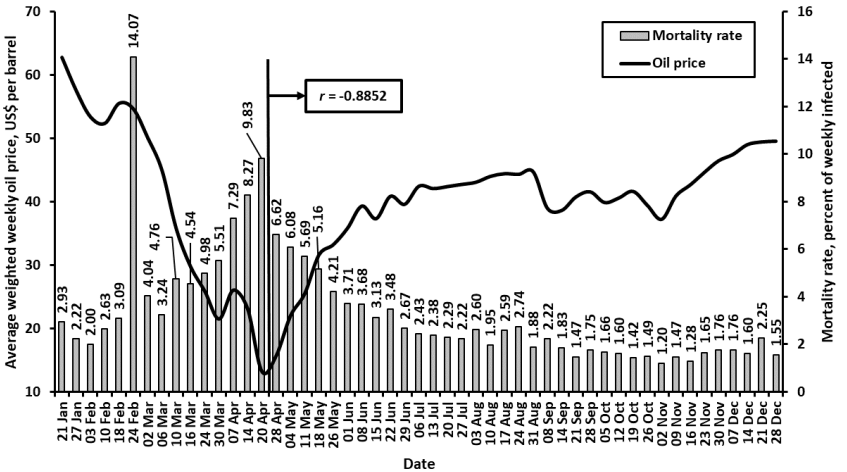

Figure 23. Interrelation between Average Weighted Weekly Crude Oil Price and Weekly World COVID-19 Coronavirus Mortality Rate.

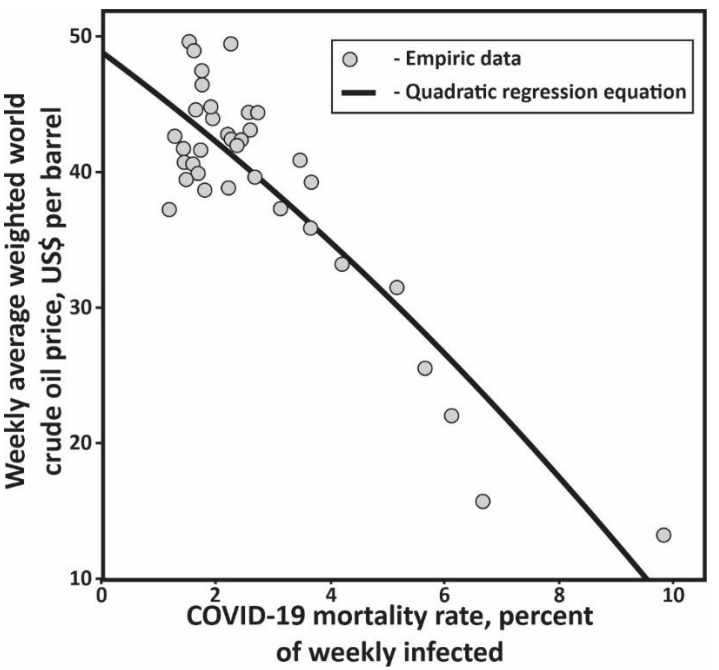

Figure 24. Average Weighted Weekly World Crude Oil Price Model Based on the Weekly World COVID-19 Coronavirus Mortality Rate.

Table 7. ANOVA Parameters of the Quadratic Regression Equation on Figure 24

Parameter	Sum of Squares	*dF*	Mean Square	*F*	ε
Regression	1,950.094	2	975.047	63.122	0
Residual	525.202	34	15.447		
Total	48.888	36			

x_i is world COVID mortality rate, % of weekly infected; y_i is weekly world oil price, US$ per barrel.

Table 8. Coefficients of the Quadratic Regression Equation on Figure 24

Coefficients	*B*	*S*	β	*t*	ε
x_i	-3.024	1.317	-0.664	-2.296	0.028
x_i^2	-0.108	0.135	-0.23	-0.795	0.432
β_0	48.888	2.369		20.634	0

S is standard error, *t* is Student's coefficient.

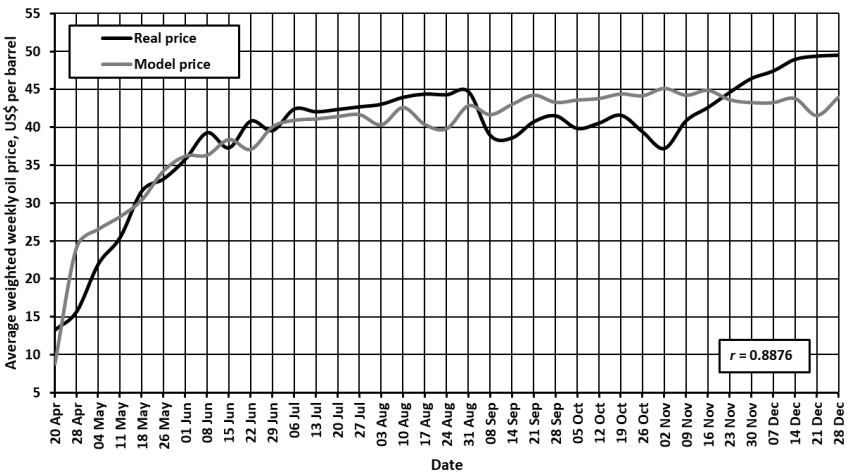

Figure 25. Comparison of Real and Model Weekly Average Weighted Crude Oil Prices.

The novel findings concerning dependence of international oil markets on world COVID-19 coronavirus pandemic very brightly spotlighted a number of extremely important regularities discussed below.

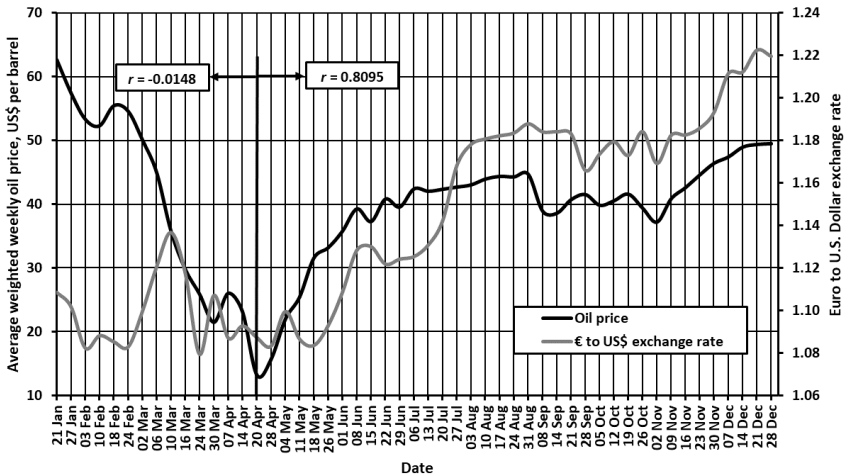

Figure 26. Interdependence Between Weekly Average Weighted Crude Oil Price and Weekly Average Euro to U.S. Dollar Exchange Rate.

2.3. BASIC FEATURES OF OIL PRICING IN 2020

In hundreds, if not thousands of analytical investigations, including those by the World Bank [104], commodity markets, in general, and oil markets, in particular, are analyzed in terms of production, consumption and prices. However, as we have discussed earlier [25], commodity price depends on the length of intermediate futures contracts chain between the first contract by producer and the least contract by ultimate consumer. Each contract of speculators, if successful, creates an added value, and therefore, if the commodity market is stable, longer intermediate contracts chain is, higher commodity price is fixed.

This simple reality, in spite of sharp equilibrium disturbance at international oil markets, is absolutely valid for the year 2020. Indeed, Figure 27 demonstrates monthly number of futures contracts for West Texas Intermediate at the New York Mercantile Exchange (NYMEX) and Brent at the Intercontinental Exchange (ICE), as published by OPEC [105]. The total number of contracts represents a simple sum of those signed at both commodity exchanges. It may be seen that number of contracts diminished

by 402.48% from January to April 2020. Of course, contracts' aggregated value also has dropped down. For instance, according to GlobalData [106], oil and gas contracts value in the first quarter of 2020 equaled US$ 13.5 billion compared with US$ 48.9 billion in the fourth quarter of 2019.

For providing insight into described features of the 2020 oil futures markets, I have tried to analyze influence of futures contracts on world oil prices. Results of this analysis is presented on Figure 28.

Significant and strong positive correlation is fixed. Decrease of both futures contracts' number and oil price is observed in January – April. But then, the indices started to improve, and, as analysis of graphs proves, by July oil markets gained an equilibrium, of course, at the background of monthly undulations, typical of oil markets, in general.

Thus, considering the described regularities, it may be concluded that influence of world COVID-19 coronavirus pandemic on oil prices is indirect and the impact comes to life via futures market. If so, all the explored regularities may be explained with perfect clarity.

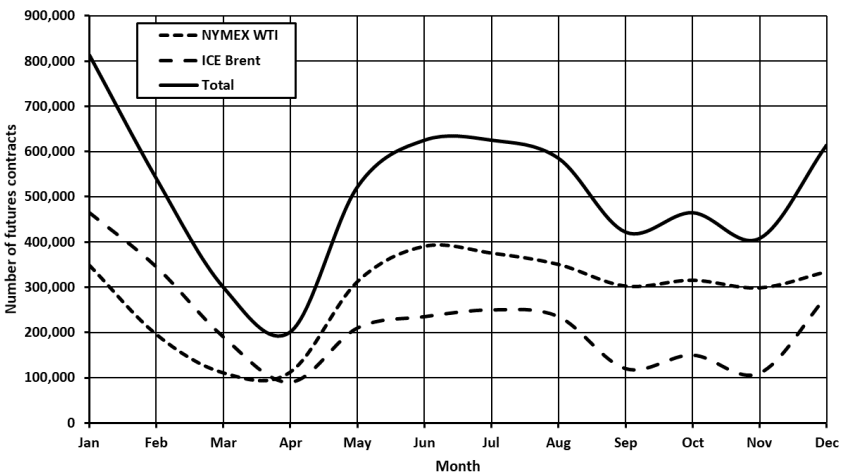

Figure 27. Monthly Number of Futures Oil Contracts at NYMEX and ICE in 2020.

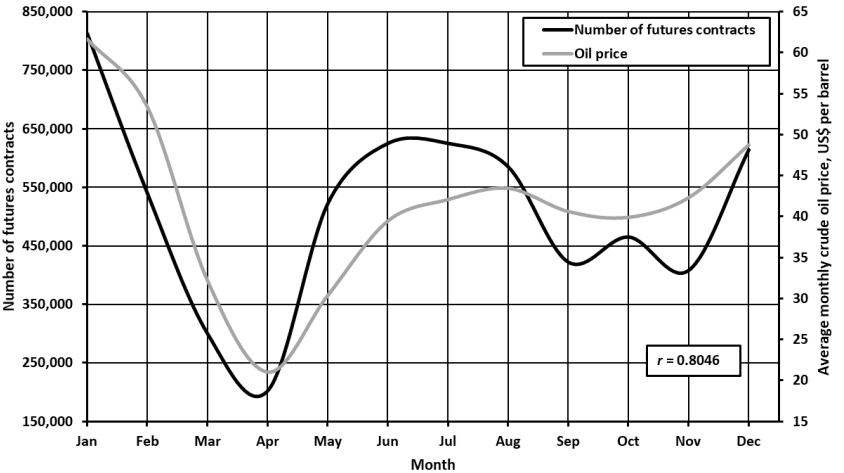

Figure 28. Interrelation between Monthly Number of Oil Futures Contracts and Oil Prices in 2020.

Within the first period of pandemic, from 21 January to 20 April 2020, dramatic decrease of oil prices was determined by a negative investors' forecast of the oil markets' perspectives rather than by diminished demand on petroleum. Let remind once more that within this period uncertainty penetrated in our souls. COVID-19 was a new coronavirus, which extremely rapidly was spreading in practically all regions of our globe. Lack of experience of disease treatment, deficit of SARS-CoV-2 tests, high mortality rate and other circumstances described in the first chapter, obliged a great majority of governments to ban international flights to their countries, to stop businesses and even to impose curfews. This statement may by proven by a number of facts:

1. In late April – May the demand on oil had not increased because coronavirus sanctions were not lifted, but prices began to grow anyway
2. From January to April, as mentioned above, number of futures contracts diminished by more than 400 percent
3. More COVID-19 coronavirus infection cases were registered worldwide, less futures contracts were signed and, therefore, less oil

prices were fixed. Thus, the negative correlation between weekly world coronavirus infection cases and oil prices is significant and strong.

Crash of the oil market determined disarrangement of the correlation between oil price and Euro to U.S. Dollar exchange rate, which is always strong either in economic equilibrium environment or, as we will see in the next chapter, when oil prices are used as a political weapon. In early spring economic prospects for the end-of-year and for 2021 were sad, negative, and poor.

Oil prices reached extreme minimum on 20 April when negative price of West Texas Intermediate was fixed. On 21 April situation started to improve fast, and all statistical regularities of the first period were immediately canceled.

Within the second period of pandemic, e.g., from 20 April 2020 till today, oil prices are driven by the coronavirus mortality rate rather than by the absolute number of infections. As it may be seen on Figure 23, the correlation coefficient between the weekly mortality rate and average weighted crude oil prices is negative and strong. In other words, the decisive factor for oil prices in the medium-term were pandemic development *tendencies* instead of the actual epidemiological situation. This statement is proven by the statistical regression model of the interdependence between oil prices and the COVID-19 coronavirus world mortality rate. At the same time, number of oil futures contracts started to increase.

Different factors determined the increase of both crude oil prices and the number of oil futures contracts after April 20.

Firstly, the coronavirus mortality rate analysis provides investors with tangible guidelines to assess the sustainability of futures markets in the medium-term and, therefore, to elaborate investment strategies. The improvement of oil futures market started in the end of April – beginning of May 2020 at the background of gradually diminishing COVID-19 mortality rate. As Figure 27 proves, in May 2020 258.42% more futures contracts were signed at New York Mercantile and Intercontinental exchanges than in April.

Secondly, a gradual stable decrease of the world coronavirus mortality rate created an environment for the liberalization of the pandemic sanctions and gradual renewal of the world economy. Without any doubts, relative recovery of oil futures markets was related with optimistic expectations of investors. It is true that in a number of countries the second and even the third waves of lockdowns were imposed but nevertheless, they were unable to change investors' expectations due to several reasons but particularly because SARS-CoV-2 vaccines were announced to be available in autumn. Indeed, already in January 2020 COVID-19 vaccines development has been expedited via close collaboration between international pharmaceutical industry and governments of practically all economically developed countries [107]. On 24 June 2020, China approved the CanSino vaccine [108]. On 11 August, Russia announced the approval of its Sputnik V vaccine [109]. The Pfizer-BioNTech vaccine with the efficiency of 90% [110] was approved by 9 November, and so on. Today, 9 COVID vaccines are authorized and approved including Pfizer-BioNTech, Moderna, Oxford-AstraZeneca, Gam-COVID-Vac (Sputnik V), BBIBP-CorV Sinopharm, CoronaVac CanSino Biologics, EpiVacCorona Vector, and BBV152, and there are also 26 vaccine candidates [111].

Thirdly, after 20 April the correlation between oil prices and Euro to U.S. Dollar exchange rate was restored.

The analysis hereto clearly demonstrates that by mid-July oil markets gained equilibrium. Hence, in December 2020 24.47% less futures contracts were signed than in January, and average oil price was 33.05% less.

2.4. MAIN FINDINGS

The provided statistical material and its analysis brought us to some novel and important findings as follows:

1. Statistically, the COVID-19 coronavirus pandemic may be divided into two periods: (i) 21 January to 20 April 2020, and (ii) after 20 April till today.

2. The dramatic failure of crude oil prices from January 21 – April 20, 2020 was not determined by the diminished world demand for crude oil. The data from late April – May show that the demand had not increased yet because coronavirus restrictions were still in place; nevertheless, prices began to increase due to the diminishing mortality rate and the announcement of the gradual lifting of restrictions. As well, optimistic forecast on COVID-19 vaccines was released.
3. Within this period a significative and strong negative correlation existed between weekly world COVID-19 coronavirus infection cases and average weighted crude oil price.
4. Such a framework was determined by negative expectations of investors and speculators at the commodity markets. Just due this fact, from January to April 2020 the number of futures contracts at New York Mercantile and Intercontinental exchanges diminished by more than by 400 percent.
5. Simultaneously, correlation between the world oil price and Euro to U.S. Dollar exchange rate disappeared demonstrating drastic equilibrium breakage at international oil markets.
6. After 20 April 2020 situation radically changed. At the background of exponential spread of SARS-CoV-2 disease, oil prices were led by the COVID-19 mortality rate, which started to diminish gradually followed by step-by-step increase of oil prices. Negative correlation between these two indices is so strong that allowed us to draw a statistical model of such an interdependence expressed by a quadratic regression equation.
7. Therefore, analysis of COVID-19 coronavirus comparative mortality rate provided investors with a tangible tool to assess oil markets in a medium-term run and, consequently, to return to commodity exchanges.
8. Starting from late April – early May 2020 oil markets began to recover, and this is proven by the restored correlation between oil prices and Euro to U.S. Dollar exchange rate.

9. At our opinion, oil markets gained stability already in mid-July 2020, however, even in December 24.47% less futures contracts were signed than in January, and average oil price was 33.05% less.
10. Thus, at least 2 years will be needed to recover the 2019 level of oil markets.
11. Impact of COVID-19 coronavirus pandemic on international oil markets is indirect. As it has been shown above, pandemic parameters directly predetermine number of futures contracts signed at basic commodity exchanges and the latter, in turn, exerts influence on oil prices worldwide.

Chapter 3

WORLD OIL MARKETS IN XXI CENTURY: BEFORE AND DURING THE COVID-19 CORONAVIRUS PANDEMIC

3.1. GENERAL REGULARITIES

There is an enormous number of publications on world oil markets in the new Millennium, and of course, we were unable to analyze all of them. That is why I will pay attention only to those materials, which from my point of view are the most interesting and important.

It should be boldly noted from the very beginning that there is a deep contrast between the Anglo-Saxon and the Russian approaches. In a number of articles, the U.S. analysts [see, for example, 112] expressed alarm that increased Russian, Kazakhstani, and Azerbaijani oil supply to international markets may challenge the OPEC's role after 2020. On the contrary, after 2015 Russian researchers faired that discovery of shale oil in the USA will greatly diminish influence of Russian companies on the international oil markets [113]. According to the in-depth analysis, proven reserves and potential resources of this oil are so huge that will be able to cut the USA crude oil imports to minimum [114]. Such circumstances have even been named *the new oil reality* [115]. Indeed, Gazprom in the recent publication [116] mentioned that the last years oil production in the USA increased by

one third, and we will see below how this statement matches with available statistical data.

Hence, in the same brochure a very interesting idea was proposed: According to Gazprom, there is a distinct difference between the olden and the today approaches to oil markets. By the end of the recent century and the first years of the new Millennium pessimistic forecasts were published where quick depletion of world oil was predicted [117-120, etc.]. On the contrary, today, as we will see below, the world is provided with oil reserves for, at least, 40 years. According to Mr. Zhukov [121], such a framework is determined by dramatic advance of exploration and drilling technologies, even on nanotechnological level, which significantly improved efficiency of exploration and drilling and this way allowed to oil companies to considerably increase the ready-to-use oil reserves worldwide. According to his opinion, this fact represents the first, and perhaps the most important, drivers of modern oil markets. Simultaneously, such markets are also driven by two additional circumstances: firstly, climate change concerns obliged governments of developed countries to maintain energy efficient policies and to lobby green energy; secondly, he, like other Russian energy economists, considers American shale oil as a new reality of modern oil markets.

As far as oil has extreme importance for the world economy [122], the main game on oil markets, according to Mommer [123], is launched between "landlord states", e.g., oil-exporting countries and states, which are obliged to import petroleum. That is why in a large number of publications [124-129, etc.] bid is put on oil pricing, which is interpreted as representing a result of supply versus demand or production versus consumption ratio. From this point of view, forecasts for 2040 and 2050 [130, 131] showed that share of oil in world energy consumption will not change but if OPEC member countries production will remain approximately the same, non-OPEC states will increase crude oil pumping by 45%.

In an extremely interesting publication B. Fattouh [132] explored oil pricing systems and outlined three important facts: (i) The adoption of the market-related pricing system in late eighties of the recent century opened a new chapter in the history of oil; (ii) Such "financialization" determined

acquiring by crude oil the characteristics of financial assets such as stocks or bonds; (iii) In turn, if before "financialization" spot prices determined prices of derivatives, today the situation is just vice versa: futures prices are main drivers of oil markets. In few other issues [133, 134, etc.] importance of futures contracts in world oil pricing is also outlined.

After this brief introduction to this chapter, let consider now existing statistical materials on world oil and discuss outcomes of the economic environment created by COVID-19 coronavirus pandemic.

Table 9. Country Ranking by Oil Reserves

Country	Reserves, billion t	Percent of world reserves
Venezuela	48.03	19.64
Saudi Arabia	40.88	16.71
Canada	27.29	11.16
Iran	21.37	8.74
Iraq	19.57	8.00
Russia	14.69	6.00
Kuwait	13.98	5.72
UAE	12.98	5.31
USA	8.20	3.35
Libya	6.30	2.57
Nigeria	4.99	2.04
Kazakhstan	3.93	1.61
China	3.57	1.46
Qatar	2.65	1.08
Brazil	1.85	0.76
Algeria	1.54	0.63
Angola	1.10	0.45
Norway	1.08	0.44
Azerbaijan	0.96	0.39
Mexico	0.80	0.33
Subtotal	235.76	96.39
World total	244.58	100.00

By 1 January 2020 world oil reserves equaled 244.58 billion tons. They were distributed in onshore and offshore zones of more than 54 countries. However, top twenty of them hosts 96.39% of world reserves (Table 9), as published by BP [23]. Let see now for how many years these reserves will

be enough. For performing this computing, first of all, dynamics of world oil production and consumption shall be analyzed.

Figure 29 analyzes world crude oil production and consumption in the 21st century. It may be seen that both curves practically align each other, and therefore in no case oil prices are determined by interrelation between physical supply and demand.

Now, it can be seen that average weighted annual crude oil production growth is 1.23%. Assuming, firstly, that such tendency will remain in coming decades, and, secondly, that oil exploration drilling campaigns are stopped entirely worldwide and no additional reserves are and will be added to the existing reserve base, it is easy to calculate the period of ensured oil production.

As it is displayed on Figure 30, oil reserves are suggested to be enough till 2060. In reality, however, gradually sophisticating exploration campaigns will determine increase of available reserves. Thus, all forecasts on accelerated oil depletion [see 117-120] have no real ground.

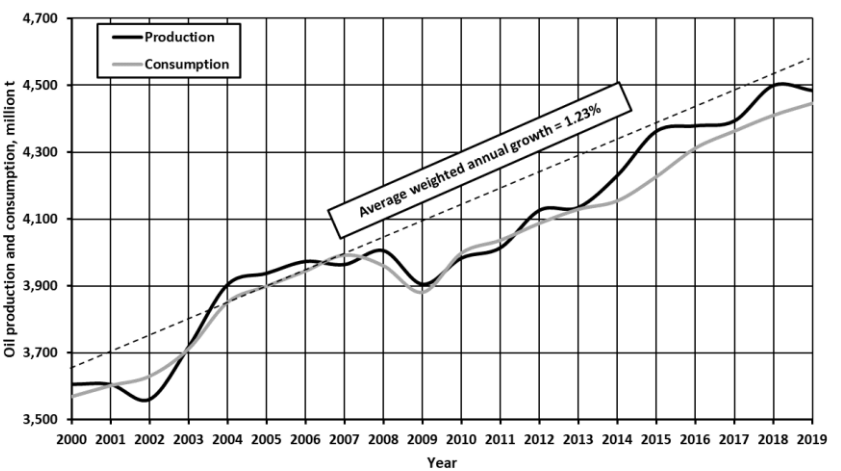

Figure 29. Dynamics of World Crude Oil Production and Consumption in the New Millennium.

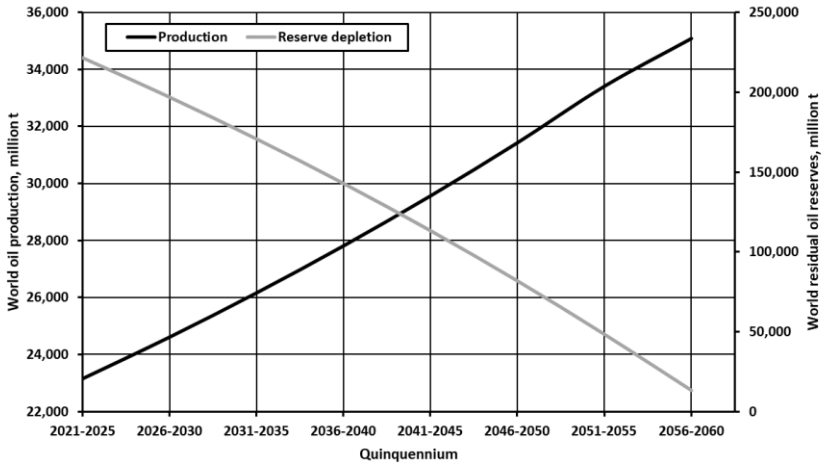

Figure 30. World Oil Production and Reserve Depletion Model till 2060.

Table 10. Top 20 Oil Producing and Consuming Countries in 2019

Country	Production		Country	Consumption	
	Million t	% of total		Million t	% of total
USA	746.72	16.65	USA	841.79	18.94
Russia	568.10	12.67	China	650.15	14.63
Saudi Arabia	556.56	12.41	India	241.97	5.44
Canada	274.85	6.13	Japan	173.59	3.91
Iraq	234.22	5.22	Saudi Arabia	158.81	3.57
China	191.01	4.26	Russia	150.77	3.39
UAE	180.25	4.02	South Korea	119.99	2.70
Iran	160.83	3.59	Brazil	109.71	2.47
Brazil	150.78	3.36	Germany	106.91	2.41
Kuwait	144.03	3.21	Canada	102.76	2.31
Nigeria	101.42	2.26	Iran	89.45	2.01
Mexico	94.92	2.12	Indonesia	77.11	1.73
Kazakhstan	91.42	2.04	Mexico	74.95	1.69
Qatar	78.53	1.75	France	72.45	1.63
Norway	78.37	1.75	Singapore	72.21	1.62
Angola	69.06	1.54	UK	71.18	1.60
Algeria	64.32	1.43	Spain	63.68	1.43
Libya	57.79	1.29	Thailand	61.65	1.39
UK	51.79	1.15	Italy	57.58	1.30
Oman	47.33	1.06	Australia	49.09	1.30
Subtotal	3,942.30	87.91	Subtotal	3,345.77	75.46
World total	4,484.49	100.00	World total	4,445.22	100.00

Table 10 introduces top 20 oil producing and consuming countries in 2019, e.g., just before the SARS-CoV-2 disease spread in the world. Crude oil is produced by about 56 states, and 20 tops of them cover about 88% of world oil pumping.

At the same time, crude oil is processed in more than 100 states; share of top 20 oil consuming countries in world oil usage is slightly more than 75%.

Figure 31 describes oil production history in the USA, Russia and Saudi Arabia. It may be seen that starting from 2011 oil production in the USA dramatically increased, and in 2019 was 1.31 times higher than in Russia and 1.34 times over those of Saudi Arabia. Therefore, analyses of Russian researchers as well as of Gazprom are correct. Geopolitical reasons of their concern will be explained in the next chapter.

Now, as it was shown on Figure 17, oil consumption is directly related with economic development. With this regard, we have compared information on oil consumption with country's GDP on the per capita basis. GDP per capita was calculated as GDP in current U.S. Dollars divided on country population headcount. Both indices for 2019 are cited according to the World Bank's World Development Indicators [1]. Figure 32 contains also the World Bank's country classification by income level [135]. Analysis of such interdependence crops out some interesting regularities. Firstly, all developed countries try to maintain energy efficient policy. Such policy consists in development of green energy, though extremely slow, launching hybrid and electric cars, and diminishing fuels consumption by modern engines. For instance, Figure 33 demonstrates world average fuels consumption by cars and vans, as released by the International Energy Agency [136]. Note that the 2030 target is 4.4 l/100 km. Note also that new cars are mainly sold in rich, e.g. high-income countries. In medium-income and predominantly poor countries number of second-hand 15-20 years-old cars is very high. Secondly, the figure proves that oil-exporting and East Asia states do not take care on crude oil consumption efficiency. That is why the correlation coefficient, though positive and significant, is not very strong.

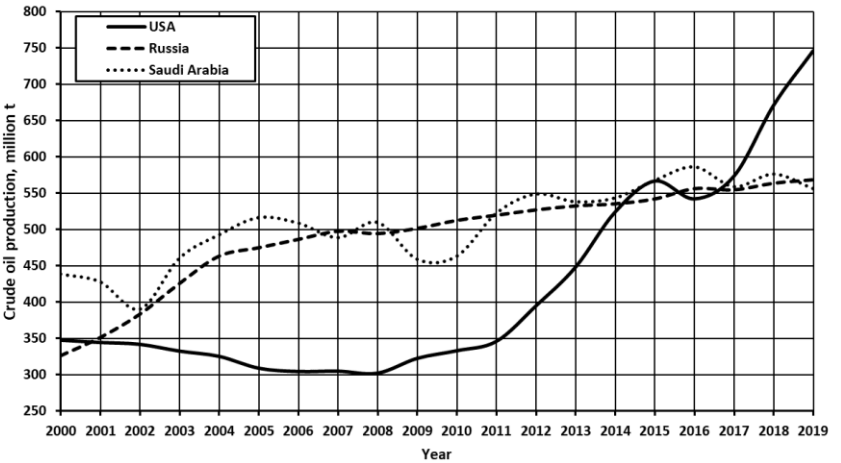

Figure 31. Oil Production History in the USA, Russia, and Saudi Arabia in 21st Century.

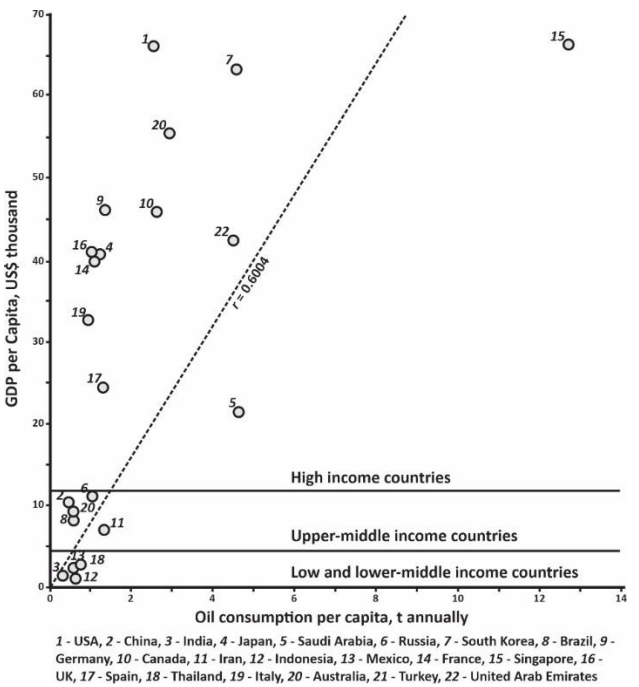

Figure 32. Interrelation between GDP and Oil Consumption Per Capita in Main Oil Consuming Countries in 2019.

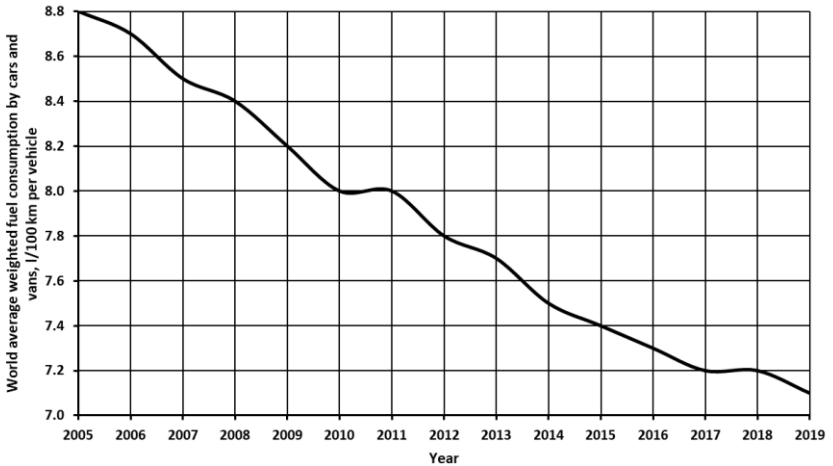

Figure 33. World Average Fuel Consumption by One Car in 2005-2019.

Figure 34 displays dynamics of commodity derivatives contracts signed at world commodity exchanges in 2010-2019 [137]. It is clear that role of options contracts is insignificant, and the lion's share belongs to futures. Further analysis of the report cited above shows that in the total volume of commodity contracts share of oil contracts is not very high but its value is extremely important (Figure 35).

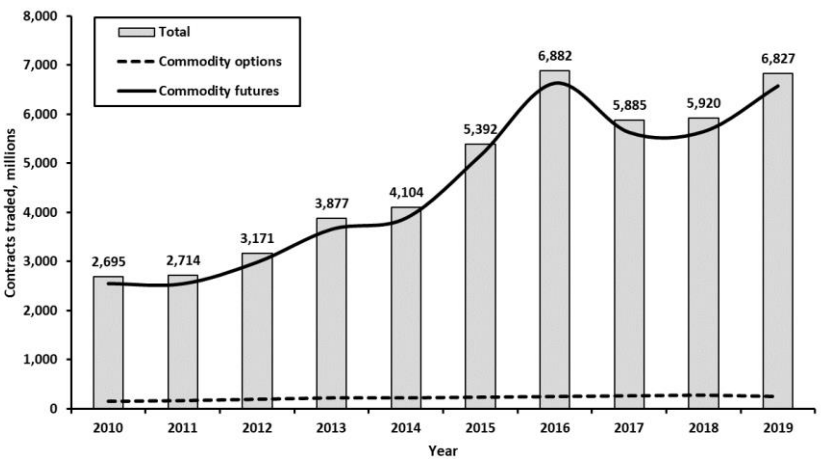

Figure 34. Number of Derivatives Contracts Signed in 2010-2019.

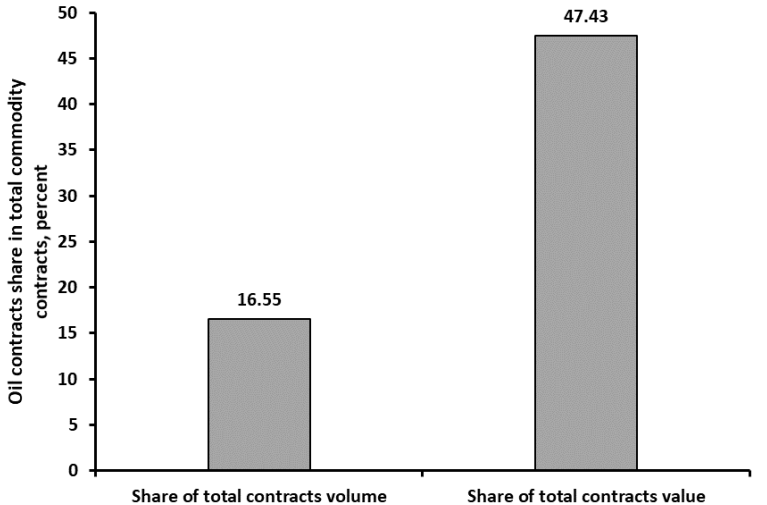

Figure 35. Share of Oil in World Commodity Contracts in 2019.

Figure 35 demonstrates average annual oil futures contract prices, as released by Statista [138] and spot prices cited according to the IMF [26]. Of course, correlation between them is extremely strong, though futures prices are always higher than the spot one. Thus, for the further analysis reference to spot prices will be enough.

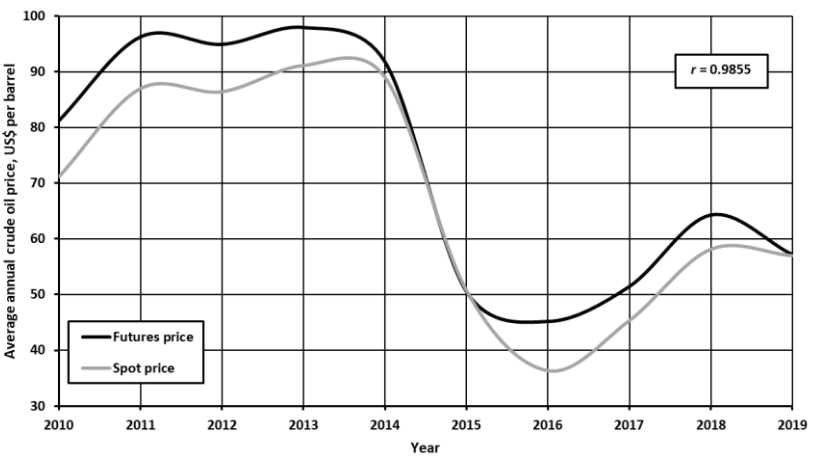

Figure 36. Average Annual Spot and Futures Oil Prices in 2010-2019.

The graphs display significant price decrease in 2015, hence, that year no disasters of global extend like COVID-19 coronavirus pandemic occurred. For understanding such fluctuations and also those, which happened before and are shown on Figure 14, some aspects of political economy of oil shall be considered.

As we have described in details earlier [25], before the collapse of the communist block the world was bipolar. The three main actors at the "grand global chessboard" were as follows:

1. Western economies, mostly united in the NATO block
2. Socialist countries, which mainly were members of the Warsaw Treaty block, and
3. The so-called "nonaligned states".

Just the nonaligned states maintained both the fragile equilibrium between the geopolitical poles of the world and the volatile peace. It is not by accident that the General Secretary of the United Nations, as a rule, is elected among the representatives of these countries.

In the cited book we also outlined that within such a geopolitical framework no global economic crisis was possible. The Great Depression of thirties of the recent century [139] did not distribute beyond Americas and, partly, borders of the USA allies. At this background economy of the USSR was being developed extensively [140]. The first attempt to get the globalized economic engine – the Bretton Woods System – included only free economies [141].

The collapse of the Soviet Union, the reasons of which were described in Introduction, as well as a series of "velvet" and "colored" revolutions immediately swept over the Warsaw Treaty countries determining extremely quick "dismantling" of socialistic regimes [142, 143, etc.]. The world became unipolar, and only after democratization of the East Europe states real globalization became possible.

The idea of globalization as unification of the civilized world around the United States, was firstly launched by Zbigniew Brzezinski in his famous book "The Grand Chessboard" [144]. Already in late eighties of the recent

century Mr. Brzezinski had predicted collapse of the USSR and designed main geostrategic imperatives, which should ensure primacy of the USA in the coming unipolar world. The first activity in the new geopolitical reality, according to Brzezinski, should be amalgamation of the post-Soviet countries into the international commodity markets via implementation of global projects like Baku-Tbilisi-Ceyhan Crude Oil Pipeline [145]. Secondly, the USA and allies should help the post-Soviet states to integrate into the world financial system and to acquire modern financial instruments.

Ideas of Mr. Brzezinski still hold up 23 years later, and the USA consecutive administrations follow them just slightly adjusting and modernizing. For involvement of the Newly Independent States in global economic turnover, the world financial institutions like the World Bank and the International Monetary Fund [146] have been applied. Both institutions opened representative offices in these states. Corresponding contribution was also made by the United Nations Development Programme (UNDP) via launching initial capacity strengthening initiative under the umbrella of combating poverty [147]. Synergistically, these three institutions were extremely active in the Newly Independent States by creating new national currencies, introducing modern fiscal systems, reforming the national banks, developing private bank networks, and supporting private businesses. Ultimately, these states were included into the world financial, mercantile and commodity markets.

There is a great number of contradictory definitions of globalization but, in principle, it means world expansion of neoliberal economic model, which provides free access to world capital and commodity markets worldwide via stock and commodity exchanges, ETF funds and other financial instruments [148, etc.]. It is unanimously agreed that economy of the globalized world is [149] and will be [150] leaded by the biggest world economy – the United State of America. For example, Figure 37, drawn according to materials of the World Federation of Exchanges [137], shows that derivatives contracts are predominantly signed in Americas and, of course, mostly in the USA.

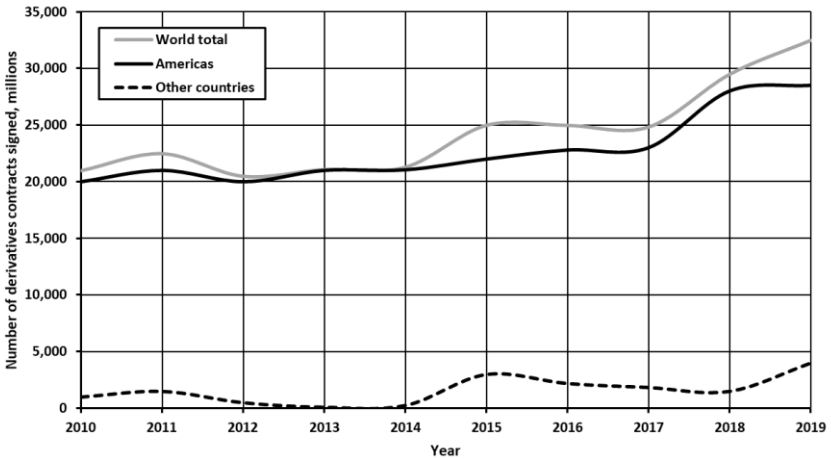

Figure 37. Derivatives Contracts Signed in the World in 2010-2019.

Hence, in addition to market engines, the U.S. government has a tangible tool for putting under control oil and other commodity markets, which consists in relative strength of the U.S. Dollar, as we have shown on Figure 12. Thus, oil benchmark price tendencies depend greatly on what currency policy maintains the Federal Reserve: within the framework of weak U.S. Dollar oil prices are high and vice versa.

During his presidency, in different times George W. Bush has maintained two diverse, even contrast economic policies. The mentioned two policies are shown on Figure 38. At the beginning, his administration elaborated weak U.S. Dollar strategy, which, as it has been analyzed earlier [25], aimed to achieve two goals:

1. Accelerated economic development of the United States via sustainable increase of futures, options and other derivatives prices, and
2. Creation of obstacles for world-wide expansion of Euro, which appeared on the currency markets on 1 January 1999 and immediately became the second largest reserve currency and the second most traded money in the world [151].

Importance of weak U.S. Dollar became more evident after September 11, 2001, as it was analyzed in a huge number of publications generalized by us [see 25]. Hence, this policy increased oil and, correspondingly, other commodities' prices and brought to several negative consequences [25]:

1. Price increase led to intense exploitation of primary commodities, and by 2007-2008 international finance institutions were concerned with possible accelerated exhaustion of their resources. For instance, the International Energy Agency in 2008 worried on sustainable energy supply in coming decades [152]. The International Atomic Energy Agency and the OECD Nuclear Energy Agency claimed on coming exhaustion of uranium reserves [153]; the analogous situation was observed in case of copper [154], lead and zinc [155], gold [156] and other mineral commodities. The Food and Agriculture Organization of the United Nations stated that the yield of basic grain commodities had almost reached its maximum limits, and significant increase of grain production became impossible without dramatic expansion of harvested areas [157].

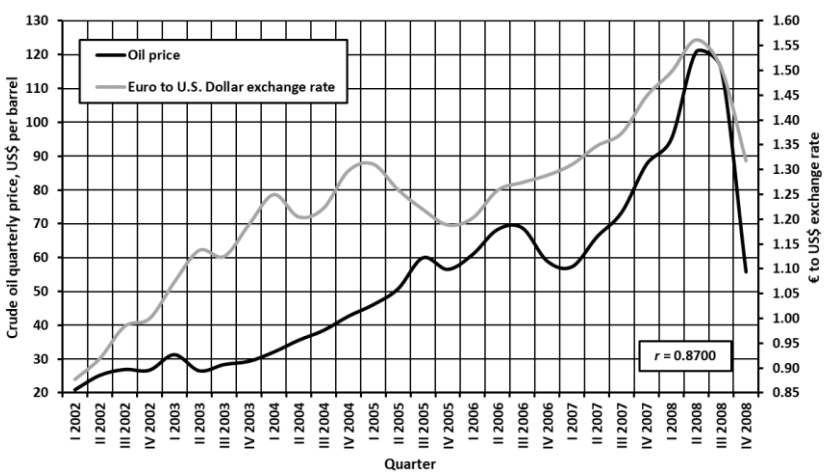

Figure 38. Interrelation between Quarterly Crude Oil Price and Euro to U.S. Dollar Exchange Rate in 2002-2008.

2. Accelerated upward course of basic commodity prices brought to a framework when further pricing rise might had been dangerous for economic equilibrium in the world, causing the entire collapse of the economic system. A serious concern with this respect was expressed by international financial and social institutions including the United Nations Development Programme, which even has launched a special survey on commodity development strategies [158].
3. On August 7, 2008 Russia-Georgia 5-day-long war took place.

It is generally agreed that the main goal of Russia in this war was getting control on Baku-Tbilisi-Ceyhan oil and South Caucasus gas pipelines and this way to blackmail Europe [159, 160, etc.]. However, active interfere of the USA and the EU gave no possibility to Russia to achieve this goal.

Russia-Georgia war dramatically changed the U.S. – Russia relations. Already in early September 2008 President Bush and the Congress started to elaborate a new politics, which was directed to oblige Russia to digest the consequences of its military involvement in Georgia [161]. On 24 September President Bush released the "Address to the Nation on the Financial Crisis" [162], indicating that the USA would not be able any long to purchase a huge amount of crude oil and would use strategic reserves. Oil prices started to drop down.

Hence, in reality, of course, the weak U.S. Dollar policy was bitterly reversed, and the currency started to strengthen followed by gradual decrease of oil prices, as it is shown on Figure 39. Let note that Euro to U.S. Dollar exchange rate is calculated using official data of the European Central Bank [163], and oil price is borrowed from IMF Primary Commodity Prices [26]. Impact of such a policy on Russia's economy will be analyzed in the next chapter.

Extremely fast deterioration of oil prices had huge negative economic impact on global economic environment. Indeed, within 5 months oil prices diminished from US$ 114.57 to US$ 41.53 per barrel or 2.76 times. Because such sharp breakage of equilibrium at oil markets was not caused by economic environment, it was impossible to predict it, and a lot of

commodity companies were liquidated. In addition, U.S. administration left out of account covariance of commodity prices. Figure 40 explores dynamics of commodity indices in 2008-2009, which dully follow behavior of oil prices, and Table 11 displays their correlation matrix in 2008-2009.

Such actions of President Bush's administration, as we have proven earlier [25], caused the world economic crisis.

Immediately after inauguration, President Obama was obliged to mitigate consequences of the recession. He instantly allocated a social fund of US$ 100 billion and started to weaken the national currency [25].

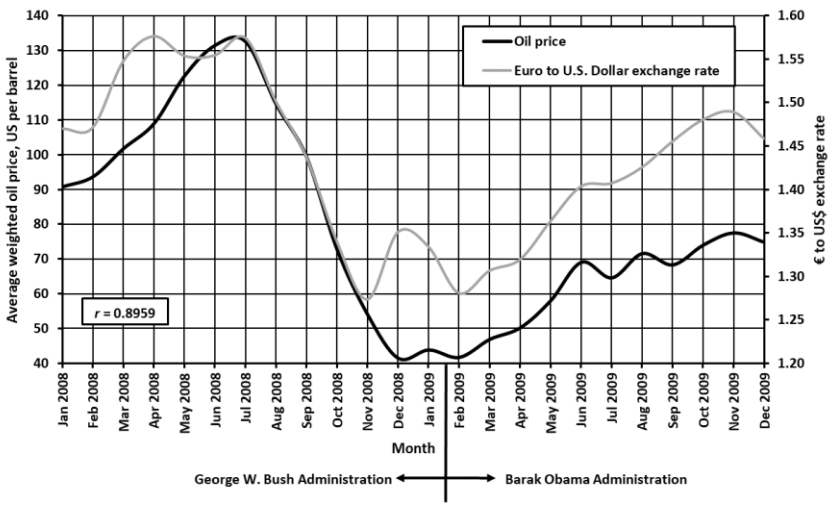

Figure 39. Interrelation between Average Monthly Crude Oil Prices and Euro to U.S. Dollar Exchange Rate in 2008-2009.

Table 11. Correlation Matrix of Commodity Indices in 2008-2009

Commodity	All	Non-fuel	Food	Fuel	Metals
All	1.0000	0.9593	0.9474	0.9976	0.8896
Non-fuel		1.0000	0.9491	0.9374	0.9729
Food			1.0000	0.9353	0.8565
Fuel				1.0000	0.8580
Metals					1.0000

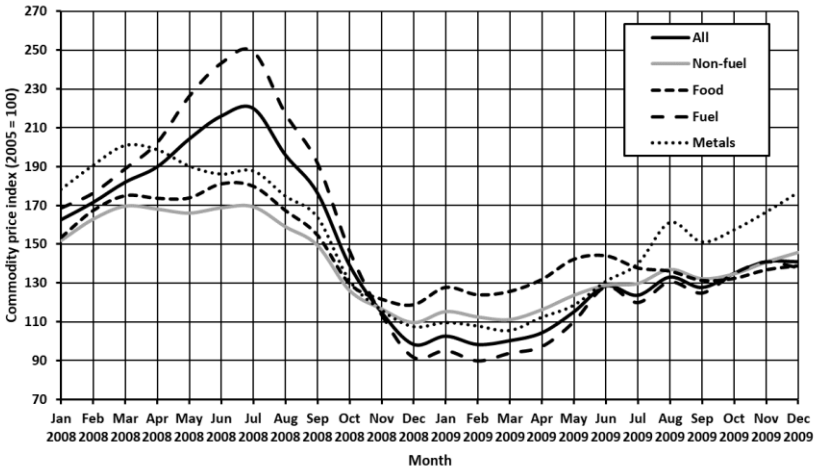

Figure 40. Dynamics of Commodity Indices in 2008-2009.

On July 20, 2009 President Obama declared [164] that "the fire is now out"! By that time nothing important happened than augmentation of commodity prices by about 43% (see Figure 40).

Hence, President Obama himself used the oil weapon in late 20014-2015 as part of sanctions against Russia, as it was mentioned in the previous chapter. Financial instrument was just the same – strengthening the U.S. Dollar. However, this time oil price diminishing policy was latent and prolonged in time and took 18 months (Figure 41). Correspondingly, terms of practically all futures contract expired, world economy remained healthy but impact on Russia's social-economic framework was huge as it is shown in the next chapter. Of course, this target-oriented policy of low oil prices caused diminishing of all commodity indices as it is displayed on Figure 42, and correlation between them is very strong (Table 12).

For the third time in our century oil as a tool of political pressure was used by President Trump against Iran. However, in this time the U.S. administration wanted to preserve more or less civilized relations with Russia [165]. Thus, oil weapon in its traditional form was not used, and instead the U.S. tried to bring oil exports from Iran to zero. Such contradictory measures, as I will show in chapter 5, were unable to achieve

the target but provoked extremely negative changes in Iranian society, which represent a dangerous challenge to both global and regional security.

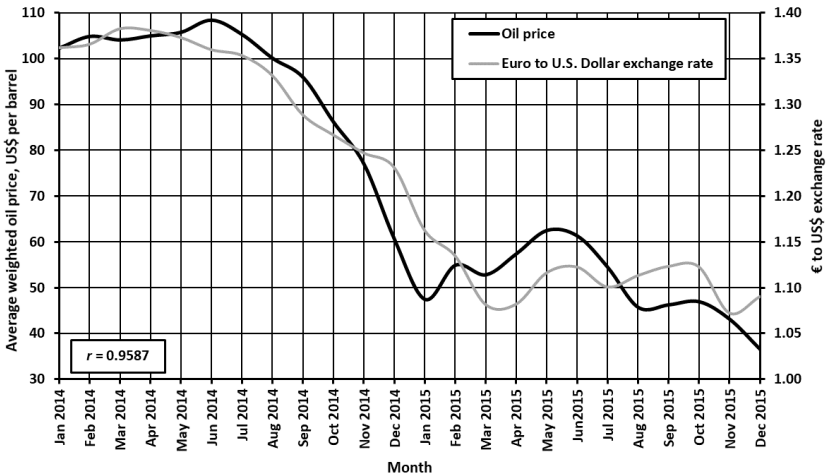

Figure 41. Interrelation between Average Monthly Crude Oil Prices and Euro to U.S. Dollar Exchange Rate in 2014-2015.

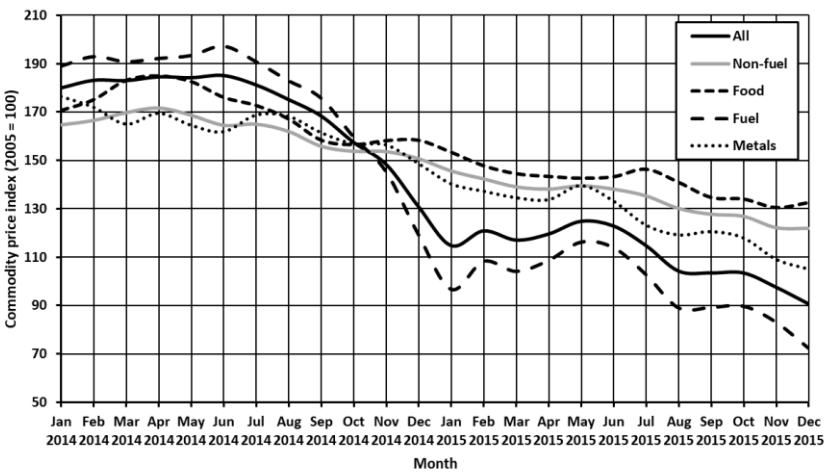

Figure 42. Dynamics of Commodity Indices in 2014-2015.

Table 12. Correlation Matrix of Commodity Indices in 2014-2015

Commodity	All	Non-fuel	Food	Fuel	Metals
All	1.0000	0.9741	0.9524	0.9988	0.9626
Non-fuel		1.0000	0.9816	0.9620	0.9764
Food			1.0000	0.9399	0.9210
Fuel				1.0000	0.9517
Metals					1.0000

Thus, during the last decade, from 2009 to 2020, oil market developed more or less consistently, obeying rules of the "new political economy of oil".

In 2020 COVID-19 coronavirus pandemic knocked to our doors.

Thorough examination of materials by the World Federation of Exchanges [137, 167-170] allowed us to assess number of oil derivatives contracts signed worldwide in 2010-2019. The 2020 data were calculated according to materials discussed in the paragraph 2.3. Figure 43 displays results of such assessment as well as average annual oil prices.

Analysis of this figure allows to formulate two essential new regularities of world oil markets.

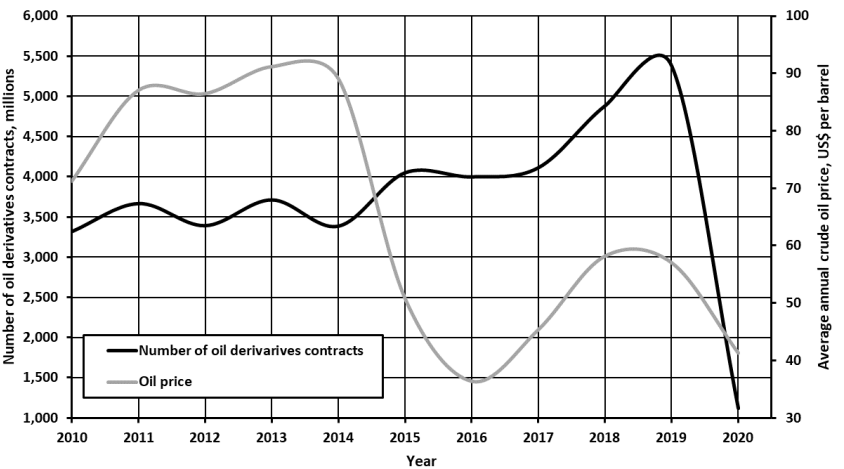

Figure 43. Assessed Number of World Oil Derivatives Contracts and Oil Prices in 2010-2020.

Firstly, within economic equilibrium number of contracts signed at commodity exchanges does not depend on oil prices: correlation between indices on Figure 43 is totally absent. Secondly, as it was shown on Figure 28, at the background of sharp disequilibrium of oil markets, which happened, for instance, during the first months of the COVID-19 coronavirus pandemic, volume of oil derivatives contracts is governed by oil prices.

In other words, oil derivatives markets are ruled by investors' and speculators' expectations. When markets are stable and in equilibrium, short- and even medium-term forecasts of possible dynamics of oil prices is a routine job, and success of investors in futures and, partly, options contracts depends on their professionalism rather than on uneven and unpredicted fluctuations at commodity exchanges the probability of which within the medium term is beyond the statistically admissible normal variance.

Nevertheless, the situation drastically alters when markets are faced with disasters and challenges of global extent. In this case, medium- if not short-term forecasts of the markets become unfeasible due to breakage of equilibria at them. Correspondingly, pricing tendencies become the sole driver of the commodity markets. As it was described in the second chapter, just such events took place in 2020. It is interesting to note that in-depth analysis by the U.S. Commodity Futures Trading Commission (CFTC) on 2020 environment at NYMEX trading WTI brought to approximately the same conclusions, because it was statistically proven that dramatic diminishing number of contracts signed by 20 April 2020 was without any doubt caused by oil spot price crash [171].

The last problem that should be analyzed in this chapter is economic dependence of oil exporting countries on international oil markets. We have explored this problem earlier [52] but the COVID-19 coronavirus pandemic has had a significantly huger impact on their economies than average in the world. From this point of view in two consecutive chapters we will explore two case studies – on Russia and Iran, e.g., on two states, which are under international sanctions and nonetheless do not obey international agreements on oil production and trade. Negative impact on them, firstly, by sanctions

and secondly, by COVID-19 coronavirus pandemic was extremely vulnerable with regard to social & economic environment.

Released figures on oil exports by countries often do not match with the objective reality. That is why I have decided to calculate exports volume as difference between production and consumption, and reliability of such approach has been proven by experience [see, for instance, 172]. Data on crude oil production and consumption were borrowed from BP's Statistical Review of World Energy [23].

Figure 44 ranks countries according to volume of oil exports. It is to be noted that these twenty states have ensured 97.52% of world oil exports, which equaled to 2,238.99 million tons in 2019, according to our calculations.

Impact of COVID-19 coronavirus pandemic of international oil shipment was huge, and according to preliminary data by Mundi [173] recalculated by us from barrels per day to million tons a year based on BP's conversion factors [23], diminished by 15.3% or by 342.52 million tons in 2020 (Figure 45).

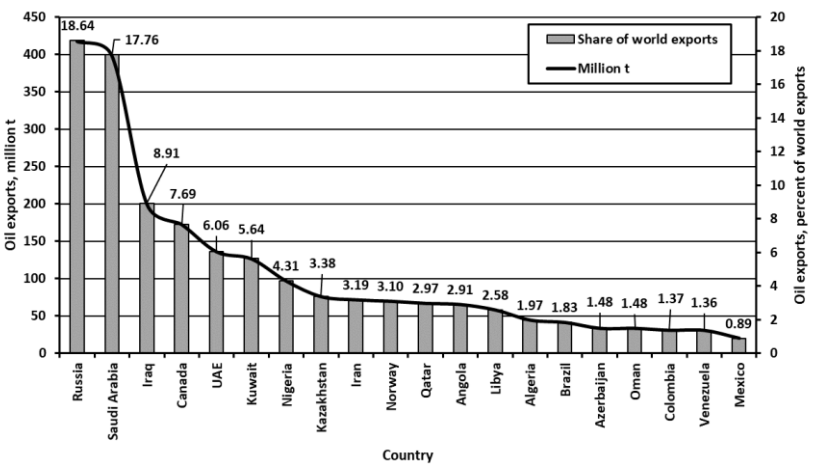

Figure 44. Country Ranking by Crude Oil Exports in 2019.

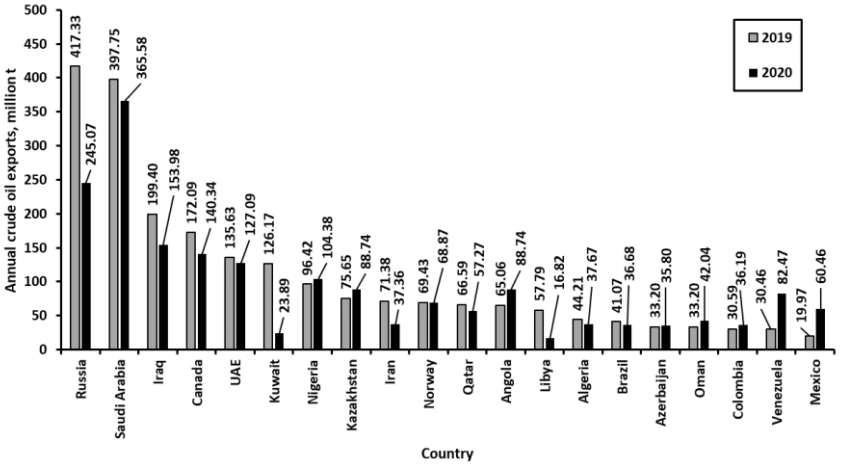

Figure 45. Oil Exports Volume by Top 20 Oil Exporter Countries in 2019 and 2020.

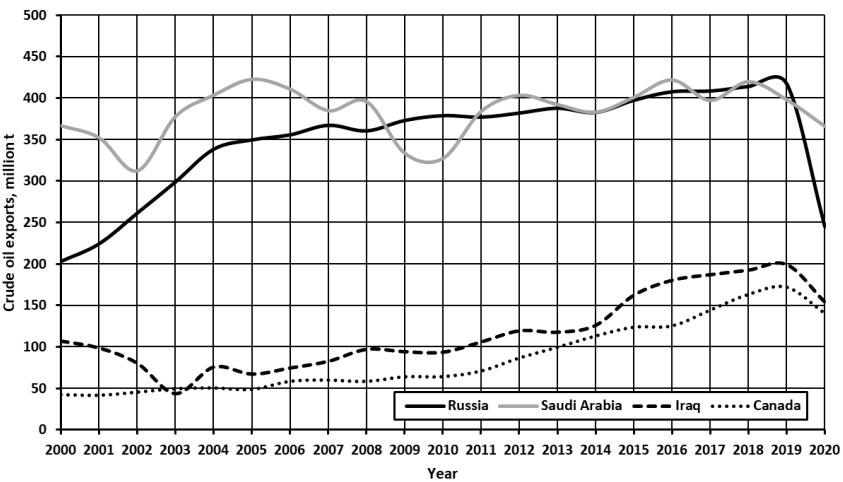

Figure 46. Oil Exports from Russia, Saudi Arabia, Iraq and Canada in 2000-2020.

It is extremely interesting to outline that if oil exports from basic overseas oil providers significantly diminished, there are states, which, vice versa, profited coronavirus pandemic for increasing crude oil exports. Such countries include Nigeria, Kazakhstan, Angola, Azerbaijan, Oman, Colombia, but the main winners in this competition are Venezuela and Mexico.

Figure 46 demonstrates oil export history for main four oil exporting countries in our Millennium. It is important to note that oil markets in our century is distinguished by severe competition between Russia and Saudi Arabia – two main crude oil providers to the international markets. Shares of Iraq and Canada are significantly less. However, Saudi Arabia is the founder and the key member of OPEC [174], as it is shown in Table 13. On the contrary, Russia is a non-OPEC state but is obliged to follow OPEC regulations on oil production. There were several agreements between OPEC and Russia in 2020, and some of them were violated. Reasons, preconditions and consequences of such policy of the Russian government will be discussed in the next chapter.

From this point of view, it is important to note that in 2020 OPEC member states in bulk exported 1,113.53 million tons of crude oil versus 245.07 million t exported by Russia. In other worlds, Russia's oil exports equaled to 22.0% of that by OPEC countries.

As well, Table 14 lists top oil companies by production in 2019 [175], e.g., before the coronavirus pandemic. Only one Russian company – Rosneft – was included in this list. Its oil production was 2.6 times less than that of Saudi Aramco.

For meeting competition with western countries, Russia tried to imply oil-rich Newley Independent States in its project of joint oil exports, and as it was noted above, analysts expressed a certain concern [112]. From the post-Soviet states, the most important policy makers on oil markets are Azerbaijan and Kazakhstan. In reality, however, Azerbaijan was implied in the international oil transit project via construction of the Baku-Tbilisi-Ceyhan pipeline of the global importance. Today, the country is exporting its oil exclusively by this pipeline, managed by BP, and the Soviet Baku-Novorossiysk pipeline during the last decade is absolutely empty [176].

The analogous situation settled in Kazakhstan. In spite of tight economic relations with Russia, this Newly Independent State developed its own energy policy based on privatization of oil and gas filed with preservation minority equity by Kazakhstani state company [177].

Table 13. OPEC Member Countries After 1 January 2021

Country	OPEC member sense
Algeria	1969
Angola	2007
Congo	2018
Equatorial Guinea	2017
Gabon	2016
Iran	1960
Iraq	1960
Kuwait	1960
Libya	1962
Nigeria	1971
Saudi Arabia	1960
United Arab Emirates	1967
Venezuela	1960

Table 14. List of Largest Oil Companies by Oil Production in 2019

Company	Country	Oil production, million barrels a day
Saudi Aramco	Saudi Arabia	10.963
Rosneft	Russia	4.218
Kuwait Petroleum Company (KPC)	Kuwait	3.412
National Iranian Oil Company (NIOC)	Iran	3.256
China National Petroleum Company (CNPC)	China	2.981
ExxonMobil	USA	2.295
Petroleo Brasiliero (Petrobras)	Brazil	1.988
Abu Dhabi National Oil Company (ADNOC)	UAE	1.973
Chevron	USA	1.830
Petroleo Mexicanos (Pemex)	Mexico	1.813

Table 15. Oil Reserves of Main Oil and Gas Fields of Kazakhstan, Their Operators, and Operations Start Years

Field	Operating company	Reserves, billion t	Operations start year
Tengiz Field	Tengizcheroil	3.411	1991
Kashagan	North Caspian Operating Co.	1.774	2016
Karachaganak	Karachaganak Petroleum Operating Co.	1.236	1984

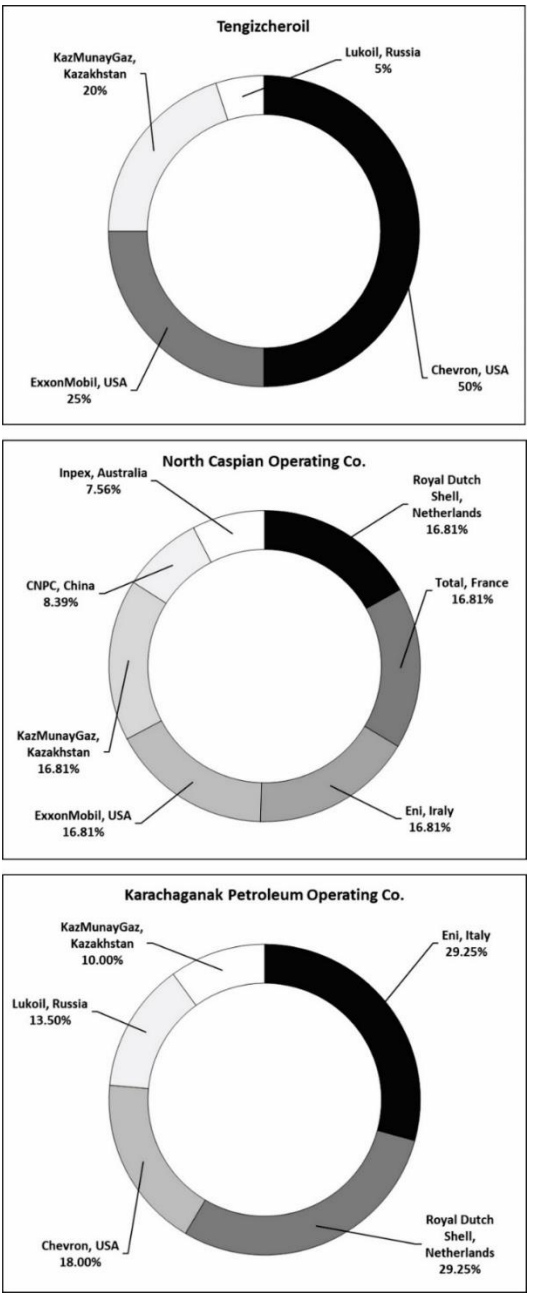

Figure 47. Shareholders of Kazakhstan Oil and Gas Operating Companies.

Table 15 introduces oil reserves, owners and production start year of the three world-class oil field of Kazakhstan [178, 179]. It may be seen that in addition to significant gas resources, total extractable oil reserves in the three major hydrocarbon fields of Kazakhstan exceed 6 billion t. Shareholders of the operator companies are displayed on Figure 47 [180-182].

The sole Russian shareholder in Tengizcheroil and Karachaganak Petroleum Operating Co. – Lukoil – has minority equity, which does not allow it to block the shareholders' meeting decisions. North Caspian Operating Co., responsible for processing of the Kashagan offshore field, has no Russian shareholders at all.

Thus, recommendations of Zbigniew Brzezinski [144] due to sustainable approaches of the U.S. consecutive administrations were put into practice – Russia was left alone at the international oil markets, and the Newly Independent States, which some thirty years ago had no rights on independent politics and energy policy, started to play their own games with close collaboration with the U.S. government and the Western giant energy companies. In the next chapter we will see what success achieved Russia in maintaining its independent energy policy.

3.2. MAIN FINDINGS

The "oil market" is an extremely complex and multi-layered notion, which, let say truth, is understood by different stakeholders according to their philosophy, psychology, and professional skills. For certain researchers oil market represents an environment where equilibrium between crude oil supply and demand is established. For OPEC secretariat it signifies an option to maintain more or less welfare of the organization's member countries. For oil exporting states it is practically a sole possibility to ensure national social & economic development. For energy resource rich post-Soviet nations oil market is a shortest itinerary, which allows them to get access to economic instruments of the globalized world. For powerful western economies it is a tool of political pressure; for commodity exchanges oil market guarantees

liquidity, and for investors it is a platform where it is possible gambling with options and futures and this way quickly earning (or loosing!) money.

In my opinion, all these approaches are valid, and in reality, oil market is a composite, often contradictory, and metastable node of all these interests. In the closing chapter we will explore the formal approach to oil markets.

It is absolutely necessary to mention that in its modern shape the oil market was formed only in the new Millennium; moreover, it is a continuously developing and live changing structural conglomerate. From this point of view, essential modernization of the oil market commenced by the end of the recent century, when, as it was noted, the first roots of oil "financialization" originated. Oil, as other primary commodities, acquired characteristics of financial assets and money, and the theory of commodity currencies was elaborated.

Development of modern IT technologies allowed to general people, practically to any citizen of our globe, to get access to commodity markets, and this framework dramatically increased number of gamblers at commodity and mercantile exchanges. It has been shown that the last decade from 20 to 36 billion commodity derivatives contracts were being sighed each year, or total volume of commodity contracts exceeded world population roughly 4.5 times! Only slightly more than 16% of this volume were oil contracts but their value was more than 45% of total derivatives nominals. And this means that oil follows a long itinerary from producer to ultimate consumer via a chain of intermediate speculation contracts, and each of them creates the added value. Thus, the 21st century's global economy cardinally differs from those of bygone times, because today social & economic growth is mostly determined by intangible, volatile financial instruments.

Such economic framework of the globalized world became possible in conditions of worldwide expansion of a neoliberal model, ruled by the United States. And this means minimum centralization of power and inadequate growth of the finance sphere. The latter is based on the model of "subprime debts", when practically all investments are made via borrowing cheap money from venture finance institutes [149]. Within the framework

of economic equilibrium or under a smart governance of commodity markets this system works well but any unexpected and unpredictable external either geopolitical shock or worldwide disaster like a war or a pandemic hampers the smooth economic environment and leads to crash of commodity markets and to a recession and a crisis.

As far as commodities including oil acquired characteristic features of financial assets and money, they must have a nominal value and an exchange rate. From this point of view two peculiarities of the market shall be noted. Firstly, this observation explains covariance of commodity prices discussed above. Secondly, an interrelation should be between the commodity price and the money capacity. As far as practically at all world exchanges oil price either directly or indirectly is fixed in the U.S. Dollars, a certain relation must exist between nominal value of oil and the U.S. currency strength. This rule of oil markets has two important corollaries. Primo, within the economic equilibrium at commodity markets, a significant correlation exists between oil price and the exchange rate of two major reserve currencies of the world – Euro and US$. Secondo, as far as oil is the most important commodity of the world and its consumption value exceeds those of any other commodity, the fixed oil price represents a certain benchmark for other commodities.

Due to these regularities, the U.S. administration has a tangible tool to govern oil markets using “oil weapon” the most powerful instrument of which is elaboration and execution of corresponding monetary policy. Hence, as we have seen above, such policy may be smart and targeted and in this case as a rule the goal is achieved without serious damage to the world economy. If the corresponding monetary policy is applied hotheadedly and imprudently, then it may cause unforeseen and unexpected consequences including economic shocks and recessions. In addition, as it has been specially outlined, basic commodity exchanges where oil derivatives contracts are mostly signed, are registered in the USA. The New York Mercantile Exchange, which is a member of the CME Group is the basic market of the West Texas Intermediate crude; the Intercontinental Exchange, which is headquartered in the USA and the UK, is trading with Brent blend.

The sustainability of the oil markets is ensured for the near future by already ready-to-use world oil reserves. According to our model, which makes allowance for possible increase of oil consumption in coming years, existing oil resources are enough for, at least, 2060. However, exploration technologies including 3D geophysical survey each year are being improved, exploration campaigns are becoming more and more efficient, and there is no doubt that oil reserves may easily be significantly increased, even doubled. Everything depends on venture investments in exploration.

When economic equilibrium at oil markets is unexpectedly disturbed, oil prices start crashing regardless the nominal strength of the U.S. Dollar. As we have seen above, such fall is usually caused by uncertainness of investors, who immediately become much more careful and avoid activity at commodity markets waiting for the moment when situation clarifies allowing short- and medium-term forecast of commodity pricing tendencies. Just such situation was characteristic of the beginning of COVID-19 coronavirus pandemic in winter – early spring 2020 when volume of oil derivatives contracts diminished 4.02 times from January to April (see Figure 28).

As a rule, other commodities also follow the oil pricing tendencies during economic shocks. Apparently, gold is the sole exception of this rule. During economic equilibrium correlation between oil and gold prices is significant and strong, as it is shown on Figure 48. Average annual gold prices were calculated based on the London Bullion Market Association's (LBMA) benchmark prices [183]. However, when economic shocks happen, gold pricing tendencies are determined by their immanent rules (compare gold and oil prices for the year 2009). The same was characteristic for the period of COVID-19 coronavirus pandemic in 2020 (Figure 49). In this case gold prices were calculated as a mean between average monthly morning and afternoon gold prices released by LBMA [183].

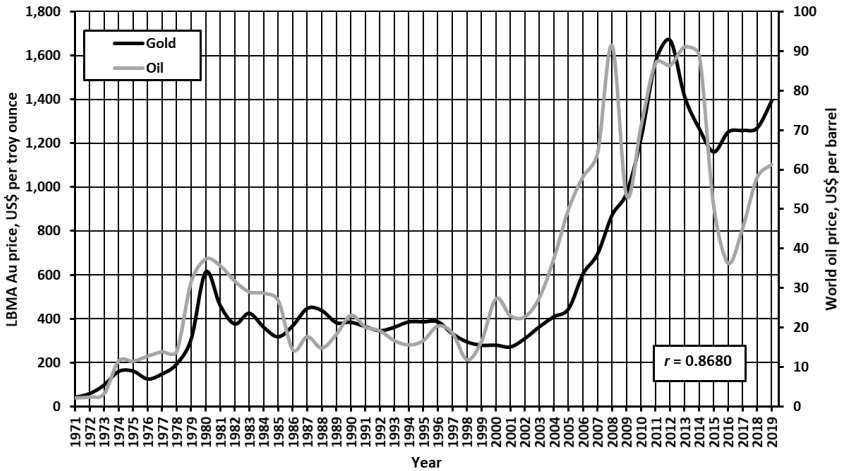

Figure 48. Interrelation between Average Annual Gold and Oil Prices.

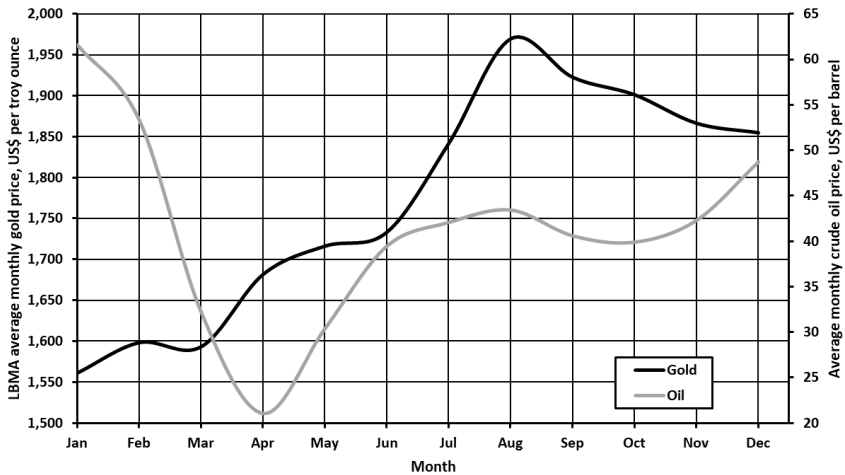

Figure 49. Average Monthly Gold and Crude oil Prices in 2020.

Such feature is determined by a specific position of gold at commodity markets as well as by peculiarities of its geopolitics [184] and price fixing. Unfortunately, there is no room here to explore this specific extremely interesting problem.

The mentioned characteristic features of international oil markets, described perhaps from a rare angle, lead to explaining the statistical

regularities of interdependence between COVID-19 coronavirus pandemic's indices with oil pricing tendencies, which, at the first glance are unusual and unexpected.

For doing this, answers on some questions as follows shall be found:

1. Why COVID-19 coronavirus pandemic must be divided into two stages, and what changes happened by the end of April 2020?
2. Why the two stages of COVID-19 coronavirus pandemic are characterized by drastically different statistical characteristics?
3. Why at the background of exponential worldwide spread of SARS-CoV-2 disease oil markets immediately after 20 April 2020 started stabilizing and in mid-July gained equilibrium?

Only in case if satisfactory answers to these questions are found, a more or less adequate and professionally proven forecast of oil markets for coming years would be possible.

Let start from the very beginning.

It does not matter had SARS-CoV-2 virus either natural or artificial origin, in any case from the very beginning the disease was suggested to represent a certain modification of H1N1 influenza. People did not take care to protect themselves from the illness. Only when the total lockdown was declared in the city of Wuhan on 23 January 2020 and day later – in the whole Hubei Province, China, thousand hundreds of foreigners started to run out the country [185] and spread the virus worldwide. By 31 January only 12,408 infection cases were registered in the world but by 20 April this amount increased to 2,6743,743 people and 177,140 deaths (see Figure 4). By mid-February people was waiting for a certain Armageddon. We already have briefly described social framework at the beginning of pandemic but here we are unable to avoid mentioning negative impact of social media networks on public opinion. Very often the enormous number of posts distributed negative expectations and the most extremal variants of the conspiracy theory were discussed.

Anyhow, in the first months of COVID-19 coronavirus pandemic investors had no other tangible indicator of economic environment than

number of infection cases. Let remind once more that the disease was unknown, nobody knew the illness course and what would be the ultimate outcome. Thus, more infection cases were identified, less activity of investors and speculators at commodity exchanges was, and, correspondingly, less derivatives contracts were signed. Figure 27 demonstrates that in February 2020 33.58% less futures oil contracts were concluded than in January, in March – 44.44% less contracts than in February, and in April – 32.67% less contracts than in March and 75.15% less contracts than in January. Such crash of oil markets has immediately broken correlation between oil prices and Euro to US$ exchange rate. Instead, the correlation between number of futures contracts and oil price appeared (see Figure 28), which is absent when oil markets are in equilibrium. Now, temporary gradual withdraw of investors and speculators from the basic oil-trading commodity and mercantile exchanges was directly determined by their analysis of the pandemic development tendencies, and just this circumstance created a strong negative correlation between COVID-19 coronavirus infection cases and oil price, which, as it was said, followed diminishing volume of futures contracts.

The climax took place on 20 April when negative price for the West Texas Intermediate oil blend was registered.

In an extremely interesting interim report by the U.S. Commodity Futures Trading Commission [171] grosso modo practically the same reasons of oil market crash are stipulated. In addition, however, this report explains why the date of 20 April was so sad [171, p. 2]:

> "The negative settlement price of the WTI Contract occurred on the penultimate day of trading for the May Contract, which expired on April 21. For the WTI Contract May expiry, market participants who were not intending to make or take delivery of the crude oil underlying the futures contract were expected to close out of their positions by April 21 (the May Contract's expiration date and last day of trading)."

The international Monetary Fund [186] and the World Economic Forum [187] also mention uncertainty as the basic factor of both the oil market crash and a huge economic environment, in general.

Now, I have not found comprehensive analysis why after 20 April 2020 oil markets started to recover. In its August Monthly Oil Market Report [188] OPEC simply registers the tendency of increasing oil prices. Hence, as we have analyzed above, within the second period of COVID-19 coronavirus pandemic all statistical regularities of both disease indicators and oil pricing have dramatically changed. Let remind once more that after 20 April some important events overlapped each other. They are as follows:

1. The SARS-CoV-2 infection mortality rate started to gradually and sustainably decrease against the background of exponential spread of the pandemic
2. The penultimate day of trading for the oil May contracts expired
3. Lockdown were announced to be canceled
4. First information on successful testing of COVID-19 vaccines were published
5. Correlation between oil prices and Euro to US$ exchange rate reappeared
6. On the contrary, coronavirus infection cases ceased to be the main driver of oil markets
7. A strong negative correlation between the SARS-CoV-2 infection mortality rate and oil prices and a statistical model of this interdependence provided investors and speculators with a tangible indicator, which allowed them to make an adequate forecast of oil markets for the short and medium term and this way gave them the opportunity for returning to commodity exchanges.

As we have proven by statistical materials, in mid-July 2020 oil markets gained equilibrium, hence, at much lower level than in January.

The period of COVID-19 coronavirus pandemic is a classic example of self-regulation at commodity markets, which are unable to survive if disequilibrium continues a comparatively long time.

The discussion hereto allows us to formulate three main lessons of COVID-19 coronavirus pandemic. Firstly, economy of the globalized world develops smoothly only in case of social & economic equilibrium. In this

case the predominant share of the added value originates by pure financial instruments, via the long chain of derivatives contracts. Secondly, any shock of the social & economic framework immediately leads to disbalance and breakage of equilibrium determining deterioration of the world and countries' GDP. Thirdly, if such shock has outer, natural origin, then commodity markets and, consequently, the world economy auto-recover themselves as soon as the first signs of the shock mitigation appear. In case if such shocks are determined by incorrect application of the "oil weapon," then governmental interfere becomes necessary.

In the closing chapter we will use these conclusions to formulate main formal rules of oil markets.

Of course, the COVID-19 coronavirus pandemic was extremely vulnerable for oil exporting countries. In next two consecutive chapters special case studies are presented on Russia and Iran, e.g., those countries, which try to avoid international regulations of oil trade and very often break interstate agreements.

Chapter 4

CASE STUDY 1: RUSSIA ON INTERNATIONAL OIL MARKETS BEFORE AND DURING COVID-19 CORONAVIRUS PANDEMIC

4.1. BASIC FEATURES OF RUSSIA'S ECONOMY

In 1999 Vladimir Putin, at time First Deputy Prime Minister of the Russian Federation and Candidate of Economic Sciences (Russian equivalent of PhD in Economics), several weeks before being nominated Prime Minister, published an article in the Mining Institute Transactions, St Petersburg [189]. This small and practically unknown publication, hence, determined the economic development of Russia in the 21st century. In this article Mr. Putin has outlined that the sole possibility of accelerated economic advance of the enormous and infrastructurally less developed country was extensive exploitation of natural resources, mainly of hydrocarbons, and their exports to international commodity markets aiming obtaining a quick free currency revenue.

By 2003, the main trends of President Putin's economic doctrine have already been elaborated. In principle, this doctrine was based on several simple principles [see, for instance, 190-194, etc.]:

1. Extensive exploitation of natural resources and their exports
2. Minimization of foreign debts
3. Establishment of the Stabilization Fund
4. Fiscal reform and fiscal stabilization, pension reform
5. Elaboration and execution of state programs in health care, education, agriculture and other sectors
6. Diminishing inflation and unemployment
7. State control on the strategic economic branches, and
8. Merging with the world economy and the world capital and commodity markets.

This way all trends of Russia's democratization launched by Boris Yeltsin [195, 196, etc.] was entirely buried [197]. It is true that President Yeltsin took indispensable steps for modernization of the social life and introduction of civil society, hence, his so-called "voucher" privatization program generated a bunch of Russian oligarchs, however, Putin's policy of re-nationalization of strategic companies didn't diminish their number, on the contrary, increased it [198].

Getting strategic joint stock companies, privatized during the Eltsin's era, under a rigid state control lead to a number of scandalous revelations among which, first of all, bankruptcy of Yukos [199] and Mr. Khodorkovsky's case [200] should be mentioned. In addition, the rigid homeland policy of Vladimir Putin determined immigration of a number of Russia's billionaires, some of which preserves good relations with the President of Russia but others, for instance, Boris Berezovsky [201] and Badri Patarkatsishvili, [202] died in England in doubtful circumstances.

There is a large number of investigations on the Russia's economy and its development tendencies [203-205, etc.]. In all such publications the role of oil exports is outlined. Moreover, basic scenarios of economic development are based on possible dynamics of international oil prices [203, etc.]. Indeed, though in the formal sectoral structure of the Russia's GDP [203] oil export is not shown directly (Table 16), in reality its role is extremely high [205]: Table 16 contains article "Other branches" with a

share of 27.5%. For understanding the role of oil exports in Russia's economy, we have calculated export value by a simple equation (6):

$$V = E.P_A = (C_P - C_C).P_A, \quad (6)$$

where: V= annual crude oil exports value, US$, E= annual crude oil exports volume, t, P_A= average annual world oil price, as released by IMF [26], US$ per t, C_P = annual crude oil production volume, t, C_C = annual crude oil consumption volume, t. Oil production and consumption volumes are published by BP [23], and average monthly oil prices are released by IMF [26].

Table 16. Structure of Russia's GDP

Economic sector	**Percent in GDP**
Agriculture	4.5
Fishery	0.3
Mining, hydrocarbon extraction	9.4
Manufacturing	13.7
Energy & water distribution	3.1
Construction	6.2
Trade	15.9
Hotels & restaurants	0.8
Transport & communication	7.8
Finances	4.4
Education	2.6
Health care, public services	3.8
Other branches	27.5

Figure 50 presents Russia's oil exports value as a share of GDP. GDP's figures were borrowed from the World Bank data base [1].

It may be seen that since 1999, e.g., after Vladimir Putin came to power, share of oil exports dramatically increased.

Russian governmental administration and analysts some ten years ago understood extremely well that such dependence on oil exports was dangerous. That is why they were trying to elaborate a new concept of economic development for the Russian Federation, where share of

hydrocarbons, and namely of oil exports would be much less, and the country would escape the Damocles' sword of oil pricing [see, for instance, 206]. Hence, such strategy happened to be unfeasible, and in reality, Russia's economic development remained practically entirely dependent on oil exports, which is extremely important even now.

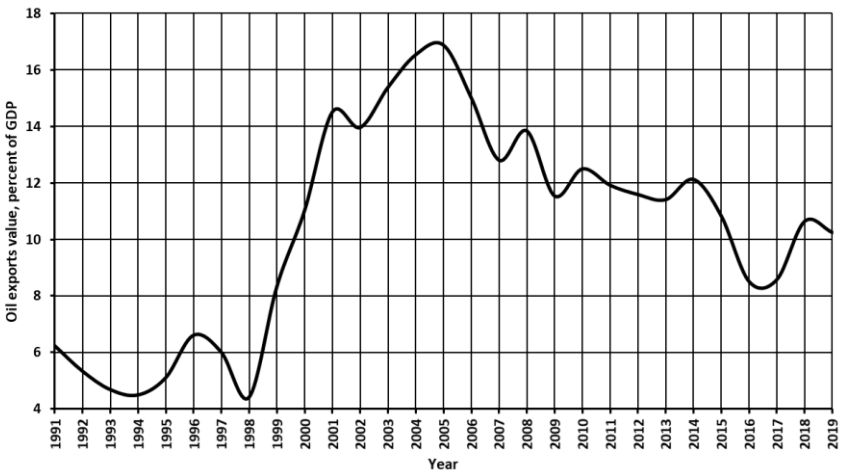

Figure 50. Share of Oil Exports in Russia's GDP.

Table 17. Top 10 Exports from Russia in 2019

Commodity & goods	**Exports**	
	US$ billion	% of total
Mineral fuels including oil	220.8	52.25
Iron & steel	18.1	4.28
Gems & precious metals	15.3	3.62
Machinery	9.0	2.13
Wood	8.6	2.03
Fertilizers	8.4	1.99
Cereals	7.9	1.87
Aluminum	5.8	1.37
Electrical equipment	5.6	1.33
Copper	5.2	1.23
Subtotal	304.7	72.10
Grand total	422.6	100.00

Table 17 introduces value of main ten commodities and/or goods exported from Russia in 2019 [207]. It may be seen that oil exports equals to 78.96% of mineral fuels exports and to 41.25% of total exports from Russia.

For development of the resource processing branches, President Putin took care to ensure production of practically all primary commodities, and from this point of view Russia became a self-sufficient country. Figure 51 demonstrates the most important primary commodities produced in Russia [208-2010]. The list includes energy resources, ferrous, light, base, noble, radioactive, and rare metals and elements, diamond, cereals and sugar, etc.

For maintaining his homeland commodity policy and acquiring corresponding licenses in countries rich in mineral resources, President Putin has chosen some key companies, among which, first of all, Metalloinvest, Rusal, Norilsk Nickel, Alrosa, and, of course, two hydrocarbon giants Gazprom and Rosneft should be mentioned. All this companies are included of the list of the Russia's strategic companies, which are directly or indirectly managed by the state [211]. Today, this list includes 197 companies.

The Open Joint Stock Company Metalloinvest Holding [212] was founded in 1999 as a result of "voucher privatization". Today, its foundation capital equals to US$ 180 million divided into 74,917,060,000 shares. 51% of equity is disposed by the state. However, at the same time, USM Metalloinvest LLC (a part of London-based Holding Company USM LLC) owns 100% of the Joint Stock Company Metalloinvest Holding. Shareholders of the latter or, according to the Metalloinvest wording "beneficiaries" are: 1) Alisher Usmanov, - 60%; 2) Andrei Skoch – 30%; 3) Farhad Moshiri – 10% [213].

With the net worth of US$ 16.1 billion, Alisher Usmanov, an Uzbekistan-born Russian oligarch and billionaire, in 2020 acquired the 83rd rank in the Forbes list of the richest people in the world [214]. Andrei Skoch was member of the Russian Duma before joining Alisher Usmanov in the mining business. In the Forbes list he has the 241st rank with the net worth of US$ 7.3 billion [215].

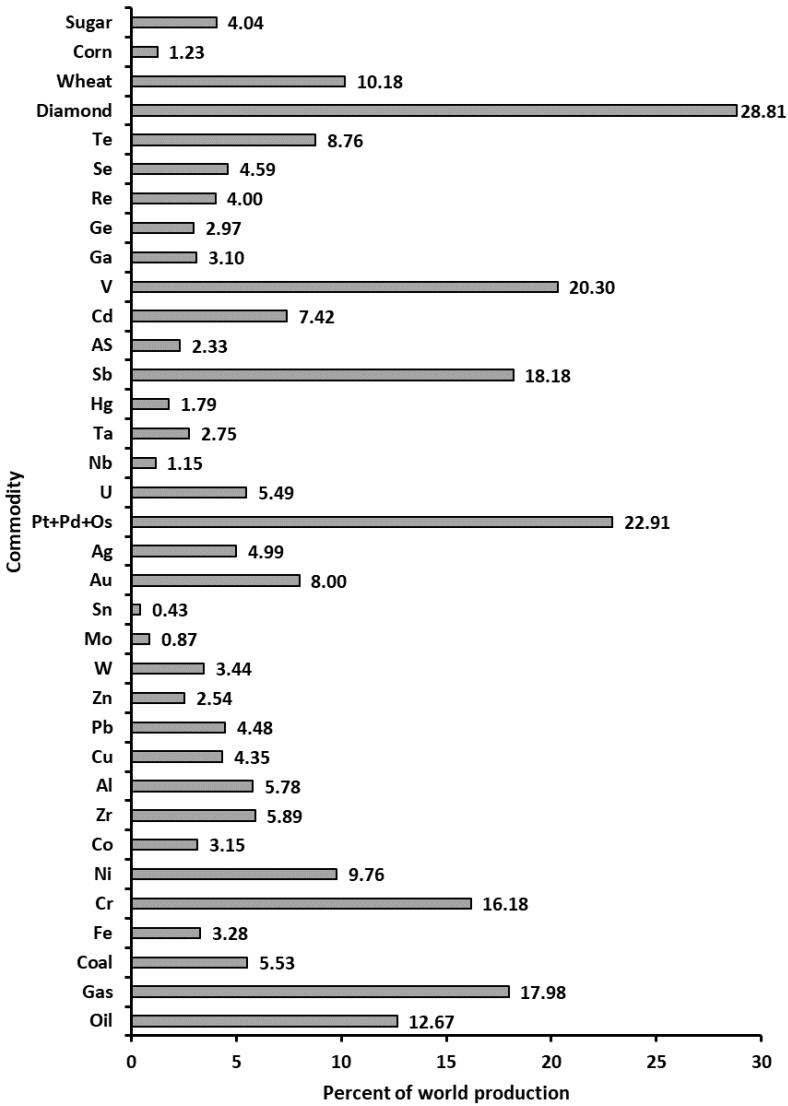

Figure 51. Production of Primary Commodities in Russia in 2018/2019 as a Share of World Production.

Farhad Moshiri has a double – Iranian and British – nationality. He is the chairman and a shareholder of USM Metalloinvest LLC. He has a 945th rank in the Forbes list with a capital of US$ 2.5 billion [216].

Metalloinvest owns [213]:

1. Lebedinskiy and Michailovskiy iron mines and processing plants
2. Oskol Electrometallurgical Plant
3. Ural Steel
4. Ural Scrap Company.

Metalloinvest is the 7th iron ore mining company in the world (Table 18), as revealed by companies' annual reports [217-226]; the world leading producer of merchant hot briquetted iron (HBI), the second world largest producer of iron pellets, and the producer of high-quality steel.

Table 18. Top 10 Iron Ore Mining Companies in 2019

Company	Country	Fe ore mining, million t
BHP Billiton	Australia	238.5
Rio Tinto	UK	326.7
Vale	Brazil	312.0
Forescue Metals Group	Australia	170.0
ArcelorMittal	Luxembourg	57.1
Anglo American	UK	42.4
Metalloinvest	Russia	40.2
National Mineral Development Corporation	India	32.4
Metinvest	Ukraine	29.0
Cleveland Cliffs Inc.	USA	25.7

Open Joint Stock Company United Company (UC) Rusal was founded in 2007 by amalgamation of [227]:

1. Rusal – Russian aluminum
2. Sual – Siberia and Ural aluminum
3. Aluminum assets of Glencore International AG.

The shareholders of Rusal are:

1. Russian company N^+ – 48.13%
2. Russian investment company ONEXIM Group – 17.02%

3. Siberia & Ural aluminum company Sual – 15.80%
4. Amokenga Holdings – a 100% daughter company of Glencore International AG – 8.75%
5. Management of Rusal – 0.26%
6. Private investors – 10.04%.

The majority shareholder of the first three companies is Oleg Deripaska who correspondingly entirely controls Rusal.

Oleg Deripaska was founder of Rusal, then of Sual and in 2007 he initiated their incorporation in a single united company. In 2020 Forbes rated him as a 908th billionaire of the world with the net worth of US$ 3 billion.

Table 19 provides a list of companies, which have produced more than 2 million t of aluminum in 2019 [228], in which UC Rusal has the third rank.

Table 19. Company Ranking by Aluminum Production in 2019

Company	Country	Al production, million t
Chinalco	China	6.1
Hongqiao Group	China	5.7
UC Rusal	Russia	3.8
Xinfa	China	3.5
Rio Tinto	UK	3.2
Emirate Global Aluminum (EGA)	UAE	2.6
SPIC	China	2.5
Alcoa	USA	2.1
Norsk Hydro	Norway	2.0

UC Rusal owns aluminum mines in Russia, Ukraine, Jamaica, Guyana, and Guinea; alumina and aluminum plants in Russia, Ukraine, Italy, Ireland, Sweden, Jamaica, Guinea, and Nigeria, as well as a trading subsidiary in the USA.

The Public Joint Stock Company MMC Norilsk Nickel was founded in 1999 by the special decree of Russia's Prime Minister. 186.1 million stocks are owned by 250,000 shareholders, among which the majority shareholders are [229]:

1. Olderfrey Holding Ltd – a company registered on Cyprus – 34.6%
2. UC Rusal – 27.8%
3. Caspian Investment Ltd – 4.2%
4. Other – 37.6%.

MMC Norilsk Nickel is:

1. The first world palladium producer with 2019 output of 2,919,000 troy ounces and the world market share of 41%
2. The fourth world platinum producer with 2019 output of 700,000 troy ounces and the world market share of 11%
3. The first world nickel producer with 2019 output of 225,000 t and the world market share of 24%
4. The eleventh world copper producer with 2019 output of 499,000 t and the world market share of 2%
5. The eights world cobalt producer with 2019 output of 7,000 t and the world market share of 3%
6. The fourth world rhodium producer with 2019 output of 78,000 troy ounces and the world market share of 9%.

MMC Norilsk Nickel owns mines and metallurgic plants in Russia, Finland, the USA, South Africa, Botswana, and Australia.

Public Joint Stock Company Alrosa was established on 19 February 1992 by the Decree of President of the Russian Federation #158c. The company has assimilated [230]:

1. Yakutalmaz – the soviet state rough diamond mining company
2. State Precious Metals and Gems Depository, and
3. Almazyuvelirexport – the state diamond and gems exporting company.

Shareholders of OJSC Alrosa are:

1. Federal Agency for State Property Management – 43.9256%

2. Ministry of Patrimonial and Land Regulation of the Sakha Republic – 25.0002%
3. Legal and private persons – 23.0739%
4. Administration of the Sakha Republic – 8.0003%.

The company has 31 subsidiaries in Russia, the USA, Switzerland, Belgium, United Arab Emirates, Hong Kong, and Angola. The company manages 10 open, 3 underground mines, 14 diamond placers, 6 processing complexes, mainly in Russia and Angola.

Alrosa is the largest rough diamond mining and processing company of the world with the market share of 27.87% [230], as it is shown in Table 20.

Table 20. Largest Diamond Producing Companies in 2019

Company	Country	Production, million carats
Alrosa	Russia	38.500
De Beers Group	UK	31.370
Rio Tinto	UK	17.111
Petra Diamonds	South Africa	4.278
Others		46.908

Of course, there are other world-class mining companies in Russia like the 4th world silver producer Polymetal International [231] or the world fourth uranium producer Company Uranium One, or having the seventh rank ARMZ [232]. These companies, having key position in sectoral economy, however, are unable to make significant impact to the Russia's social & economic development.

That is why the government pays permanent attention to hydrocarbons producing companies, and first of all – to Gazprom and Rosneft.

History of Rosneft dates from nineteenth century. The first reference to the enterprises being now a part of Rosneft go back to 1889, when the oil-field exploration on Sakhalin was launched [233]. However, in whole-scale the company was established in the Soviet era, after the Second World War, when USSR launched an extensive exploration of oil and gas fields in Siberia and started exporting oil to the Eastern Europe states via the pipeline

system Druzhba [25]. In September 1995 Rosneft was reorganized into the Open Joint Stock Oil Company Rosneft. Today, the company's shareholders, who dispose 10,598,177,817 ordinary securities, are [234]:

1. JSC Rosneftegaz – 40.40%
2. BP Russian Investments Limited – 19.75%
3. QH Oil Investments LLC – 18.93%
4. National Settlement Depository – 10.43%
5. LLC RN-NeftKapitalInvest – 9.60%
6. LLC RN-Capital – 0.55%
7. Federal Agency for State Property Management – < 0.01%
8. Other – 0.34%.

In other worlds, the sole real private minority shareholder of the company is BP. Other shares are disposed by companies entirely accountable to the central government of the Russian Federation.

Public Joint Stock Company Gazprom is the largest joint stock company of the Russian Federation. It was founded on 17 February 1993 by the Decree # 138 of Prime Minister of the Russian Federation [235]. Today, the capitalized assets of the company equal 23,673,512,900 shares, divided between [236]:

1. Federal Agency for State Property Management – 38.37%
2. JSC Rosneftegaz – 10.97%
3. JSC Rosgazifiksatsiya – 0.89%
4. ADR holders – 19.70%
5. Other – 30.07%.

Gazprom owns and/or manages [237]:

1. 100% of shares of 74 daughter companies
2. Majority shares of 39 companies
3. Minority shares of 42 companies

4. 22 gas storages with the bulk capacity of 93,533 million m^3 of natural gas
5. More than 35,000 km of pipelines in Russia, Ukraine, Belarus, and Armenia
6. About the totality of gas reserves in Russia
7. About 35% of oil reserves in Russia.

As far as both Rosneft and Gazprom are managed by the central government of the Russian Federation, they are maintaining the synergetic policy in Russia and beyond and this way represent extremely serious players at the international oil and gas markets.

Now, because practically all world-class oil companies are producing simultaneously both oil and gas, for performing their ranking I have recalculated gas production into million tons of oil equivalent (Mtoe), according to conversion factors proposed by BP [23] and added this volume to oil production. For doing this a huge number of publications was analyzed [237-250, etc.]. Table 21 presents results of this analysis.

It may be seen that Gazprom, being the largest gas producing company of the world, has the second rank by hydrocarbons extraction, and Rosneft has the sixth rank. However, jointly in 2019 they have produced 738.13 million tons of oil equivalent. Now, because they are covered by an umbrella of the integrated management by both the Federal Agency for State Property Management of the Russian Federation and the state-owned JSC Rosneftegaz, both companies are acting synergistically at international oil markets and represent a powerful weapon of the Russian government to carry out the corresponding policy.

Such energy policy and corresponding Russian foreign politics led to a number of huge international conflicts, namely – to Russia-Georgia war, as it has been mentioned above, and to Russia-Ukraine “Gas Wars”, which ultimately determined annexation of Crimea.

Table 21. Ranking of Major Hydrocarbon Companies of the World by Production in 2019

Company	Country	Production		
		Oil, million t	Gas, billion m^3	Hydrocarbons, Mtoe
Saudi Aramco	Saudi Arabia	657.40	79.10	720.89
Gazprom	Russia	48.00	501.20	450.26
INOC	Iraq	391.70	0.00	391.70
NIOC+NIGC	Iran	160.80	209.80	329.18
Rosneft	Russia	234.10	67.00	287.87
ExxonMobil	USA	196.80	82.60	263.09
PetroChina	China	124.10	109.40	211.90
CNPC	China	101.70	118.80	197.05
Sonatrach	Algeria	48.30	127.40	150.55
KPC	Kuwait	156.90	0.00	156.90
Petrobras	Brazil	108.20	47.70	146.48
Chevron	USA	92.90	62.90	143.38
BP	UK	52.10	68.80	107.32
Pemex	Mexico	36.20	43.00	70.71

The precondition of these gas wars was as follows.

Basic oil and gas infrastructure including pipelines and gas storages was constructed in the Soviet era, when the Central Committee of the USSR Communist Party didn't see independence of Soviet republics even in nightmares. Correspondingly, the pipelines and gas storages were designed paying attention to geographical instead of geopolitical framework. As a result, the predominant majority of the Druzhba network and gas export pipelines traces the Ukraine territory toward Uzhgorod. As well, 13 gas storages with total capacity of 31.3 billion m^3 are located in Ukraine [78].

After collapse of the USSR, Russia authorized Gazprom to manage pipelines and gas storages in Russia and Ukraine, however, Ukrainian Rada nationalized them [251]. The contradiction of two countries concerning geopolitics of gas and lack of common approaches to conditions under which Russian gas could be transferred to the European Union, led to Russia – Ukraine 2006 [252] and 2009 [253] gas wars, which were described earlier [78].

Thus, Russia decided to construct the Blue Stream 24-inch diameter offshore gas pipeline from Beregovoye at the Russian shore of the Black Sea to Samsun in Turkey. However, its capacity was insufficient to mitigate the situation and to solve the Russia – Ukraine conflict [254].

Indeed, Figure 52 demonstrates capacity of export pipelines, which supplied Europe with Russian gas before 2012. 70% of their bulk capacity falls on those traversing Ukraine. Thus, this Newly Independent State had a possibility to play its best card in bargaining with Gazprom on wholesales and transit gas tariffs, and Gazprom suffered a defeat in this game.

Correspondingly, Russia, firstly, constructed the Nord Stream pipeline system [255] and, secondly, interfered in inner politics of the independent Ukraine ultimately annexing Crimea and supporting nationalistic movements in the Russian-speaking eastern part of the country.

But even now situation is not very easy for Gazprom.

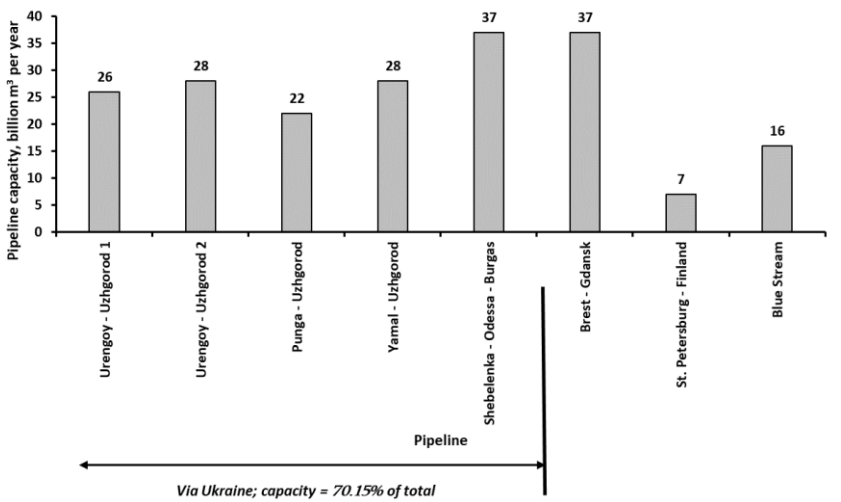

Figure 52. Capacity of Interstate Gas Pipelines Managed by Gazprom Before 2012.

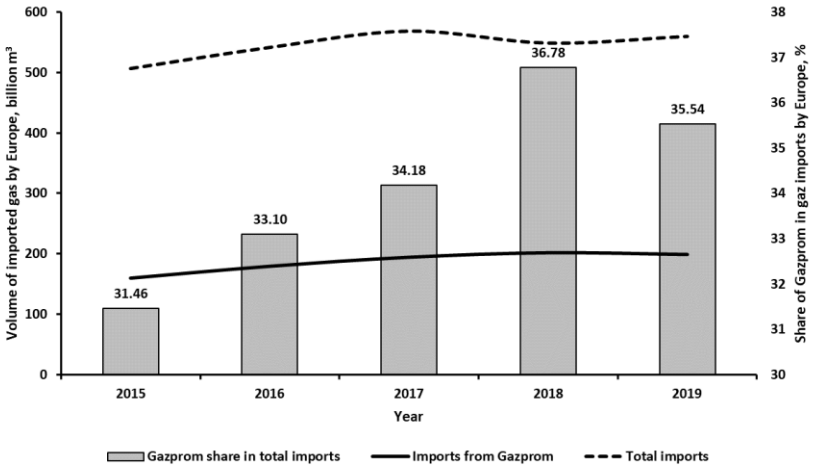

Figure 53. Share of Gazprom in European Gas Imports.

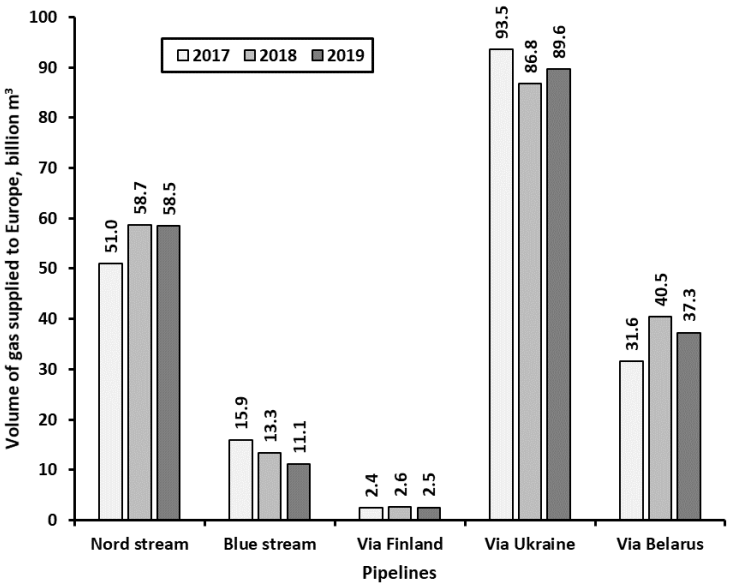

Figure 54. Gazprom's Oil Exports to Europe by Different Pipeline Systems.

Analyzing the Company's last annual report [237], several important conclusions may be made.

Figure 53 provides information of Gazprom's share in gas supply to Europe, which the last years sustainably surpassed 30%. According to the

company's recent annual report, this volume of natural gas was supplied by different pipelines.

Figure 54 proves that even after the Nord Stream pipeline system became operational, importance of Ukrainian transit pipelines diminished only insignificantly, and such a framework creates a serious concern both to the European Union, which tries to diminish dependence on Russia in gas supply [256], and to Russia, which, on the contrary, desires to insure gas supply to Europe avoiding intense usage of transit pipelines on the Ukrainian territory. For achieving this goal, the Russian government is lobbying the Nord Stream 2 project [257], which, however, meets a lot of opposition, and probability of its ultimate blockage is high enough [258].

Thus, President Putin's concept of Russia's social & economic development is based on exports of primary commodities. In addition, the strategic companies briefly described above, are trying to acquire mineral deposits and hydrocarbon fields worldwide. At the same time, among primary commodities role of oil is incomparably high. For instance, in 2019 Russia exported 417.32 million tons of crude oil, and the nominal value of its exports was US$ 132.61 billion. The same year the country exported 234.73 billion cubic meters of natural gas. In this case the nominal value of exports equaled to US$ 40.89 billion, e.g. was 3.24 times less than that of oil exports. Thus, gas exports represent a geopolitical press on Europe rather than a real economic engine.

Like two-faced Janus, the oil-oriented economic policy of President Putin has both positive and negative consequences for Russia, discussed below.

4.2. Russia at International Oil Markets Before COVID-19 Coronavirus Pandemic

For maintaining oil export-oriented economy, first of all resource endowment for extensive oil production shall be guaranteed. Figure 55 displays dynamics of Russia's proven oil reserves in 1991-2019, as released

by BP [23]. The figure outlines a tendency of fast oil reserve depletion: in 1991-2015 reserves diminished by 1,879.14 million tons or by 11.86%, then by 2019 slightly increased by 689.85 million tons. For understanding reasons of depletion, we have analyzed interrelation between oil production and reserve movement (Figure 56). Comparison of Figures 55 and 56 reveals two well-pronounced tendencies.

Firstly, oil production dramatically diminished in 1991-1999, and only starting from 2000, e.g., from the first year Mr. Putin came to power, began to sustainably increase. In 2000-2005 such increase was fast, with an average annual rate of 9.30%, then the production growth slowed down, and the average rate became 1.31%. Thus, accelerated resource depletion in 1991-2000 without any doubt was determined by mismanagement of oil fields within the framework of a huge economic crisis rather than by extensive oil production. Let remind that collapse of the Soviet Union immediately canceled economic relations both between the former Soviet republic and with the "near abroad" [259]. When President Putin started to implement his economic approach, described above, the situation radically changed, and in 2006-2007 resources were slightly improved.

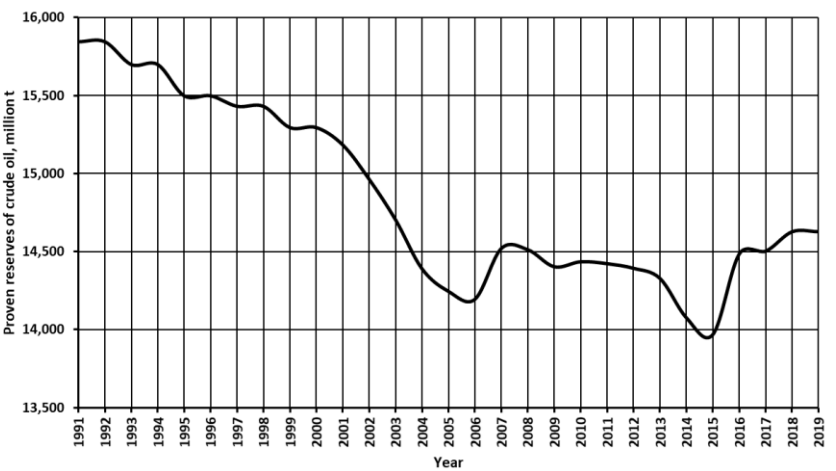

Figure 55. Proven Reserves of Crude Oil of the Russian Federation in 1991-2019.

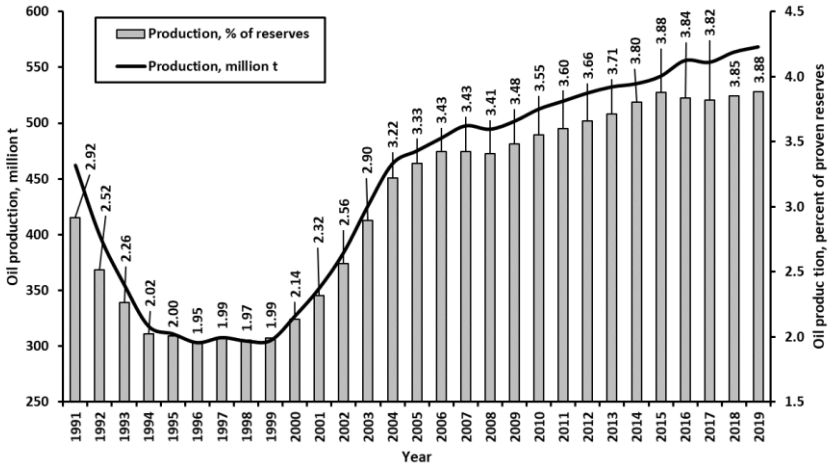

Figure 56. Dynamics of Oil Production in the Russian Federation in 1991-2019.

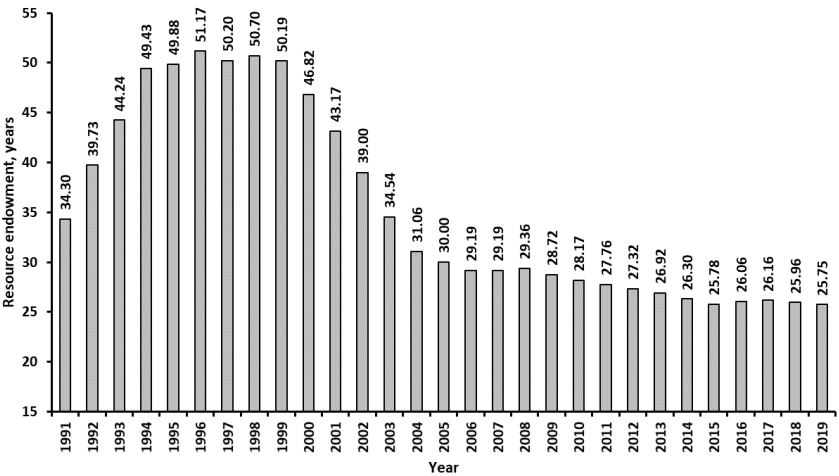

Figure 57. Dynamics of Oil Resource Endowment of the Russian Federation in 1991-2019.

Secondly, increment of resources determined by both exploration campaigns and adequate management of oil fields were unable to follow extensive production of crude oil: In 2019 3.88 percent of proven reserves were produced. Such circumstances led to accelerated oil depletion, e.g., to diminishing of oil resource endowment or, in other words, of the term when

oil production is supported by existing reserves. Figure 57 shows that starting from 1999 this index is being dramatically diminished and in 2019 comprised less than 26 years. Nonetheless, in my opinion, Russia never will abandon this policy under Mr. Putin's presidency.

Figure 58 summarizes information of Russia's crude oil production and exports. There is a picturesque increase of oil exports already a year after Vladimir Putin became President of the Russian Federation. After 2001 exports sustainably was more than 70% of oil production with one exception for the year of the world economic crisis.

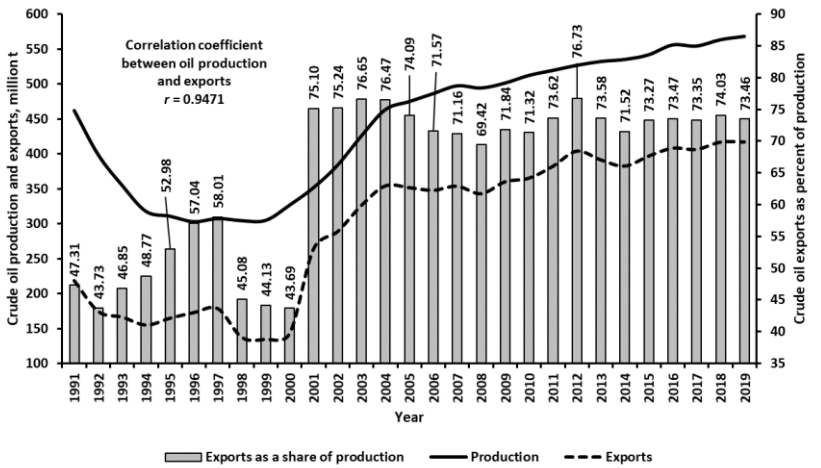

Figure 58. Russia's Oil Production and Exports in 1991-2019.

Table 22 describes oil exports from Russia in 2019 by destination [23]. It may be seen that Europe and China are the main oil trade partners.

According to the Rosneft's recent annual report [238], 44% of oil exports or about 184 million tons was performed by pipelines, 55% or 229 million t – by tankers, and 1% (4 million t) – by rail. 89% of exports or slightly more than 371 million tons was effectuated under futures contracts and had a concrete destination. Roughly 50 million tons or 11% of total exports were traded under spot contracts in the offshore zone on the tanker-to-tanker basis.

Table 22. Oil Exports from Russia by Destination in 2019

Destination	Percent of total exports
Canada	0.31
USA	2.30
Other Americas	0.12
Europe	53.48
CIS	6.44
Middle East	1.95
Australia	0.31
China	27.14
India	1.03
Japan	2.76
Singapore	0.50
Other Asia & Pacific	3.65

Table 23 lists basic oil seaports and terminals of the Russian Federation.

Table 23. Basic Oil Seaports of the Russian Federation

Export port	Sea	Percent of oil maritime exports
Primorsk	Baltic Sea	35.14
Kozmino	Sea of Japan	21.62
Ust-Luga	Baltic Sea	18.92
Novorossiysk	Black Sea	16.22
De Kastri	Sea of Japan	5.41
Varney	Barents Sea	2.70

Table 24 represents a database according to which oil exports from Russia was calculated using equation (6). Data on oil production and consumption was drawn from the BP's statistical yearbook [23], and average annual oil prices were calculated based on IFM's Primary Commodity Prices [26]. For conversion of prices expressed un US$ per barrel into US$ per ton the BP's ton to barrel conversion factor for the average weighted world crude oil was used. Statistical analysis of this data bank allowed us to formulate several important economic regularities of oil exports from the Russian Federation.

Table 24. Data Bank on Russia's Crude Oil Sector

Year	World oil price		Oil Industry indices, million t			Export value, US$ billion
	US$ per barrel	US$ per t	Production	Consumption	Export	
1991	20.20	148.07	461.9	245.3	216.60	32.07
1992	19.25	141.10	398.8	235.0	163.81	23.11
1993	16.75	122.78	354.9	196.2	158.65	19.48
1994	15.66	114.79	317.6	172.9	144.69	16.61
1995	16.75	122.78	310.7	150.6	160.15	19.66
1996	20.46	149.97	302.9	129.6	173.31	25.99
1997	18.64	136.63	307.4	128.4	179.06	24.47
1998	11.91	87.30	304.3	123.1	181.23	15.82
1999	16.56	121.38	304.8	125.7	179.08	21.74
2000	27.39	200.77	326.7	123.2	203.41	40.84
2001	23.00	168.59	351.7	127.1	224.59	37.86
2002	22.81	167.20	383.7	122.1	261.64	43.74
2003	27.69	202.97	425.7	126.5	299.25	60.74
2004	37.66	276.05	463.3	124.7	338.60	93.47
2005	50.04	366.79	474.8	125.0	349.80	128.30
2006	58.30	427.34	486.3	130.4	355.86	152.07
2007	64.20	470.59	497.3	130.0	367.36	172.87
2008	91.48	670.55	494.3	133.6	360.62	241.81
2009	53.48	392.01	501.4	128.2	373.18	146.29
2010	71.21	521.97	512.3	133.3	379.03	197.84
2011	87.04	638.00	519.5	142.2	377.24	240.68
2012	86.46	633.75	526.7	144.6	382.09	242.15
2013	91.17	668.28	532.2	144.3	387.94	259.25
2014	85.60	627.45	535.1	152.3	382.83	240.21
2015	41.85	306.76	541.8	144.2	397.56	121.96
2016	36.34	266.37	555.9	148.1	407.81	108.63
2017	45.33	332.27	554.3	145.7	408.60	135.76
2018	58.15	426.24	563.3	149.3	414.09	176.50
2019	43.35	317.76	568.1	150.8	417.33	132.61

Figure 59 displays interrelation between crude oil exports volume and value in 1991-2019. Though the correlation between these two indices is significant and strong and both of them display growing tendency, nonetheless oil exports value is subject to serious annual undulations. Such behavior without any doubt is determined by annual changes of average oil prices.

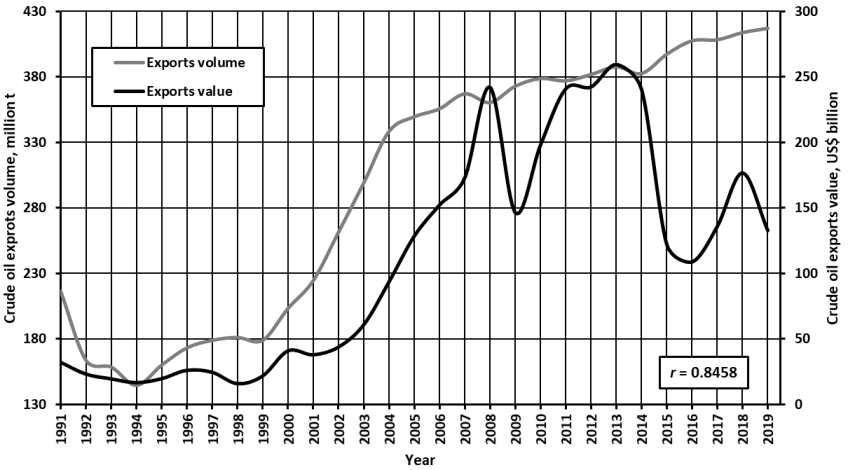

Figure 59. Russia's Crude Oil Exports Volume and Value in 1991-2019.

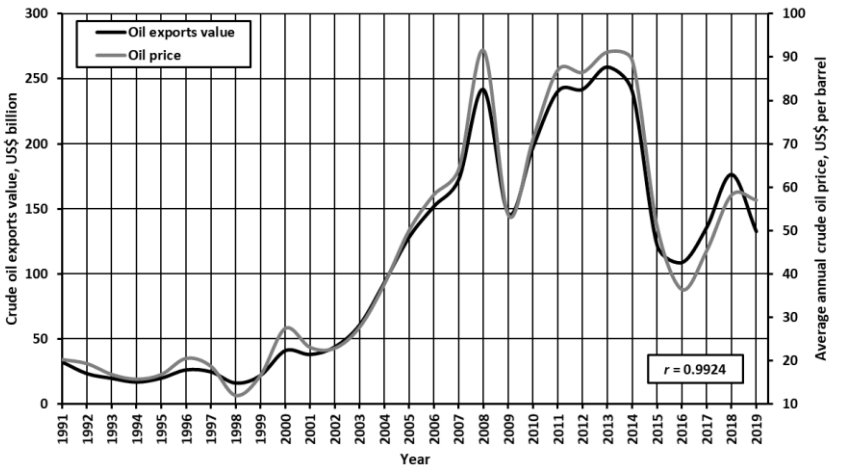

Figure 60. Interrelation between Russia's Oil Exports Value and Average Annual World Crude Oil Prices in 1991-2019.

For confirming this thesis, we have analyzed the interdependence between oil exports from the Russian Federation and international oil prices, displayed on Figure 60. Analysis of the regularity cropped out by this figure resulted in formulation of two important conclusions: Firstly, oil exports value, of course, depends on two parameters – exports volume and oil price,

and secondly, impact of oil price on exports value is at least three times more powerful than those of exports volume. Geopolitical applications of these rules will be discussed below.

Figure 61 compares Russia's oil exports value with the country GDP. Extremely high value of the correlation coefficient allowed us to perform statistical modelling of the GDP of the Russian Federation based on oil exports value. Quadratic regression equation is shown on Figure 62 whereas parameters and coefficients of the regression equation are displayed, correspondingly, in Tables 25 and 26.

Quadratic regression plot has a quasi linear shape, and this means that possible increase of oil exports value will significantly improve GDP of the Russian Federation.

Table 25. ANOVA Parameters to Quadratic Regression Equation on Figure 62

Parameter	**Sum of Squares**	***dF***	**Mean Square**	***F***	***ε***
Regression	12,223,117.140	2	6,111,558.570	170.399	0
Residual	932,522.403	26	35,866.246		
Total	13,155,639.543	28			

x_i is oil exports value, US$ billion; y_i is GDP of Russia, US$ billion.

Table 26. Coefficient of Quadratic Regression Equation on Figure 62

Coefficients	***B***	***S***	***β***	***t***	***ε***
x_i	6.212	1.646	0.780	3.779	0.001
x_i^2	0.006	0.006	0.189	0.914	0.369
β_0	194.440	80.232		2.423	0.023

S is standard error, *t* is Student's coefficient.

Figure 63 compares dynamics of real and model GDP, computed from oil exports value. Accuracy of the model is ± 3%. In other words, whoever will be able to manage oil exports value from Russia, will have a tangible key to the country's economic welfare.

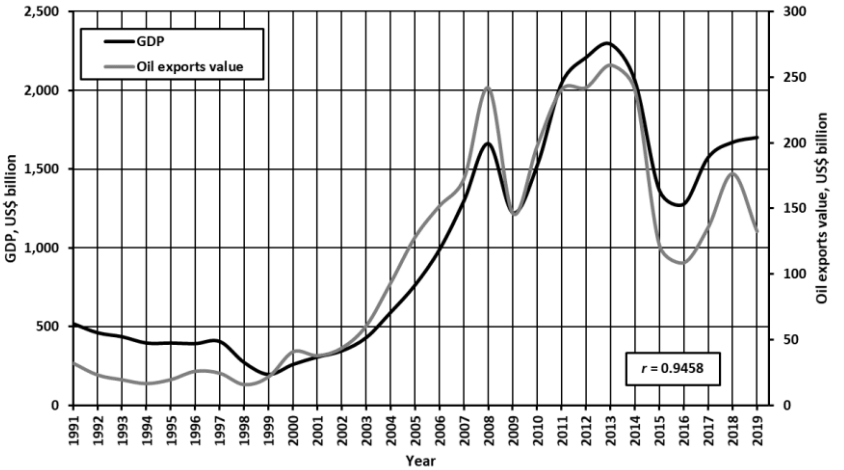

Figure 61. Interdependence between Russia's Oil Exports Value and GDP in 1991-2019.

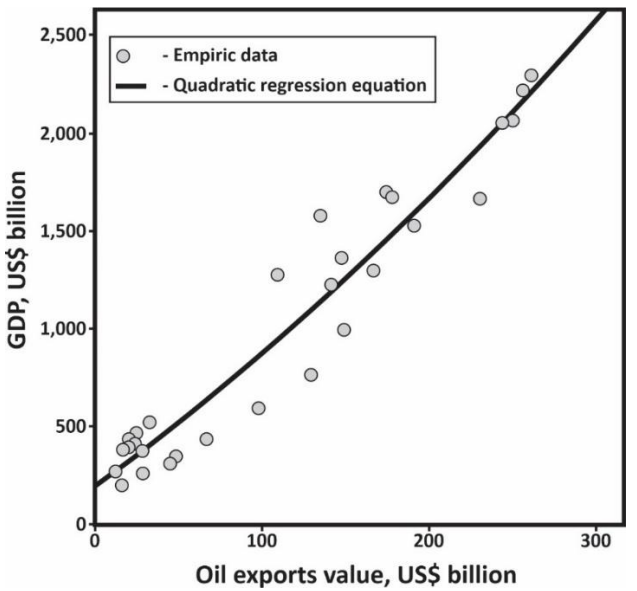

Figure 62. Russia's GDP Model Based on Oil Exports Value.

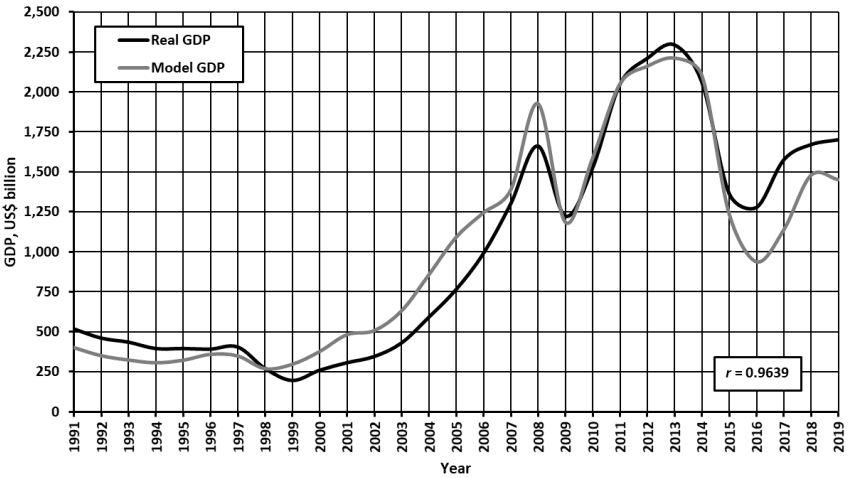

Figure 63. Real and Model GDP of Russia, Computed from Oil Exports Value.

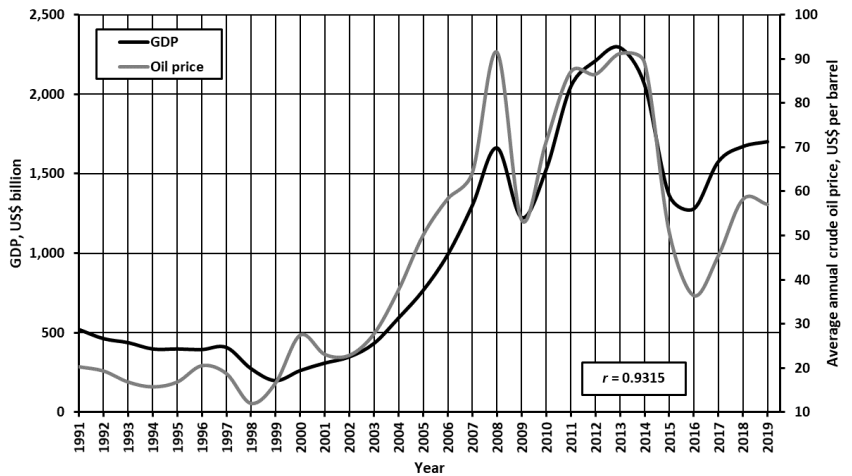

Figure 64. Interdependence between Russia's GDP and Average Annual Oil Prices in 1991-2019.

Now, as Figure 60 has sown, impact of oil prices on its exports value from Russia is very strong. Correspondingly, we were interested to investigate numerically what is the influence of international oil prices on the country's GDP. With this regard we have statistically studied the

interdepence between these two economic indices, as it is displayed on Figure 64.

Significant and strong correlation between Russia's GDP and oil prices allowed us to draw another statistical model, which ties these two parameters. Quadratic regression equation is displayed on Figure 65, and its parameters and coefficients are described by Tables 27 and 28, correspondingly.

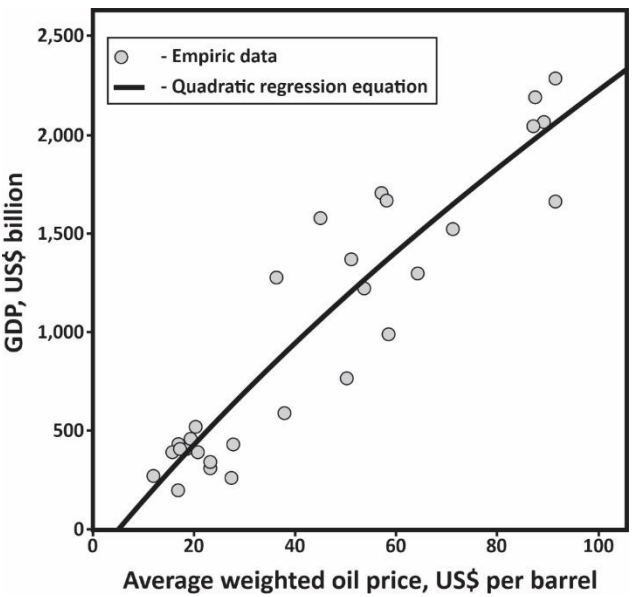

Figure 65. Russia's GDP Model Based on Oil Prices.

Table 27. ANOVA Parameters to Quadratic Regression Equation on Figure 65

Parameter	Sum of Squares	*dF*	Mean Square	*F*	ε
Regression	11,441,052.671	2	5,720,526.336	86.746	0
Residual	1,714.586.872	26	65,945.649		
Total	13,155,639.543	28			

x_i is oil price, US$ per barrel; y_i is GDP of Russia, US$ billion.

Table 28. Coefficient of Quadratic Regression Equation on Figure 65

Coefficients	*B*	*S*	β	*t*	ε
x_i	29.313	8.937	1.144	3.280	0.003
x_i^2	-0.053	0.085	-0.217	-0.622	0.539
β_0	-155.707	186.046		-0.837	0.410

S is standard error, *t* is Student's coefficient.

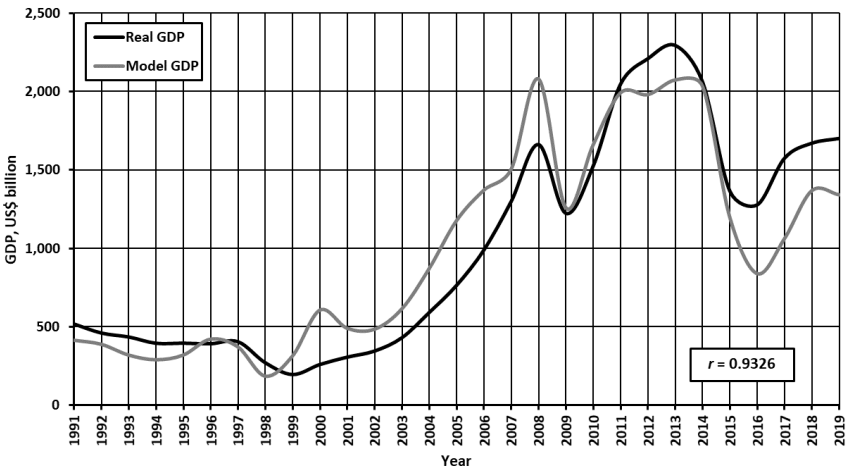

Figure 66. Real and Model GDP of Russia, Computed from World Oil Prices.

Figure 66 demonstrates that the accuracy of the model is ± 5%.

It is important to note that the influence of crude oil prices on the Russia' GDP is indirect: Prices determine oil exports value, which, in turn, regulate GDP of the country.

The performed statistical modelling with perfect obviousness proves that economic development of the Russian Federation is totally determined by oil exports. If we compare now figures 14, 41 and 64, we may see that any fluctuation of oil prices immediately causes changes in the Russia's GDP. From this point of view, President Obama's sustainable, 1.5-years-long strong U.S. Dollar policy in 2014-2015, which provoked gradual decreasing of international oil prices (see Figure 41), lead to collapse of the Russia's economy. Figure 67 demonstrates dependence of U.S. Dollar to the Russian Ruble exchange rate on international oil prices from mid-2014 to

the end of 2017, e.g., the year before the sanctions on Iran were imposed. Monthly crude oil prices are released by IMF [26], and average monthly US$ to RUB exchange rate was calculated from daily data as they are shown by X-Rates [260].

This analysis revealed that the Russian national currency strength is entirely determined by oil prices within the framework of the targeted strong U.S. Dollar policy. It may be seen that from June 2014 to February 2016 the Russian Ruble devaluated by 225.56% causing the 2014-2015 finance and economic crisis in the Russian Federation.

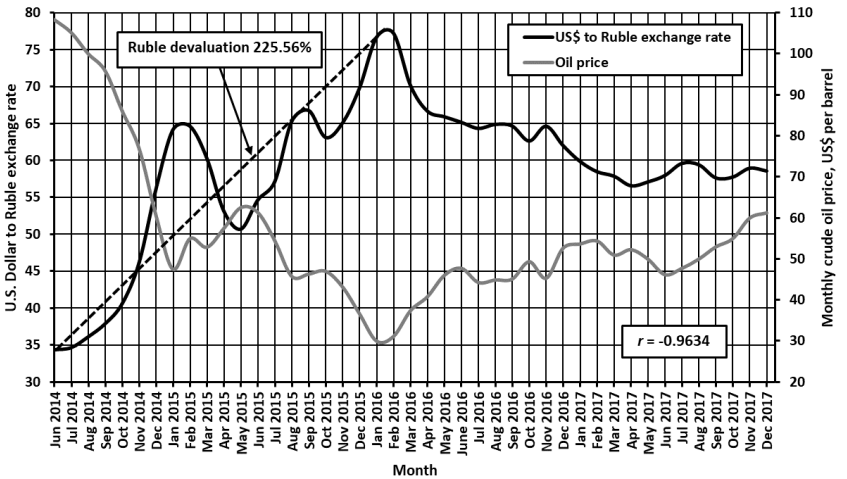

Figure 67. Interdependence between Oil Prices and Russian Ruble to U.S. Dollar Exchange Rate in 2014-2017.

In a predominant number of abundant researches on the 2014-2015 finance and economic crisis in Russia [261-263, etc.] among several reasons of the currency collapse, first of all decrease of oil prices is mentioned. Such price fall has been unforeseen by the Russian government and adequate mitigation measures have not been applied. My opinion, as sown above, is just the same.

Moreover, I believe that the Russia's central bank had no instruments for mitigation of this crisis. From this point of view attempts to explain devaluation of Ruble due to application of the new government finance policy of the weak national currency [264] seem to be methodologically unproven.

Indeed, the modern political economy considers the weak currency exchange rate policy as a tool for the accelerated economic development [265]. For instance, such policy was successfully applied by President George W. Bush during the first term of his presidency. But there is an enormous difference between economies of the USA and the Russian Federation. Within the framework of direct or indirect price quoting in US$, increase of commodity and derivatives prices do not impact on the national consumer market. Russia's case is quite different. When the lion's share of the added value is created at international commodity markets, and the predominant majority of consumer goods are imported, the weak national currency policy leads to increase of consumer prices, unemployment and mass impoverishment of population, because no adequate indexation of consumer prices was applied. For instance, for the period 2014-2015, when devaluation of the Russian Ruble was catastrophic, the governmental experts concluded that the consumer prices increased only by 12.9%, and the trade turnover diminished by 10% [266].

Of course, Russian economists and geopolitical analysts clearly understand inferiority and lameness of the oil-export-oriented economic policy and are trying to elaborate new approaches and new concepts [203-205, 267, 268, etc.]. Among them launching of infrastructural projects, reform of fiscal policy, sectoral and regional development, etc. were proposed. However, all such strategies, elaborated even on the governmental level [203], happened to be a simple piece of paper and never have been executed.

In my opinion, neither of new approaches will be realized in practice under Vladimir Putin's presidency.

4.3. CONSEQUENCES OF COVID-19 CORONAVIRUS PANDEMIC FOR RUSSIA'S ECONOMY

There is a number of publications where influence of the world COVID-19 coronavirus pandemic on the Russia's economy is explored. The World Bank Group reported [269] that after the economic growth in the first quarter of 2020, the pandemic caused a sharp recession in finance sector and on the labor market, and recommendations were elaborated to mitigate these negative features. In a special report by the Russian Academy of Sciences in mid-spring 2020 [270] a severe decline of the Russia's GDP was forecasted due to several reasons like inflation, decrease of world oil prices, increase of consumer prices, lockdown of business activity, etc. Dzobelova and her co-authors [271] who explored economic environment in the Russia's regions, outlined increase of unemployment and forecasted economic decline but their article did not overpass the margins of a general narrative. In a quite interesting research by D. Sagramoso, also published in mid-spring 2020 [272], it is forecasted that the negative impact of COVID-19 pandemic on the Russian economy will be very severe – according to her opinion, Russia's GDP would shrink by 6% in 2020, and all the negative consequences were suggested to be mitigated only by 2024. In a publication by Yermakov and Henderson [273], the oil price deal between Russia and Saudi Arabia is welcomed, hence, in reality the first deal failed [274]. As far as misunderstanding between Saudi Arabia and Russia concerning OPEC+ oil strategy led to serious consequences for Russia's economy, it seems necessary to briefly discuss highlines of this deal.

Already in late February – early March OPEC+ (e.g., OPEC member countries and its allies) was seriously concerned on the oil market short-term development trends within the framework of COVID-19 coronavirus pandemic [275]. Because Saudi Arabia was, is and, at our opinion, will be an informal leader of OPEC, very often the Arab Kingdom "uses its spare capacity to *reduce* volatility in oil markets and protect the global economy from a volatile, cyclical industry" [274, p. 6]. As response to OPEC's concern caused by the COVID-19 coronavirus pandemic impact on

sustainability of oil markets, Saudi Arabia initiated an extraordinary meeting of OPEC+. This meeting has been called on 6 March 2020 in Vienna. As a measure against the falling oil prices in late January – February, Saudi Arabia proposed a new cut of oil production of 1.5 million barrels a day, in addition to already agreed cut of 2.1 million barrels a day relative to the output as of October 2018 agreed in December of 2019 [276]. However, this proposal has risen a hard objection of the Russian party leaded by the Russia's Deputy Energy Minister Pavel Sorokin. As a counterbalance, Russia proposed to extend the 2018 deal but not introduce a new cut before the second half of 2020. According to Mr. Sorokin, such a policy "would have given time for everyone to evaluate the true effect of COVID-19 on demand" [273, p. 3]. Immediately after the deal failure, on 8 March 2020, Saudi Arabia announced unexpected price discounts of US$ 6 to US$ 8 per barrel to customers in Europe, Asia, and the United States [277]. On 12 March Russia's Energy Minister Alexander Novak held a meeting with the representatives of Russia's main oil companies. Practically all of them outlined that they will meet difficult days though survive under the pressure of low oil prices. However, Rosneft fixed a different position proposing to withdraw from OPEC+ [273]. Finally, on 12 April OPEC+ including Russia signed a deal under the following conditions:

1. 1 May – 30 June 2020 – oil output reduces by 9.7 million barrels per day comparing with October 2018 production level jointly by all OPEC+ members
2. 1 July – 31 December 2020 – increase of output by 2 million barrels a day, e.g., 7.7 million barrel per day less than in October 2018
3. 1 January – 30 April 2021 – increase of oil production by 1.9 million barrels daily.

According to certain studies [279, etc.], this deal meets objectives of Russia's geopolitical interests and its oil strategy. However, we will see below what were the real consequence of this deal for Russia's economy.

Table 29. Data Bank on COVID-19 Coronavirus Pandemic in Russia

Date	Weekly coronavirus infection cases	Weekly deaths	Mortality rate, % of infected	Date	Weekly coronavirus infection cases	Weekly deaths	Mortality rate, % of infected
21 Jan	0	0	0	13 Jul	45,837	1,143	2.49
27 Jan	0	0	0	20 Jul	43,787	988	2.26
03 Feb	0	0	0	27 Jul	40,634	927	2.28
10 Feb	0	0	0	03 Aug	38,144	853	2.24
18 Feb	2	0	0	10 Aug	36,390	794	2.18
24 Feb	0	0	0	17 Aug	35,091	739	2.11
02 Mar	1	0	0	24 Aug	33,748	708	2.10
06 Mar	10	0	0	31 Aug	33,826	731	2.16
10 Mar	7	0	0	08 Sep	40,470	814	2.01
16 Mar	73	0	0	14 Sep	32,531	642	1.97
24 Mar	402	1	0.25	21 Sep	41,275	854	2.07
30 Mar	1,341	8	0.60	28 Sep	49,978	896	1.79
07 Apr	5,661	49	0.87	05 Oct	66,316	1,090	1.64
14 Apr	13,605	112	0.82	12 Oct	86,421	1,247	1.44
20 Apr	26,019	235	0.90	19 Oct	103,006	1,644	1.60
28 Apr	46,437	462	0.99	26 Oct	115,908	1,903	1.64
04 May	51,710	489	0.95	02 Nov	123,814	2,204	1.78
11 May	76,076	653	0.86	09 Nov	141,094	2,320	1.64
18 May	69,334	713	1.03	16 Nov	107,121	2,041	1.91
26 May	71,664	1,085	1.51	23 Nov	211,249	3,706	1.75
01 Jun	52,536	1,048	1.99	30 Nov	181,152	3,355	1.85
06 Jun	52,780	1,116	2.11	07 Dec	193,158	3,702	1.92
15 Jun	69,552	1,120	1.61	14 Dec	192,444	3,794	1.97
22 Jun	55,070	1,115	2.02	21 Dec	196,471	3,960	2.02
29 Jun	48,876	960	1.96	28 Dec	200,308	3,914	1.95
06 Jul	46,706	1,130	2.42	31 Dec	81,252	1,754	2.16

One additional feature of the above-analyzed articles can be mentioned. Surprisingly, in neither of these and analogous publications statistics on both real epidemiologic situation in Russia and influence of oil markets on the Russia's economy were analyzed. So, we will try to provide the corresponding statistical data.

According to the WHO official information [7], by 31 December 2020 there were totally 3,159,297 infection cases in Russia, with 57,019 deaths. Table 29 contains a data bank on the dynamics of SARS-CoV-2 disease spread in Russia. The WHO data were processed according to the

methodology described in Chapter 1. Figure 68 provides the general statistics on the disease.

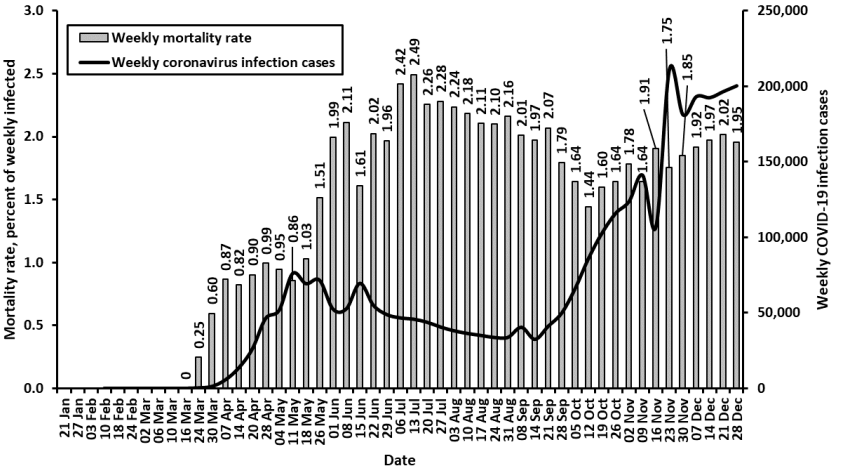

Figure 68. General Statistics on COVID-19 Coronavirus Pandemic in Russia.

Comparison of this figure with average world data (see Figure 4) reveals a quite unusual tendencies of the pandemic in Russia.

Firstly, the initial infection case was fixed on the week of 2 March 2020, and the first death occurred on 24 March. Secondly, it is true that the average world mortality rate computed according to our methodology, is 3.39% versus 1.71% in Russia, though in this state the tendency of gradual and sustainable decrease of mortality rate after 20 April is absolutely unpronounced. The average world mortality within the period of 20 April – 31 December rates 2.60%, and in 31 August – 31 December – 1.66%. For the same periods the mortality rate in Russia is, correspondingly, 1.85% and 1.76%. Hence, this reverse development of SARS-CoV-2 disease in Russia is an epidemiological problem. On the other hand, 2020 economic processes in Russia, as it is shown below, follows international rather than national tendencies. For instance, Figure 69 demonstrates interrelation between weekly average weighted crude oil prices and U.S. Dollar to Russian Ruble exchange rate [260].

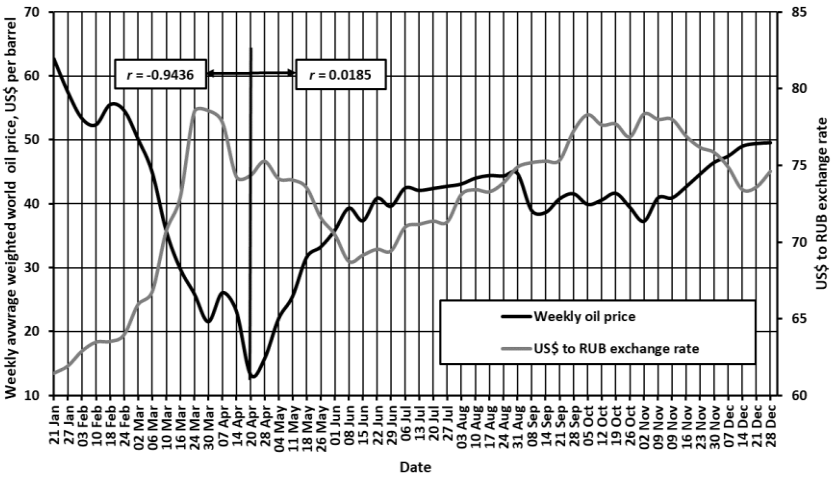

Figure 69. Interdependence between Average Weighted Weekly Crude Oil Prices and U.S. Dollar to Russian Ruble Exchange Rate in 2020.

It is really interesting to note that the exchange rate of the Russian national currency versus U.S. Dollar in 2020 was characterized just by the reverse tendencies that Euro: Comparison of these data with Figure 26 shows that as soon as correlation between oil prices and Euro to U.S. Dollar was restored, it disappeared in case of Ruble to Dollar exchange. It must be boldly outlined that such a behavior is typical for all freely convertible currencies as it is shown on Figure 70 [280-283]. After 20 April all them have lost the negative correlation with oil prices.

Additionally, usually absent correlation between freely convertible currencies and oil prices becomes extremely strong when U.S. Dollar is artificially strengthened targeting decrease of oil prices for geopolitical reasons. Figure 71, for example, displays such a correlation with Swedish Krona [284].

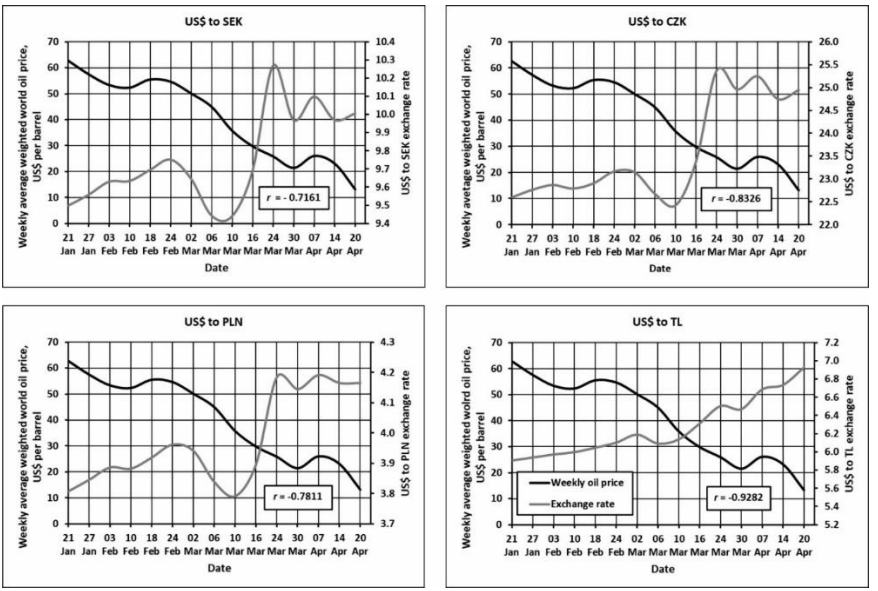

Figure 70. Interrelations between Averages Weighted Weekly World Crude Oil Prices and the Exchange Rates of U.S. Dollar to Swedish Krona, Czech Koruna, Polish Zloty, and Turkish Lira from 21 January to 20 April 2020.

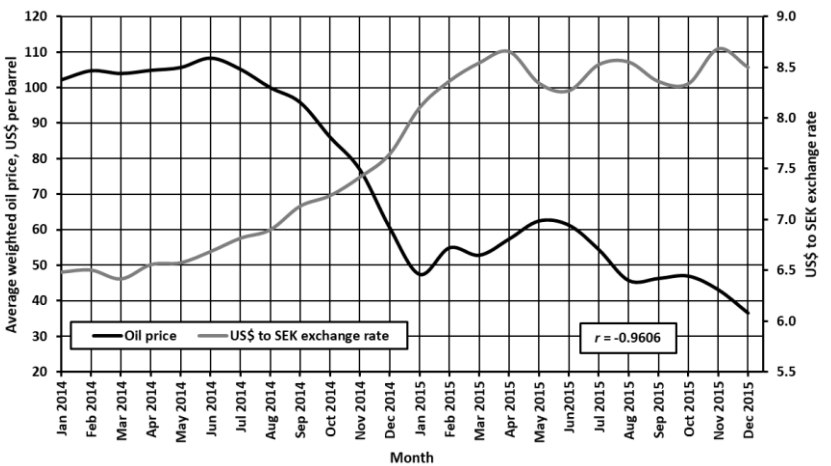

Figure 71. Interrelation between Average Monthly Oil Prices and Swedish Krona to U.S. Dollar Exchange Rate in 2014-2015.

Hence, of course, such interrelation is indirect and is determined by the tight dependence of the currency on the U.S. Dollar comparative strength (Figure 72).

These regularities represent a picturesque manifestation of the political economy of the exchange rate. Unfortunately, there is no room in this book to explore them in depth, though I hope to perform such analysis in a particular publication.

Hence, they proof very clearly that the Russian economy is characterized by a dualistic character: On one hand, all strategic economic branches, and first of all the hydrocarbon sector, are rigidly governed by the central government. On the other hand, aiming merging with the international oil markets, Russia was obliged to liberalize its finance management.

Table 30 assesses Russia's oil exports value in 2020. Exports volume was released by the Ministry of Energy of the Russian Federation [285]. Monthly oil prices are quoted according to IMF primary commodity prices [26] and recalculated per ton using the BP's conversion coefficient [23]. Figure 73 compares monthly dynamics of oil export's' volumes and values.

The above table and figure demonstrate two facts: Primo, in spite of enormous efforts of the Russian government to maintain oil exports volume on the 2019 level, it has diminished by 44.33%, from 417.32 to 232.36 million tons. Secondo, dramatically reduced crude oil price, which for the year 2020 equaled to US$ 41.26 per barrel in average or was 27.61% less than in 2019, in combination with minimized oil exports volume determined drastic drop of exports value by 47.02 percent, from US$ 132.61 billion to US$ 70.26 billion.

For understanding Russia's behavior on international oil markets in 2020, it is important to analyze how the country's government has respected the 12 April OPEC+ agreement. For this purpose, we have processed the official data by the Ministry of Energy of the Russian Federation [285] and recalculated them on the daily basis using BP's conversion coefficient [23]. Figure 74, which contains results of this analysis, shows that the basic provisions of the agreement were respected as the Russian government decided to interpret them.

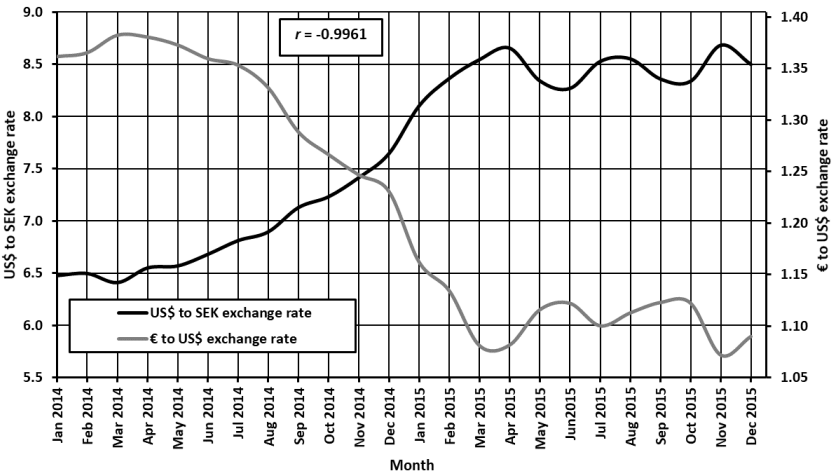

Figure 72. Interrelation between Swedish Krona and Euro to U.S. Dollar Exchange Rates in 2014-2015.

Table 30. Assessment of Russia's Oil Exports Value in 2020

Month	**World oil price**		**Oil exports**	
	US$ per barrel	US$ per t	Volume, million t	Value, US$ billion
January	61.63	451.75	21.70	9.80
February	53.35	391.06	20.88	8.16
March	32.20	236.03	21.51	5.08
April	21.04	154.22	22.26	3.43
May	30.38	222.69	18.44	4.11
June	39.46	289.24	18.16	5.25
July	42.07	308.37	17.20	5.31
August	43.44	318.42	17.95	5.72
September	40.60	297.60	17.87	5.32
October	39.90	292.47	19.45	5.69
November	42.30	310.06	18.33	5.68
December	48.73	357.19	18.58	6.64
Total 2020	41.26	302.42	232.34	70.26

Forecasts of Russia's GDP for the Year 2020 in different investigations dramatically differs from each other. According to the Greater London Authority [286], GDP will decrease by 5.5 percent comparing with those of 2019. Approximately the same prognosis is made by the European

Commission [287], which in addition indicates that the lion's share in this decline will be determined by net exports, predominantly of hydrocarbons [287]. In the United Nations global analysis [288], the economic decrease of 6.1% is foreseen for Russia, like in the publication of Sagramoso [272].

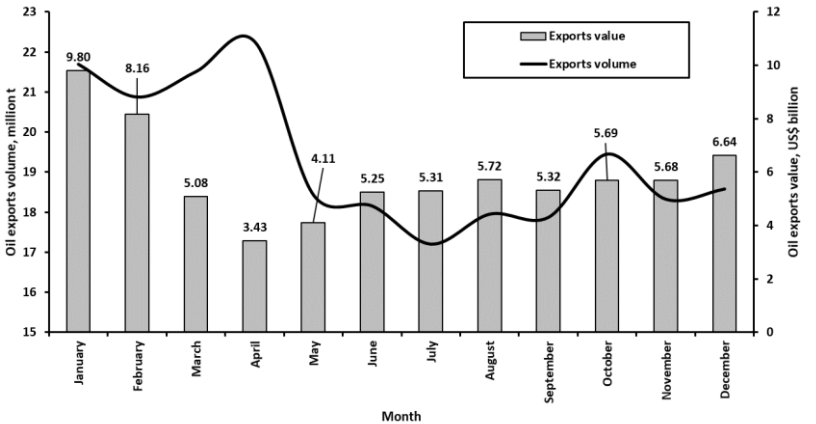

Figure 73. Monthly Russia's Oil Exports Volume and Value in 2020.

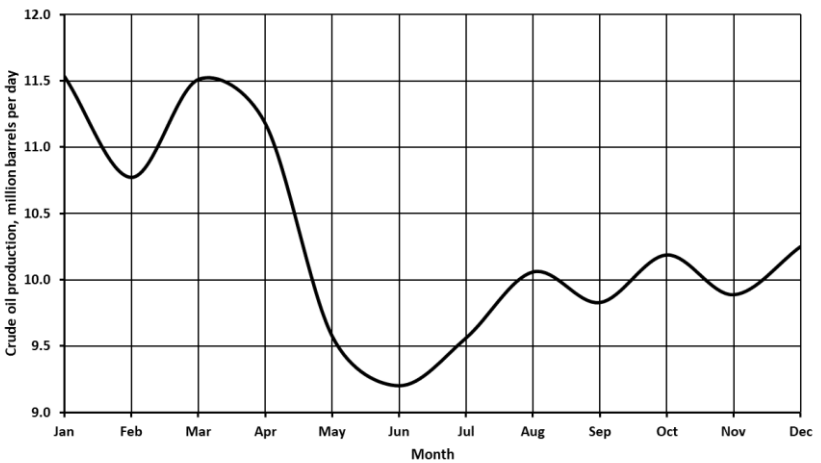

Figure 74. Crude Oil Production in Russia in 2020.

International Bank for Reconstruction and Development jointly with the World Bank predicts economic decline from 4 to 6% in Russia [289].

According to Statista, GDP reduction may change from -8.03 to -10.03 percent, correspondingly, for single-hit and double-hit scenarios [290]. At this background forecasts by Fitch Rating, Inc., which predicts 1 % economic growth [291], seems to be strange enough. Our assessment is much more pessimistic.

We have made two forecasts, based on regression equation shown, correspondingly, on Figure 62 and 65. According to them, GDP of Russia is forecasted to be US$ 960 billion and anyway in no case would exceed US$ 1,100 billion.

Thus, in 2020 Russia's GDP is suggested to be the worst in the last decade (Figure 75).

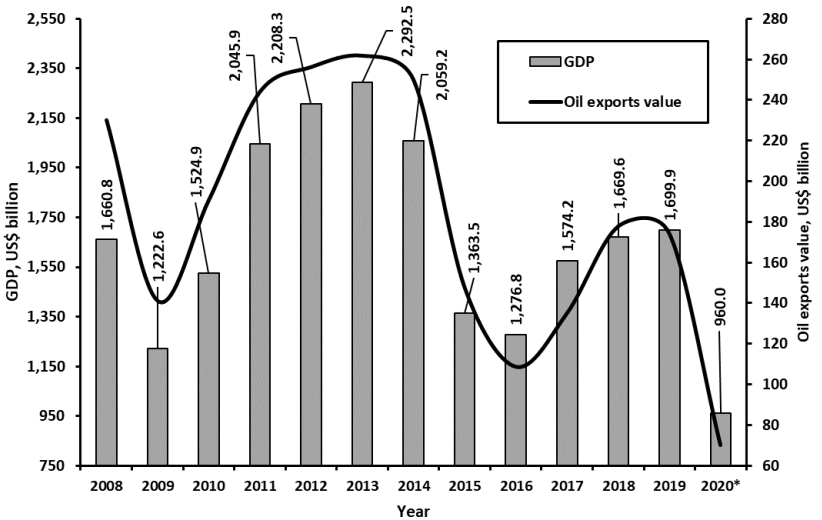

Figure 75. GDP of Russia in 2008-2020. * = Forecast.

4.4. MAIN FINDINGS

Boris Yeltsin inherited from Mikhail Gorbachev a half ruined enormous country in a deep economic crisis. All attempts of the last president of the Soviet Union to modernize and to reformate the social & economic framework of the country under an umbrella of the communist ideology

were unsuccessful. Boris Yeltsin has risen a "kamikaze" [292, p. 90] team of reformers who aimed to transform the country into a liberal democracy.

During the first term of Yeltsin's presidency this team of like-minded professionals, boldly supported by the Russia's President, put into practice a number of reforms of prime importance, and some of them were irreversible: In early 1992 consumer and wholesales processes were liberalized, most of industrial enterprises were privatized, hundred millions of small and medium businesses were founded between 1992 and 1994; financial markets and a private banking sector sprang up, etc. [293]. However, the road of reforms was "rocky" [294]: The "voucher" privatization, as it was mentioned, created the first wave of Russian millionaires and billionaires, the most profitable economic branches were monopolized and criminalized by powerful small semi-thuggish clans, a tsunami of businesspeople murders embraced the country, by 1996 economic development hampered [295].

On 1 July 1996 "Nezavisimaya Gazeta", at time the leading intellectual newspaper of Russia, published an article signed by leading American and Russian Economists including Leonid I. Abalkin, Director, Institute of Economics; Lawrence R. Klein, Nobel Laureate and Benjamin Franklin Professor of Economics, University of Pennsylvania; Wassily W. Leontief, Nobel Laureate and Professor of Economics, New York University, and many others [296]. The article namely asserted that:

1. The Russian government must play a much more important role in the economy
2. Strong governmental actions are necessary to prevent the further criminalization of the economy
3. Governmental action is necessary to recover from the major reductions in output
4. A new social contract is necessary, including a social safety net
5. Government policy must recognize that if there is a 'secret' of a market economy it is not private ownership per se, but rather competition.

The corresponding detailed proposal was transmitted to Boris Yeltsin.

Thus, in this article reform mistakes were not avowed but its main pathos consisted in a bold thesis that government should play a much more important role in governance of the social & economic framework. In other words, it could be read between lines that the economic reform was too accelerated and that Russia was not ready for full-scale liberalization of economic life. Of course, this proposal as well as consequences of Yegor Gaydar's "shock therapy" [292] challenged Yeltsin's mind on the future of the Russian statehood and the obligatory changes to be performed in governance. And then, 1998 financial and economic crisis occurred. The crisis was extremely vulnerable not only for population, which lost almost all their bank savings but also for private businesses and state institutions [297, 298, etc.]. So, I am sure that Boris Yeltsin has decided to yield authority to Vladimir Putin for radical alteration of the Russia's social & political doctrine.

The philosophy and the political economy of Vladimir Putin cardinally differed from those of Boris Yeltsin [299] and, according to a number of researchers [300, 301, etc.], represented a typical manifestation of the state capitalism. Hence, the state capitalism always has been considered as a radical alternative to the market capitalism [303], whereas President Putin tried, and not unsuccessfully, to amalgam state property on strategic industries with liberal economic relations and boldly promoted incorporation of Russian companies into international capital and commodity markets. For example, as we have noted above, 19.70% of Gazprom actioners are ADR (American Depositary Receipt) holders.

This doctrine of Russia's economy has both positive and negative features.

On one hand, the extensive production and exports of oil ensured an accelerated economic development of Russia (see Figure 61), which step-by-step allowed to the President of the country developing national social & economic programs, stipulated above.

Of course, President Putin, in particular, and his consecutive administrations, in general, were aware that such economic doctrine based mainly on the single economic branch was dangerous for the economic

security of the country. That is why, Russia is permanently maintaining the corresponding foreign politics, which from the economic point of view is characterized by the following three features:

1. Constant pressure on the European Union [see, for instance, 303] for increasing role of Russia on its energy markets. For ensuring this trend, different projects of global importance were already executed included the Blue Stream and the Nord Stream 1.
2. Promotion and intensive governmental support of the world class Russian commodity companies; also, ensuring their amalgamation with international capital and markets via IPO (Initial Public Offering) at leading world stock, mercantile, and commodity exchanges, emissions campaigns of securities, acquiring, when possible, shares in international commodity extractive companies, obtaining licenses on mineral and hydrocarbon resources worldwide, etc.
3. Promotion of commodity downstream processing businesses aiming exportation of high-tech goods instead of commodities. However, this is a long-term project and today the Russia's industrial infrastructure does not meet world requirements.

For instance, comparing the Global Value Chains (GVC) of the world and Russia's exports structure within the framework of world COVID-19 coronavirus pandemic, the International Bank for Reconstruction and Development jointly with The World Bank Group outlined that [289, p. 42]:

> "Russia is not comparable with the majority of countries in the commodity group (such as Sub-Saharan Africa or Latin America) that are characterized by a smaller market size and relatively cheap labor. Russia's characteristics are consistent with high forward GVC participation, i.e., a high share of domestic value added in its exports that is not directly consumed in the export destination but re-exported…"

Hence, Russia's export structure is far from those of world GVC, as it is shown on Figure 76 drawn according to data published in the cited essay: It

may be seen that the share of manufacturing exports in Russia is three times less than the global average.

Thus, after the bid was made on the oil exports from the very beginning of Vladimir Putin's presidency, Russia was, is and will be unable to break the oil exports dependence of its economy in the predictable future.

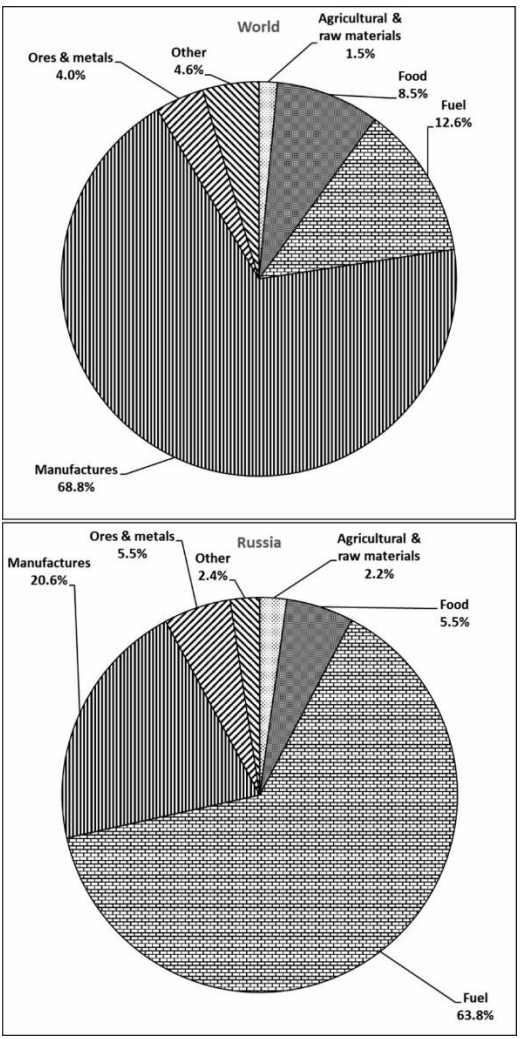

Figure 76. Russia's Potential to Integrate into GVCs [289].

And this peculiarity, on the other hand, determines extreme volatility and vulnerability of Russia's economic framework. The system functionalizes smoothly when the world economy is stable and in equilibrium but any economic or political shock has an immediate impact on Russia's social & economic environment, which is much deeper than average in the world.

Considering this well-pronounced feature of the Russia's economy, the Western democracies, and first of all – the United States, have a tremendously powerful oil pricing weapon against the aggressive foreign politics and commodity policy of the Russian Federation. When this weapon is applied consistently during comparatively long period of time, say a year, then, in addition to a huge negative impact on the Russia's GDP, it provokes devaluation of the Russian Ruble, finance and economic crises, like those of 2014-2015.

Drastically different economic framework is creating by natural world disasters, a clear manifestation of which is COVID-19 coronavirus pandemic.

During the first period of the pandemic, all statistical regularities of international oil markets were destroyed, and first of all – correlation between Euro to U.S. Dollar exchange rate and international oil prices. It is extremely important to note that on the contrary, strong negative correlation between these prices and the exchange rate between U.S. Dollar and Russian Ruble was expressed extremely boldly. The same behavior is typical practically of all national currencies freely convertible into U.S. Dollar at financial markets. Within the second period of the pandemic, when international oil markets started to tend towards an equilibrium and correlation between Euro to U.S. Dollar exchange rate versus oil prices has been restored, on the contrary, Russian Ruble as well as other free currencies lost the mentioned correlation.

The described discovered regularities expose practically unexplored patterns of the theory of commodity prices and of the political economy of the exchange rate. This complex dependency briefly and simply may be explained as follows: When oil markets are in equilibrium, petroleum benchmark prices, as described, depend on the strength of U.S. Dollar. In

this case, oil markets, even at national level, are not contingent of the Purchasing Power Parity (PPP) of the national currencies: oil is quoted in U.S. Dollars and it makes no matter at what rate money is converted in US$. When oil markets are subject to targeted political & economic pressure, oil prices are artificially regulated by U.S. Dollar strength. Correspondingly, exchange rates of free national currencies, which are not subject to governmental or institutional interventions, alter pro rata strengthening or weakening of the U.S. Dollar. This process, in turn, posteriori determines origination of the negative correlation between oil prices and currencies' exchange rate.

Absolutely different is the case of global disasters creating economic environment, which is beyond the rules and instruments of the globalized world. In these circumstances, as it was shown in the chapters 2 and 3, the snowball effect of oil crash is determined by uncertainty of commodity markets and, as a result, by temporary withdraw of investors and speculators from them. In this case, application of financial instruments is unable to sustain oil prices, and only the stabilization of situation leads to regaining market equilibrium. In this case correlation between oil prices and Euro to U.S. Dollar disappears because oil price failure is determined by the catastrophic decrease of derivative contracts volume. On the contrary, the described uncertainty has a negative influence on economy, which becomes weaker proportionally to oil price decrease. Correspondingly, lower oil prices are, weaker become national currencies. It should be noted that statistical analysis of world crude oil prices and currencies exchange rates of Russia and other selected countries was performed recently [304], however no correlation analysis was applied.

In 2020, all the globe including Russia was challenged by the COVOD-19 coronavirus pandemic but the negative effect of the disease in this country was incomparably higher than the world average. Being strongly dependent on oil prices, Russia found itself as a hostage of the pandemic, when oil prices started to dramatically diminish.

Two additional factors shall also by mentioned. Firstly, according to the well-known Russian economist, Academician Menakir, unlike fast recovery of Russia's economy after the 1998 and 2008-2009 financial & economic

crises, Russia was unable to surmount consequences of the 2014-2015 finance crisis and instead of "economy of recovery" the country was overtaken by "economy of stagnation" [305, pp. 15-16]. This phenomenon is quite understandable if we analyze once more Figures 60 and 61. After the 1998 financial and the 2009 world economic crisis oil prices rapidly increased and achieved its average annual maximum of more than US$ 100 per barrel in 2013 (see Figure 60). Correspondingly, in 2013 Russia has the maximum GDP value. On the contrary, after the targeted oil price decrease in 2014-2015 oil prices never returned to the 2013 level; Russia's GDP growth in 2016-2017 was modest and insufficient for economic recovery and development.

Secondly, Russia met the COVID-19 coronavirus pandemic being in state of economic stagnation, and was unable to overpass global challenges, as it was shown above, by inner economic drivers. Usage of international drivers also was limited due to:

1. Lack of necessary potential to integrate into GVCs (see Figure 76)
2. Low oil prices, which in 2020 were 27.61% less than in 2019 and 54.74% less than 2013
3. OPEC+ agreement of 12 April 2020, which Russia was forced to sign; this agreement significantly diminished oil production and exports (see Table 30 and Figure 73-75).

Correspondingly, according our forecast, in 2020 Russia's GDP is suggested to be the lowest in the new Millennium.

It may be said in conclusion that Russia's social & economic environment is characterized by dualistic, contradictory features. Having autocratic political structure including low enforcement and juridical systems, when oppositionist figures are poisoned and arrested under ridiculous accusations [306, 307], having rigid control on strategic economic companies within Russia, the government is obliged to maintain liberal foreign economic policy for merging with the international commodity markets, because only them allow efficient capitalization of primary commodities, and of oil, first of all.

Chapter 5

CASE STUDY 2: IRAN ON INTERNATIONAL OIL MARKETS BEFORE AND DURING COVID-19 CORONAVIRUS PANDEMIC

5.1. BASIC FEATURES OF IRAN'S ECONOMY

In enormous volume of publications political structure, background data, country profile, economic features, etc. of the Islamic Republic of Iran are discussed. Essential information on this Islamic state was published by the United Nations [308, 309], governments of the United Kingdom [310, 311], the United States of America [312, 313], Australia [314]. Different aspects of politics, political economy, social environment and many other problems are covered in a lot of scientific researches [see, for instance, 315-319, and many others].

According to the Constitution of the Islamic Republic of Iran [320], adopted immediately after the Iranian Revolution and then amended in 1989, Iran represents a unitary Islamic state, based on a so-called *velayat-e faqih* system (Guardianship of the Islamic Jurist). The Constitution granted the Islamic Jurist with the following functions:

1. Appointment of the highest judicial authority in the country
2. Holding of supreme command over the Army

3. Signing of the certificate of appointment of the president
4. Dismissing, if needed in the national interest, the president.
5. Granting amnesty.

The Guardianship is headed by the Islamic Leader of Iran. For executing these functions, the Islamic Revolutionary Guard Corps (IRGC – *Sepâh-e Pâsdârân*) was founded.

The predominant majority of researchers [see, for instance, 321] believe that Iran is a typical theocratic state, where the power step-by-step shifted from velayat-e faqih to the military control [322]. According to others [216], Iran is a semi-theocratic state, which in addition to the theocratic power has a democratically elected president and parliament. This way, Iran is characterized by absolutely unusual, unique form of government.

It should be noted that since 1979, e.g., after Iran hostage crisis [96] and till 2013, e.g., the last year of Mahmoud Ahmadinejad's presidency or during 34 years Iran habituated to survive under a different type of international sanctions and became a self-sufficient country the economy of which is based on exploitation and downstream processing of primary commodities. The country is entirely furnished by agricultural production and is extracting a huge amount of mineral resources shown on Figure 77, drawn according to the information by BP [23] and the British Geological Survey [208].

In addition, revenue from oil exports is used for imports of enormous number of strategic commodities and consumer goods starting with cyanide, aircrafts, cars, their repair parts, weapon, etc., and finishing by cell phones and software [323]. As far as Iranian banks have no SWIFT and international money transactions in and out Iran are banned [324], for any international transactions, according to the U.S. Congressional Research Service [325], Iran directly or indirectly founded 145 banks in 60 countries.

Interrelation between these institutions and official state bodies and banks of Iran is unusual and atypical for world financial practice, and for understanding these relations as well as the whole economic engine of the state, the peculiarities of the Iranian Rial's exchange rate shall be considered.

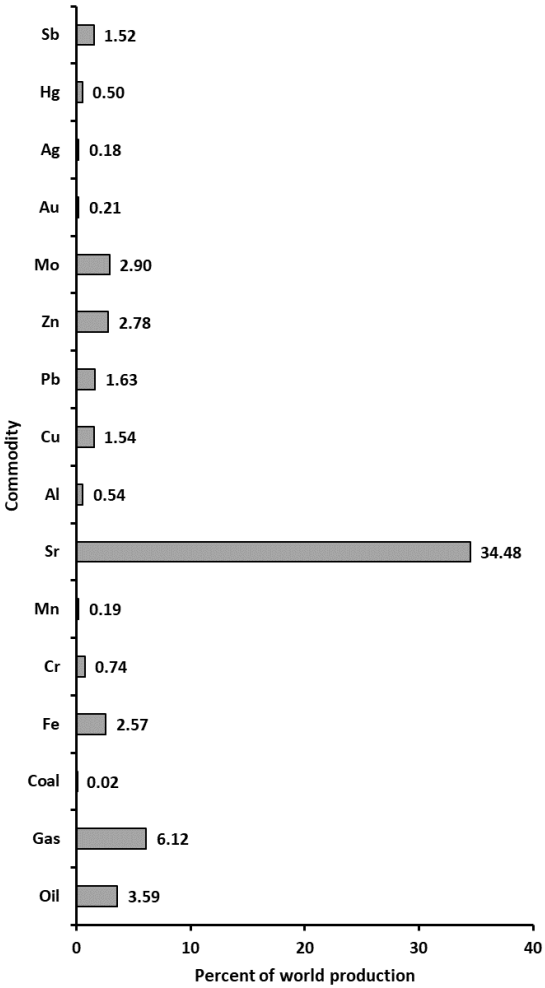

Figure 77. Production of Basic Primary Mineral Commodities in Iran in 2019 as a Share of World Production.

The system of exchange of Iranian Rial (IRR) to any free currency, for instance, to Euro, depends on the exchange rates of these currencies to U.S. Dollar. Theoretically, there are three different systems of exchange of IRR to US$ [326]: (i) official exchange rate of the Central Bank of Iran, (ii) free market exchange rate, and (iii) NIMA. The latter is the Persian acronym for an online currency system launched by the Central Bank of Iran in April 2018. It is a very small market where Iranian exporters can sell their foreign

currency earnings for Iranian Rials, and NIMA system has no impact on the county's economy. That is why mainly the official and the commercial (free market) exchange rates are vastly applied in Iran.

The official exchange rate is rigidly governed by the Central Bank of Iran whereas the free market exchange rate varies over a wide range. Figure 78 provides dynamics of official [328] and commercial [329] U.S. Dollar to Iranian Rial (IRR) exchange rates in 2016-2020. It may be seen that in 2020 the commercial exchange rate was 4.94 times worse than the official one.

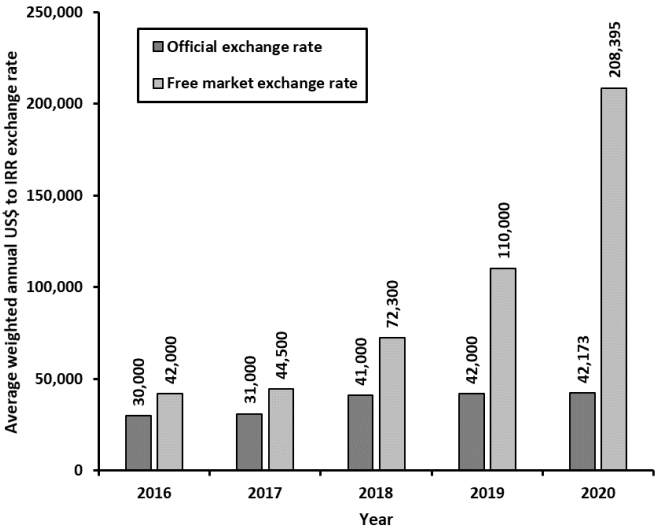

Figure 78. Official and Commercial U.S. Dollar to Iranian Rial Exchange Rates in 2016-2020.

This unusual feature of Iran's financial system creates a ridiculous misunderstanding when the economic framework of the country is analyzed. For instance, according to the official exchange rate, the devaluation of Iranian Rial in average equaled to annual 5.77% in 2016 to 2020. Just these official data are used by the World Bank Group in its World Development Indicators [1]. In reality, however, devaluation was as high as 15.97 annual percent for 5 years and to 47.22% in 2020 compared with 2019.

Another confusing particularity of Iranian economy is the Government Budget. Iran represents a rare example of countries which do not have state

budgets. Iranian Majles (e.g. Islamic Consultative Assembly, which represents, in principle, the Parliament) is approving a Government Budget, e.g. those assets, revenue and expenditure that may be disposed by the central civil power. As we will see below, these assets are only a minor part of finances.

Table 31 describes general features of the 2020-2021 government budget as approved by the Consultative Assembly [330]. It may be seen that both revenue and expenditure exceed 2 trillion Iranian Rials, and the budget deficit equals to about 486 billion IRR or to 22.48% of the revenue. Figure 79 demonstrates revenue sources to the government budget. It is clearly visible that the sole article of free currency revenue to the budget are oil sales. Other sources rise cashflow in Iranian Rials. At the first glance, the situation is not ideal but supportable – the government dispose more than 2 trillion IRR. Hence, recalculation of these figures in U.S. Dollars according to the official and the free market exchange rates (Figure 79) reveals an absolutely dramatic situation: Because in 2020 population of Iran was 84,267,476 people, budgetary revenue was approved as US$ 608.33 per capita according to the official exchange rate, and to US$ 123.11 per capita according to the free market exchange rate.

Table 31. Government Budget of Iran for the Fiscal Year 2020/2021

Budgetary article	Unit of measure	Value
Government debt to GDP	%	44.2
Government revenue	IRR billion	2,161,900
Government expenditure	IRR billion	2,648,012
Budget balance	IRR billion	-486,112

The same may be said about the GDP per capita, which, of course, is computed from the official exchange rate. According to CEIC [332], Iran's GDP per capita was US$ 5,494.05 in 2018 and grow up to US$ 5,535.74 in 2019. However, this figure does not much with the existing reality: In 2019 country's GDP diminished by US$ 32.78 billion and equaled to US$ 421.22 billion. Thus, dividing this figure by population headcount, we may prove that GDP per capita was much lower – US$ 4,998.60. However, if the

Iranian Rial's strength is assessed by the free market exchange rate, then GDP per capita will be 4.94 times lesser – US$ 1,011.57 and the sad reality will be revealed – Iran is a poor country.

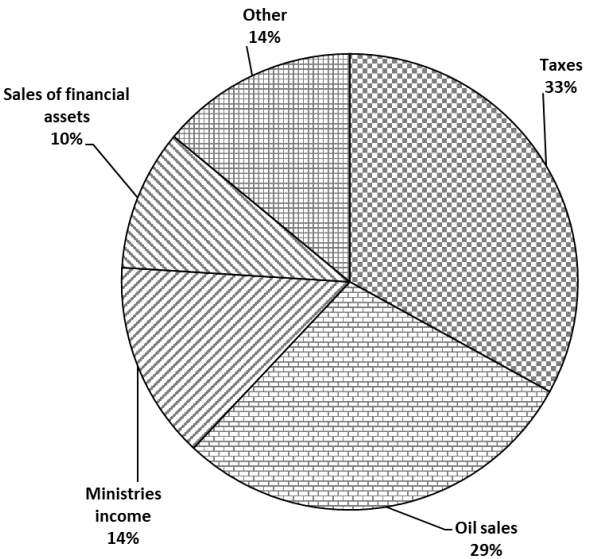

Figure 79. Revenue Structure of the 2020-2021 Iranian Government Budget.

Two additional problems are related to both the government budget and the dualistic system of Iranian's Rial to free currency exchange. First of all, as Figure 79 reveals, oil sales comprise 29% of the government revenue plan, e.g., equals to 662,951 billion reals. According to the official exchange rate, this money is assessed to be an equivalent of US$ 14.87 billion. Hence, as it is shown below, in reality the nominal value of oil exports in 2019 was about US$ 21.58 billion. And this means that approximately 31.11% of the free cash flow, risen by international oil sales, is beyond the government control and, correspondingly, disposed by the parallel power branch – the Islamic Revolutionary Guard Corps (Sepâh-e Pâsdârân).

The second feature consists in the following: Any Iranian citizen who needs free currency is obliged to exchange Iranian Rials according to the free market exchange rate. At the same time, the governing structures, including, of course, the Islamic Revolutionary Guard Corps, are using the

rate of the Central Bank of Iran. Correspondingly, the simple financial operation of celling foreign currency at the free market and then rebuying it in the Central Bank originates an additional source of income, entirely covered by the out-of-pocket payments of Iranian citizens. Volume of this cash flow is assessed below, in course of the analysis of Iranian Forex assets.

Figure 81 shows the general structure of Iran's GDP [1], and Table 32 provides information on some basic 2019 economic indices compared with those of the year 2018 computed by us based on the World Bank Group [1, 333, pp. 144-145] data.

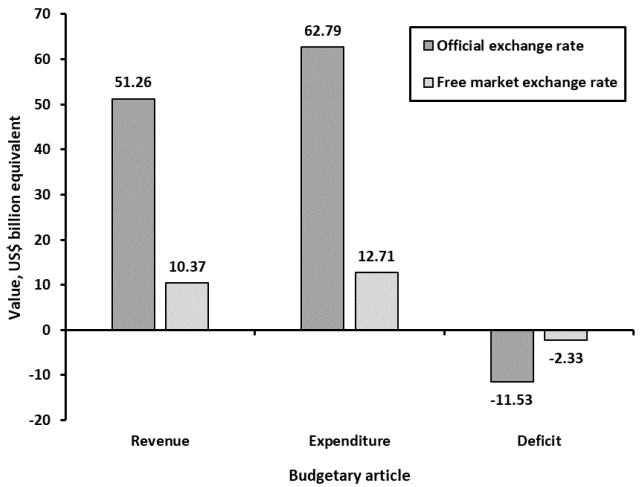

Figure 80. Basic Articles of Iranian 2020-2021 Government Budget Recalculated According to the Official and the Free Market Exchange Rates of Iranian Rial Versus U.S. Dollar.

However, these World Bank data do not coincide with information released by D. Workman [334] and processed by us earlier [172, 323]. Analysis of his information provided in Table 33, demonstrates that in 2019 total exports value assessed based on the World Bank data, is 4.92 times higher than that released by Mr. Workman. For the year 2017 the World Bank figure exceeds those of Mr. Workman 1.78 times. These difference in evaluations, of course, partly served to demonstrate how U.S. sanctions have deteriorated foreign economic relations of Iran but the 2017 case displays a

certain methodological gap. Let remind that for Russia D. Workman's figures [207] were adequate (see Table 17).

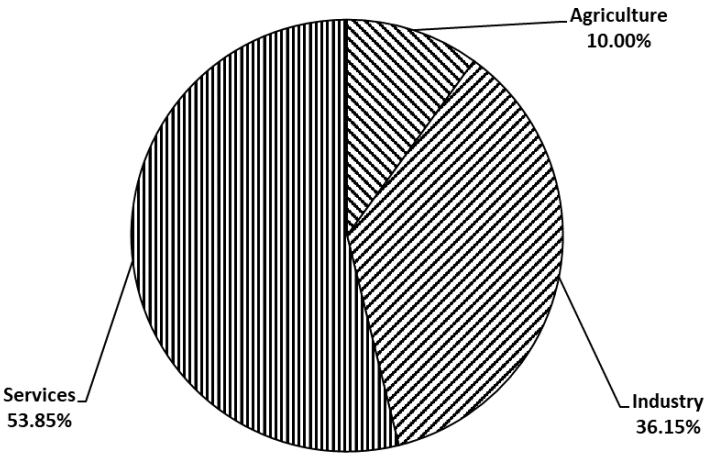

Figure 81. Structure of Iran's GDP.

Hence, estimation of the real exports value is a crucial question for analysis of Iran's economy.

Any economic essay on Iran obligatory shall discuss, even briefly, consequences of President Rouhani's economic reforms.

Table 32. Some Basis Economic Indices of Iran

Index	**Unit of measure**	**Year**		**Annual change, %**
		2018	2019	
GDP	US$ billion	454.00	421.22	-7.22
Exports	US$ billion	150.86	132.00	-12.50
Imports	US$ billion	144.47	101.85	-29.50
Inflation (consumer prices)	Annual %	18.01	31.20	73.24
Industry	US$ billion	164.12	147.93	-9.86
Agriculture	US$ billion	45.40	50.55	11.34
Services	US$ billion	244.48	222.74	-8.89

Table 33. Top 10 Commodities & Goods Exported from Iran in 2017 and 2019 [334]

Commodity & good	**Exports**			
	2017		2019	
	Exports value, US$ million	Share of total, %	Exports value, US$ billion	Share of total, %
Mineral fuels including oil	48,700.00	77.92	16,400.00	61.08
Plastics, plastic articles	3,000.00	4.8	3,100.00	11.55
Ores, slag, ash	2,200.00	3.52	1,300.00	4.84
Organic chemicals	1,800.00	2.88	1,600.00	5.96
Iron, steel	1,400.00	2.24	725.7	2.7
Fruits, nuts	934.8	1.5	835.8	3.11
Fertilizers	681.8	1.09	204.7	0.76
Salt, sulfur, stone, cement	561.3	0.9	412.1	1.53
Copper	386.2	0.62	540.6	2.01
Aluminum	305.4	0.49		
Vegetables			173	0.64
Subtotal	59,969.50	95.95	25,291.90	94.2
Total	62,500.00	100	26,849.15	100

The first attempt to introduce modest political and economic reformation of Iranian society was undertaken by 5th President Sayyid Mohammad Khatami in the beginning of our century. However, all his proposals were blocked by the Guardianship of the Islamic Jurist as inconsistent with the Constitution [335]. In turn, President Rouhani immediately after being elected the 7th President, “plight of political prisoners, increase in the number of executions, reports on human rights violations in prisons and harsh sentences against artists and political activists by the judiciary deepen concerns” [336, p. 2]. From the very beginning, the President Rouhani’s economic policy was based on gradual liberalization of economic life. Especially after signing on 14 July 2015 the Iran Nuclear Deal, economic expectations became optimistic till the sanctions imposed by President Trump [337, 338]. One of the main drivers of this policy was privatization of state enterprises.

According to the privatization plan, 103 large and 62 medium and small companies were suggested to be privatized. By August 2017, 55% of Iranian power plants have completed privatization [339, 340]. However, this economic policy of liberalization met huge resistance of the Islamic leader [341], and corporatization of strategic enterprises like Iranian Mines & Mining Industries Development & Renovation Company (IMIDRO), Iran Minerals Production and Supply Company (IMPASCO), National Iranian Copper Industries Company (NICICO), etc. either hampered or the majority shares in them was acquired by representatives of Sepâh-e Pâsdârân (the Islamic Revolutionary Guard Corps).

In general, Iranian economy is suggested to be characterized by 10 negative features [342]:

1. Government is under the Guardianship of the Islamic Jurist control. All attempts of President Rouhani to privatize National Iranian Oil Company and National Iranian Gas Company were unsuccessful and blocked by ecclesiastic leaders. Today, government-owned companies consume a large part of the budget, causing budget deficits. All hydrocarbon companies operate under the control of the Islamic Revolution Guards Corps.
2. Dependence on oil. In the next paragraph this feature is described in details.
3. Unsustainable growth of GDP. Explanation of this peculiarity is also given in the next paragraph.
4. High level of unemployment. According to the Statistical Center of Iran [343], the unemployment comprised 12.1% of economically active population in 2018. Surprisingly, according to Statista [344], in 2019 unemployment diminished to 11.38%. Figure 82 demonstrates unemployment level in the new Millennium. We will see below that unemployment rate is not related with the real economic situation of the country.

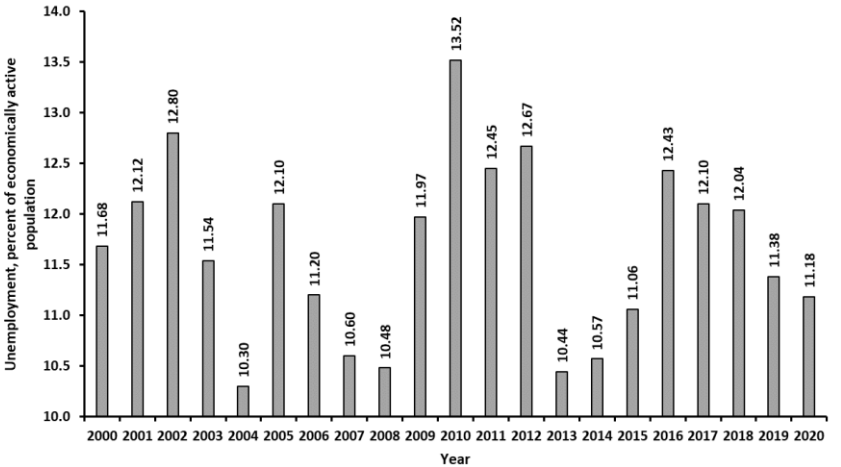

Figure 82. Unemployment in Iran in 2000-2020.

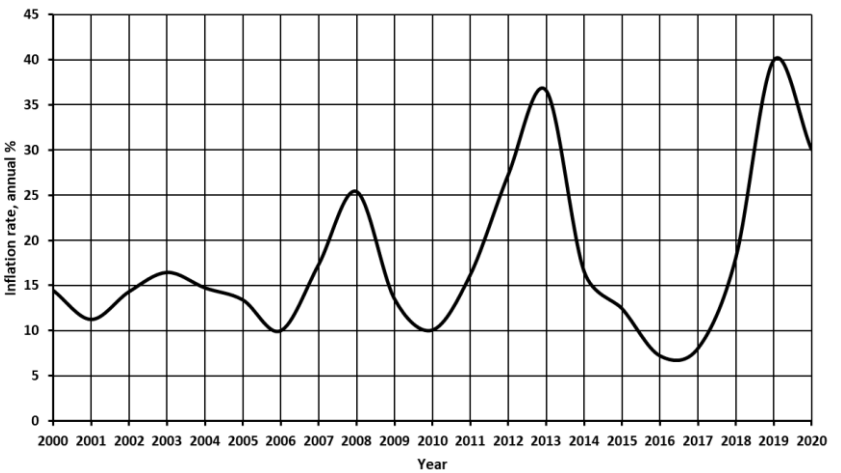

Figure 83. Inflation Rate in Iran in 2000-2020.

5. Uncontrolled inflation. Figure 83 demonstrates inflation dynamics in Iran in 2000-2020 [345, 346]. In the cited article Mr. Khavand believes that "causes of this high inflation include flaws in the economic and political structure, fluctuations in oil revenues, rise of government expenditures and an ongoing foreign policy crisis" [342]. Hence, in the next paragraph we will see that the great

majority of the mentioned reasons have practically no impact on the inflation rate. At our opinion, the uncontrolled inflation, if it really is uncontrolled, may be determined by mismanagement of the finance sector, which simultaneously is accountable to both the government and the Guardianship of the Islamic Jurist. Indeed, "many physicians have killed the king."

6. Social inequality. Mr. Khavand stated that the main reason of inequality is lobbying in business concessions and their delivery to "insiders", e.g., supporters and allies of the Guardianship of the Islamic Jurist. He also mentioned that Gini index in recent years was lower than before the revolution. We have specially processed all available data on Gini index [347-350] and generalized them on Figure 84. It is well known that interdependence between inequality and Gini index is negative – higher inequality, lower Gini index is [351]. From this point of view, Gini index after Revolution was roughly on the 1970- year-level and dramatically diminished only during Mahmoud Ahmadinejad's presidency. Within the framework of President Rouhani's administration, it started to gradually increase.

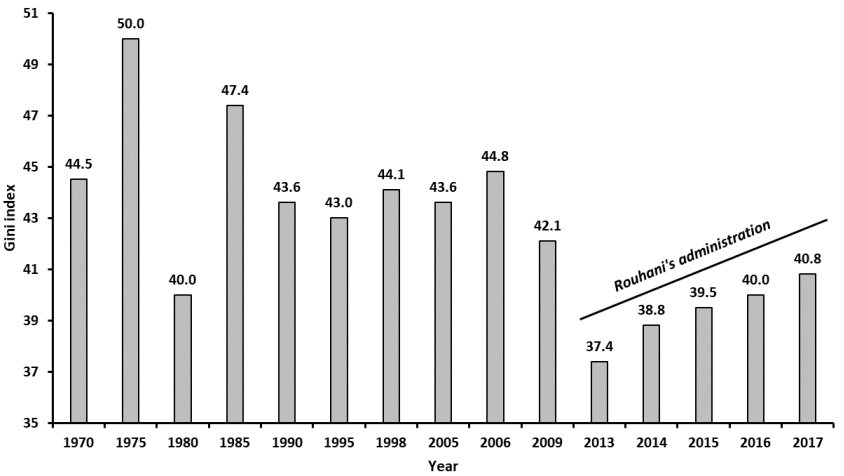

Figure 84. Gini Index in Iran.

7. Systematic corruption. According to Transparency International [352], by Corruption Perceptions Index (CPI) Iran had the 149 rank among 183 countries in 2020. The most upsetting is systematic increase of the corruption level and, correspondingly, diminishing CPI score in last years (Figure 85). As a basic reason of awfully high corruption level in Iran, Mr. Khavand nominated "the highly discriminative nature of the Islamic Republic system and the way" the concessions are attributed to the Guardianship of the Islamic Jurist's allies.
8. Permanent fresh water deficit. A tragic and really vulnerable environmental framework, an ecologic catastrophe is characterized for the Urmia Lake, which each year lacks 800 million m^3 of water resource. As a result, the lake is drying faster than the Aral Sea [353]. The main problem originates from the local government approaches, which grants population with licenses of Urmia Lake water usage for agricultural melioration. These permissions have also created a wave of corruption on the regional level. In 2013, in course of his electoral campaign, Hassan Rouhani promised to mitigate this problem, and a huge number of investigations have been performed since [353-355, etc.], including a professional roundtable organized by UNDP [356]. However, nothing tangible has been done in 7 years because, I am sure, serious business interests of different competing, let say, stakeholder companies close to the ecclesiastic leader are implied, and the administration of the President seems to be unable to overpass these contradictions.
9. Unreasonable system of subsidies. According to the Financial Tribune [357], the volume of subsidies to population on its fossil fuel increases each year by approximately 42.2%. In 2018 their amount equaled to 15.3% of Iran's GDP and to 16% of total global energy subsidies. Iran is the world largest fuel subsidizer, having spent US$ 69.2 billion on fossil energy consumption subsidies in 2018. For comparison, the same year Saudi Arabia has allocated US$ 44.72 billion and China – US$ 44.44 billion. Such spending

hamper economic development of the country encumbering launching social & economic programs of national importance.

10. A ruined banking system. As it was said, due to sanctions, Iranian banks have no access to international SWIFT and IBAN systems, and no money transfers are possible from and to Iran. We will discuss this problem in the closing remarks to this chapter.

To these ten negative features of Iranian economy, "nightmares", as they were called by F. Khavand [342], I am obliged to add one additional, eleventh damaging peculiarity, which consists in lack of access for foreign companies to "cheap" freely convertible currency in the country. Any income in Iran originates and is accounted in Iranian Rials, and foreign companies are obliged to exchange their earnings at the free market. Simultaneously, the financial authorities are calculating taxes and other liabilities as well as income from extraction of primary commodities according to the official exchange rate. Thus, foreign companies are losing profit pro rata the difference between the official and the free market exchange rates, and the corresponding state authorities, vice versa, are obtaining the additional income, which is beyond the Law in force.

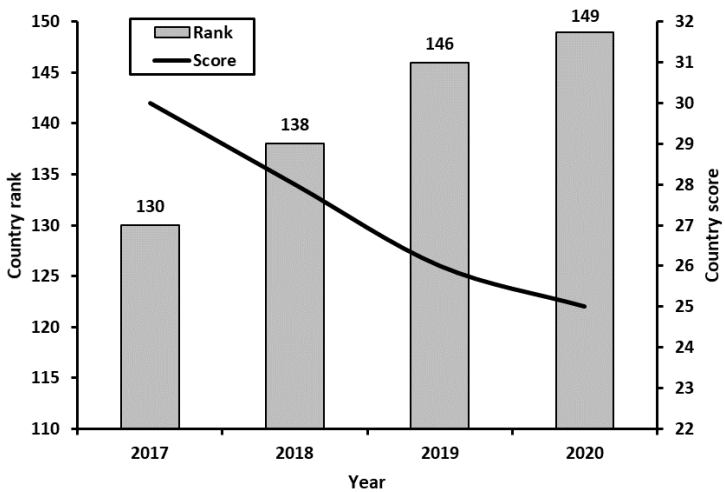

Figure 85. Iran's Rank Among 183 Countries by CPI in 2017-2020.

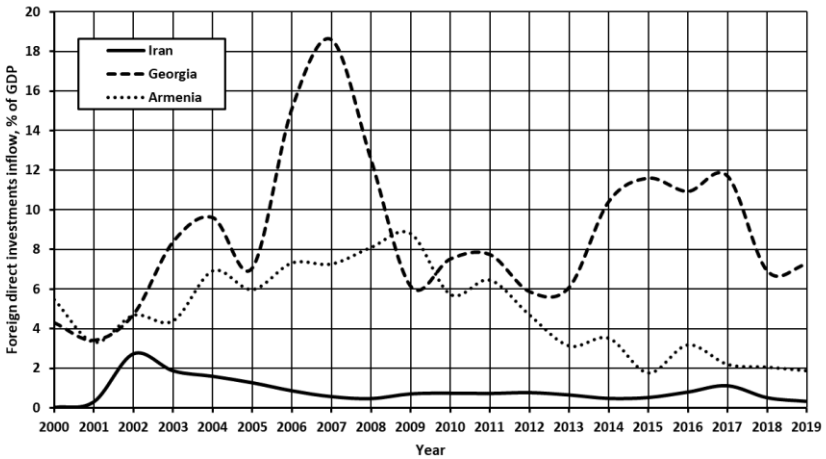

Figure 86. Inflow of Foreign Direct Investments in Iran, Georgia and Armenia in 2000-2019.

Correspondingly, the inflow of net foreign investments into the country is very low, as it is shown on Figure 86. I have excluded the case of Azerbaijan from this chart because the first years of the new Millennium BP and its partners have performed huge investments in development of Azerbaijani oil fields and construction of Baku-Tbilisi-Ceyhan oil pipeline. Such inflow of foreign investments does not have regular character and exceeds the scope of average weighted regularities. Corresponding data are borrowed from the World Bank World Development Indicators [1] and Nordea [358] for the year 2019 in case of Iran.

Our assessment of this cash flow will be considered after discussion on COVID-19 coronavirus pandemic's influence on Iran's economy.

Figure 87 represents our calculations on hydrocarbons (oil + gas) and crude oil production as well as petroleum exports as a share of Iran's GDP. Computing was effectuated according to the standard procedures described above. The graph displays tremendously spectacular patterns – all the three curves like twins repeat the shape of each other. And this feature means that in spite of the fact that oil exports value ranges from 22.72 to 7.08% of GDP calculated according to the official exchange rate of Iranian Rial (15.86% in average), just the hydrocarbon sector, and oil exports first of all, entirely determines social & economic welfare of the country.

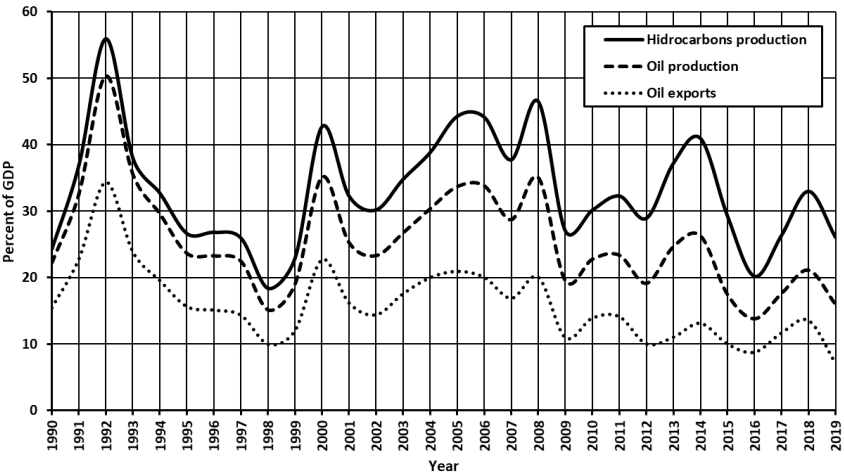

Figure 87. Hydrocarbons Production and Oil Exports Value as a Share of Iran's GDP in 1990-2019.

5.2. IRAN ON INTERNATIONAL OIL MARKETS BEFORE THE COVID-19 CORONAVIRUS PANDEMIC

Oil production in Iran in industrial volumes commenced in 1872, when Nasir al-Din, Shah of Persia, had signed the first concession with a German-born British entrepreneur Baron von Reuter [359]. However, the real development of the oil industry started in 1908, when British Petroleum (BP) began operating in the country [360] and founded the Anglo-Persian Oil Company. In 1951 according to the new law on petroleum, the Anglo-Persian Oil Company, where BP was the majority shareholder, was nationalized and all the basic assets were transferred to the National Iranian Oil Company (NIOC) founded in 1941 [359, 360]. Today, the company entirely controls oil production in the country.

By 1 January 2020, Iran had the fourth rank according to petroleum resources having 21.37 billion t of proven reserves (see Table 9). Figure 88 shows oil output in Iran from 1965 to 2015 on a daily basis [23]. Its maximum production the country achieved by the end of seventies of the recent century. In 1976 5,918 barrels a day were pumped, in 1978 – 5,302

barrels. Immediately after the Islamic Revolution, production had catastrophically fallen to less than 1,500 barrels a day. After 1982, production started to very slightly increase but never reached the 1976 level.

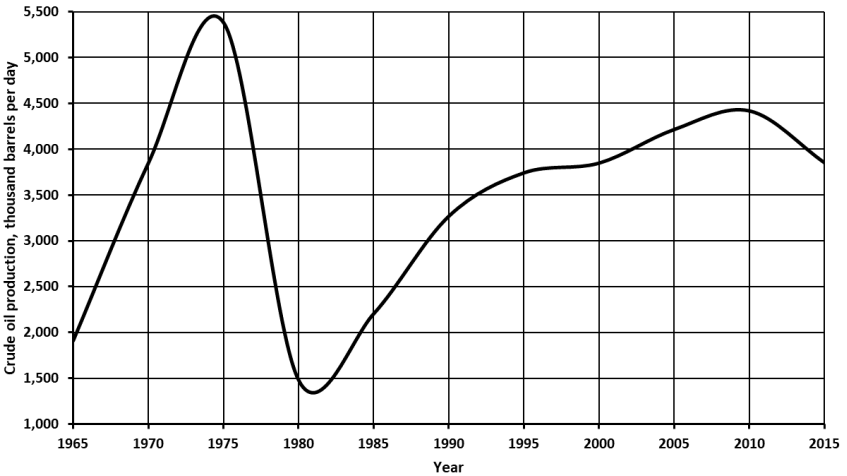

Figure 88. Crude Oil Production in Iran in1965-2015.

Table 34 represents a data bank on Iran's oil sector, where crude oil production and consumption are cited according to the BP's yearbook [23] and prices are computed from average monthly prices as released by IMF [26]. Oil price per ton is calculated using the BP's conversion coefficient.

Figure 89 provides information on Iranian crude oil production, consumption, and exports in 1980-2019. It is clearly visible that the main driver of the oil industry is petroleum export: Within the investigated period consumption in average equaled to 37.84% of production, and exports, consequently – to 62.16%. Due to sanctions imposed on Iran, the National Iranian Oil Company, unlike the Russian Gazprom and Rosneft, had no possibility to capitalize its assets on stock, mercantile, and commodity exchanges. That is why Iran is obliged to export oil according to either intergovernmental agreements or NIOC's back-to-back contracts with mainly Chinese, Indian, South Korean, Japanese, Turkish and, partly European companies.

Table 34. Data Bank on Iran's Oil Sector

Year	World oil price		Oil Industry indices, million t			Export value, US$ billion
	US$ per barrel	US$ per t	Production	Consump-tion	Export	
1980	37.42	274.29	74.16	27.87	46.28	12.70
1981	35.75	262.05	66.16	27.74	38.42	10.07
1982	31.83	233.31	120.09	30.17	89.92	20.98
1983	29.08	213.16	122.83	36.68	86.16	18.37
1984	28.75	210.74	102.52	39.71	62.81	13.24
1985	26.92	197.32	110.35	43.62	66.73	13.17
1986	14.44	105.85	102.70	40.28	62.42	6.61
1987	17.75	130.11	116.73	42.00	74.72	9.72
1988	14.87	109.00	117.38	44.26	73.12	7.97
1989	18.33	134.36	143.84	47.52	96.32	12.94
1990	23.19	169.98	162.79	49.26	113.53	19.30
1991	20.20	148.07	174.37	52.26	122.11	18.08
1992	19.25	141.10	175.68	55.60	120.08	16.94
1993	16.75	122.78	184.29	60.43	123.86	15.21
1994	15.66	114.79	184.98	62.76	122.22	14.03
1995	16.75	122.78	185.46	62.85	122.60	15.05
1996	20.46	149.97	186.64	65.47	121.17	18.17
1997	18.64	136.63	186.96	67.58	119.38	16.31
1998	11.91	87.30	190.79	65.00	125.78	10.98
1999	16.56	121.38	178.12	65.45	112.66	13.68
2000	27.39	200.77	191.67	67.66	124.00	24.91
2001	23.00	168.59	189.80	68.15	121.66	20.51
2002	22.81	167.20	179.12	68.43	110.69	18.51
2003	27.69	202.97	202.09	69.16	132.93	26.99
2004	37.66	276.05	208.83	71.20	137.64	38.01
2005	50.04	366.79	207.87	78.56	129.32	47.44
2006	58.30	427.34	210.62	85.68	124.95	53.42
2007	64.20	470.59	213.26	87.88	125.38	59.04
2008	91.48	670.55	215.43	92.00	123.42	82.93
2009	53.48	392.01	207.22	90.97	116.25	45.65
2010	71.21	521.97	212.03	82.46	129.57	67.73
2011	87.04	638.00	212.53	84.17	128.36	82.30
2012	86.46	633.75	180.48	86.02	94.46	60.36
2013	91.17	668.28	169.67	93.91	75.76	51.08
2014	85.60	627.45	174.05	87.20	86.85	52.75
2015	41.85	306.76	180.24	77.12	103.12	30.52
2016	36.34	266.37	216.14	79.17	136.98	35.17
2017	45.33	332.27	235.49	79.46	156.02	48.00
2018	58.15	426.24	224.68	80.60	144.08	61.41
2019	43.35	317.76	160.83	89.45	71.38	29.82

By 2017 a stable market structure for Iranian oil exports had been established. Table 35 introduces the 10 major oil importer countries from Iran, according to our previous slightly updated study [172]. For performing oil exports, Iran has developed a huge tanker company – National Iranian Tanker Co., which has the sixth world rank with the capacity of 13.8 million DWT [361].

According to the Article 44 of the Constitution [320], the state-owned National Iranian Oil Company (NIOC) is responsible for organization of the overall up-, mean-, and downstream oil businesses starting from geological exploration and resource estimation, and finishing by marketing and sales of oil and oil products within and beyond Iran. For industrial activities in Iran, NIOC had founded 10 daughter companies, which performs development & engineering, oil production, procurement, and management of terminals [362].

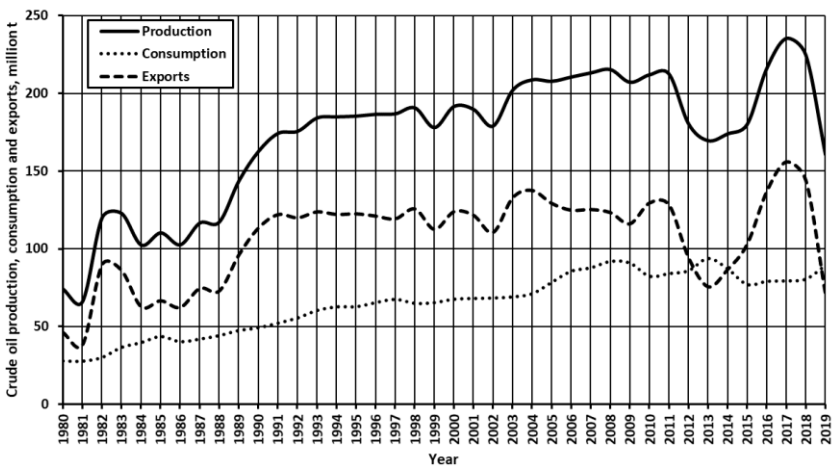

Figure 89. Iranian Crude Oil Production, Consumption, and Exports in 1980-2019.

For maintaining international oil policy, NIOC had established a chain of foreign subsidiaries in Switzerland, UK, Malaysia, etc. [363]. In general, there are three different companies with their foreign subdivisions: (i) Kalanaft Company with a representative office in London, (ii) Naftiran Inter-Trade Company with sub-divisions in Switzerland, Hong Kong,

Malaysia, etc., and (iii) NIOC International Affairs (London) Limited. In addition, there is a special company (Asia Energy Trading LLC) for trading with China, India, and partly South Korea.

Table 35. Main Importing Countries of Iranian Oil in 2017

Main importer countries of Iranian oil	**Oil exports**		
	Barrels per day	Million tons per year	Value, US$ billion
China	648,080	32.27	10.72
India	501,982	25.00	8.31
South Korea	313,646	15.62	5.19
Turkey	165,207	8.23	2.73
Italy	154,813	7.71	2.56
Japan	137,541	6.85	2.28
U.A.E.	127,215	6.34	2.11
Spain	113,941	5.67	1.89
France	109,396	5.45	1.81
Greece	77,138	3.84	1.28
Subtotal	2,348,959	116.98	38.87

Naftiran Inter Trade Company (NICO) Sarl together with its affiliated daughter subdivisions Sima General Trading and Swiss Management Service Sarl, is a Switzerland representation of the Tehran-based company Naftiran Inter-Trade Company, which, in turn, is entirely accountable to NIOC. There are other analogous companies under umbrella of Naftiran Inter-Trade Company, which cover other countries.

Analysis of the regularities expressed on Figure 87 called us for an in-depth study of the influence of oil exports on Iran's economic framework. For doing this, we have performed, like in case of Russia, statistical investigation of interrelation between country's GDP and oil exports value computed by the equation (6). Figure 90 shows positive and strong correlation between these indicators, and, correspondingly, the statistical model is described by a quadratic regression equation (Figure 91), the parameters and coefficients of which are presented in Tables 36 and 37, correspondingly.

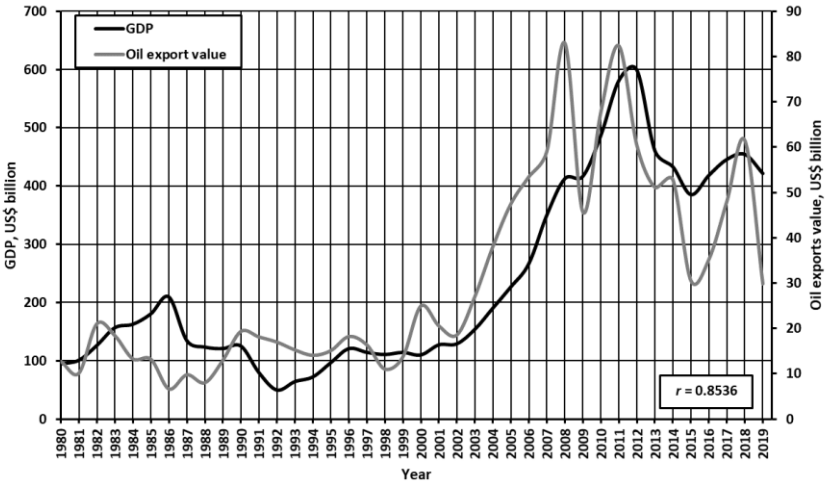

Figure 90. Interrelation between Iran's GDP and Oil Exports.

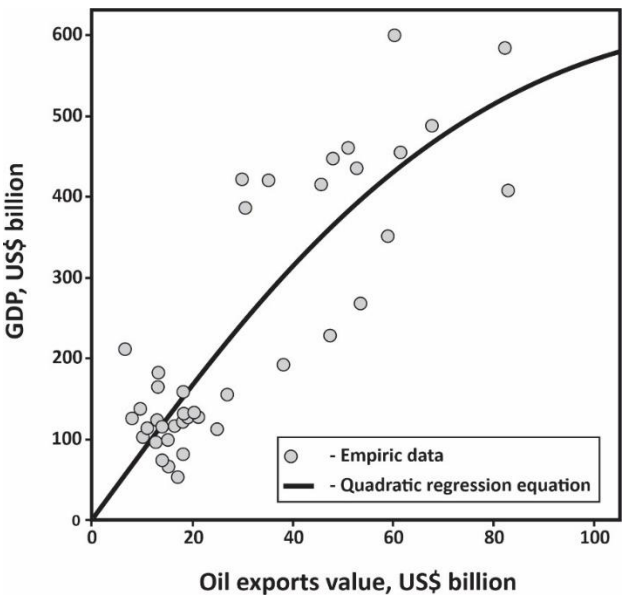

Figure 91. Iran's GDP Model Based on Oil Exports Value.

Table 36. Parameters of Quadratic Regression Equation at Figure 91

Parameter	Sum of Squares	*dF*	Mean Square	*F*	ε
Regression	751,931.462	2	375,965.731	52.119	0
Residual	266,905.812	37	7,213.671		
Total	1,018,837.274	39			

x_i is oil exports value, US$ billion; y_i is GDP of Iran, US$ billion.

Table 37. Coefficients Quadratic Regression Equation at Figure 91

Coefficients	*B*	S	β	*t*	ε
x_i	9.503	2.698	0.780	3.522	0.001
x_i^2	-0.037	-0.412	0.189	-1.157	0.255
β_0	-3.171	80.232		-0.074	0.941

S is standard error, *t* is Student's coefficient.

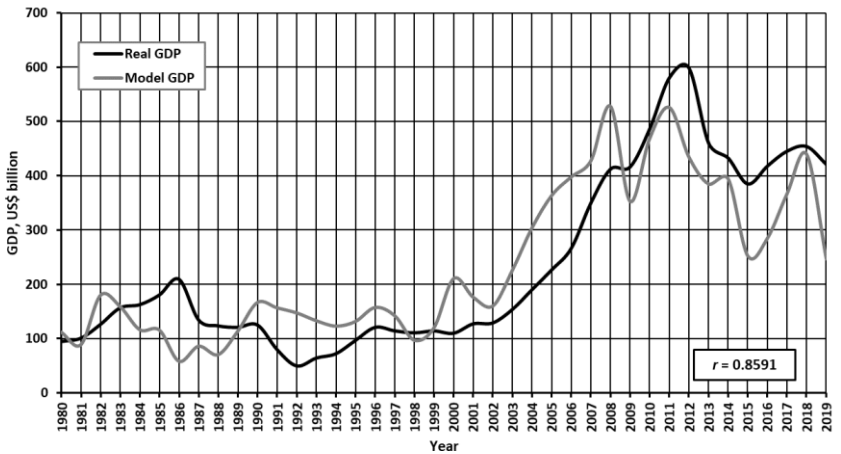

Figure 92. Comparison of Iran's Real and Model GDP.

Figure 92 compares Iran's real and model GDP, computed from the value of oil exports. Accuracy of the model is assessed as ± 7%.

It may be seen at Figure 90 that President Obama's sanctions against Russia have had a negative impact on Iran as well: GDP of the country diminished by US$ 27.61 billion in 2014 compared with 2013, and by US$ 47.74 billion in 2015 compared with 2014.

However, unlike Russia, such 1.5-year-term economic slump was not followed by a financial crisis. Figure 93 explores interrelation between average monthly U.S. Dollar to Iranian Rial exchange rate and crude oil prices. Correlation coefficient, though negative and significant, is relatively weak if compared with the Russian Ruble behavior (see Figure 67). In my opinion, if in the beginning of the unexpected oil price decrease from June 2014 Iranian Rial followed rules of the political economy of exchange rates, within approximately 8-10 months the Iranian financial authorities have undertaken corresponding actions, used a small amount of Iranian Forex reserves, and established such official exchange rate, which best suited to the purposes of political & social governance of the Iranian society.

The outlined peculiarity of the recent finance history of Iran is an additional picturesque proof that the economy of the country is rigidly maintained by the governing bodies and has nothing in common with rules of market relations. Very often short-term financial shocks are determined by contradictions between the secular and the ecclesiastic state structures, which have different goals and strategies.

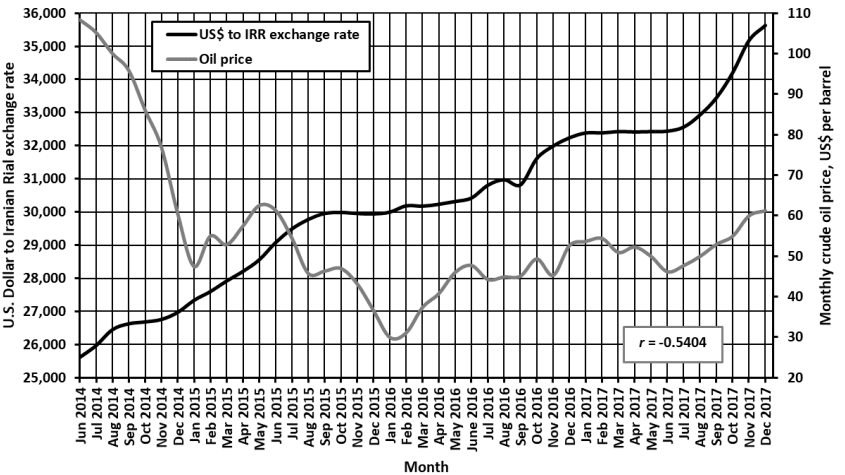

Figure 93. Interrelation between U.S. Dollar to Iranian Rial Exchange Rate and Oil Price in 2014-2017.

In any case, starting from January 2016, Iran's economy began to develop rapidly. In 2016 GDP was roughly US$ 33 billion over than that of 2015, and in 2017 the additional growth of US$ 27.4 billion was fixed. The beginning of 2018 was also favorable for the country but in mid-summer President Trump made a declaration on rigid sanctions to be imposed. As it was noted above, President Trump's basic goal was to bring oil exports from Iran to zero. Already in December 2018 together with my post-graduate student, today – PhD in Economics Khatuna Tabagari [172], I have declared that these sanctions would seriously damage Iranian social & economic environment but in no case the ultimate goal could be achieved and Iranian oil exports, though seriously diminished, still would remain the most important article of the country's free currency revenue.

Let briefly consider our basic arguments and compare our conclusions with what has happened in reality.

Firstly, as soon as the United States in early August 2018 announced new sanctions on Iran and declared that oil exports will be diminished to zero [100], China, at the background of the USA-China trade war, which had negatively impacted the both economies [364], declared in August 2018 that business in Iran will continue [365].

Secondly, President Trump understood very well that a number of mainly East Asia countries like China, India, South Korea, partly Japan were unable to substitute Iranian oil by other sources. In the cited article [172] we have studied in-depth oil exports structure of China, India and South Korea and have shown that within approximately 1.5 years in no way they will be able to refuse imports of Iranian oil. Understanding such reality very well, the U.S. administration has temporarily exempted eight countries (Japan, China, India, Italy, Greece, South Korea, Taiwan, and Turkey) from sanctions for importing oil from Iran [366].

Thirdly, it is true that the U.S. administration has approved sales from its Strategic Petroleum Reserve to substitute exports from Iran [367], hence, this measure had a political rather than an economic importance. Indeed, Figure 94 displays volume of the USA Strategic Petroleum Reserve (SPR) for 1 January of each consecutive year according to the U.S. Energy Information Administration [368] recalculated on million tons. In 2018 Iran

has exported 144.08 million t of oil or 53.46 million tons more than the whole U.S. petroleum Strategic Reserve for the beginning of the corresponding year.

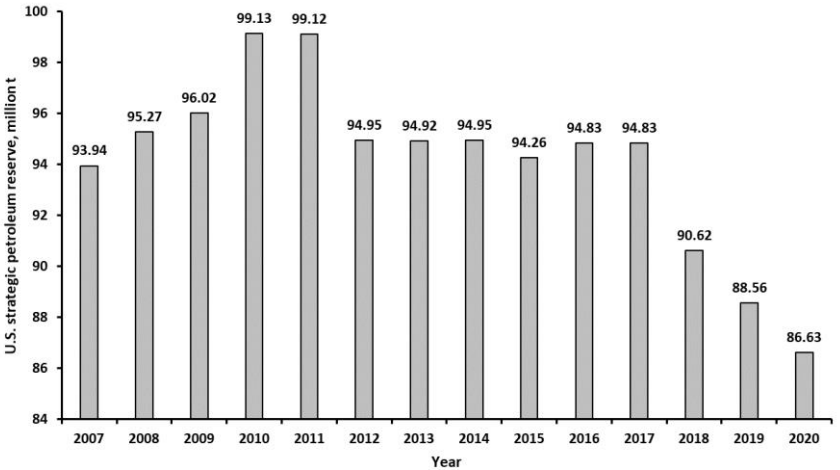

Figure 94. Volume of the U.S. Strategic Petroleum Reserve by 1 January of Each Year.

Thus, we concluded that cancelling of Iranian oil exports was technically and politically unfeasible.

Let see now, what has happened in 2019.

Table 38 demonstrates data of N. McCarthy [369] corrected by us. It is interesting to note that in 2019 and 2020 in addition to countries shown in Table 38, Iran exported oil to some "problematic" states including Syria. According to existing information [370], for instance, in May 2020 Iran shipped about 95,000 barrels of oil per day to Syria, and since June this figure increased to 100,000 barrels daily. In 2019 Egypt arrested 6 Iranian tankers, and Gibraltar also closed access to Mediterranean for Iranian tankers. But later, after Iran has arrested the UK tankers in the Persian Gulf, the detained Iranian ships were released and Gibraltar also opened the channel to Iranian vessels. It is suggested that in Mediterranean oil is repumped to Lebanese tankers based on ship-to-ship principle [370]. Moreover, Iran shipping network is directly tied to Syrian new petroleum refineries, as analyzed in details by Albin Szakola [371].

Table 38. Oil Exports from Iran by Destinations in 2019

Destination	**Oil exports**	
	Barrels a day	Million t a year
China	520,209	25.91
South Korea	328,419	16.36
India	218,946	10.90
Japan	91,652	4.56
Turkey	82,317	4.10
Other	191,790	9.55
Total	1,433,333	71.38

Table 39. Assessment of Iranian Oil Production, Consumption, and Exports in 2016-2019

Index	**Year**	**Value**	
		Million t	US$ billion
Production	2016	216.14	57.57
	2017	235.49	78.25
	2018	224.68	95.77
	2019	160.83	67.19
Consumption	2016	79.17	21.09
	2017	79.46	26.40
	2018	80.60	34.36
	2019	89.45	37.37
Exports	2016	136.98	36.49
	2017	156.02	51.84
	2018	144.08	61.41
	2019	71.38	29.82

For proving that American sanctions on Iran have had a huge impact on this Islamic state, Mr. Katzman from the U.S. Congressional Research Service (CRS) provided annual data on the volume of exported petroleum [325] outlining that oil exports in 2019 has reduced 3.08 times comparing with the year 2018. However, his information does not match with results of our thorough analysis (Figure 95), which is shown in Table 39. Calculations were made based on the data bank in Table 34. In reality, Iranian international oil sales diminished 2.02 times, from 2.89 million barrels a day to daily 1.43 million.

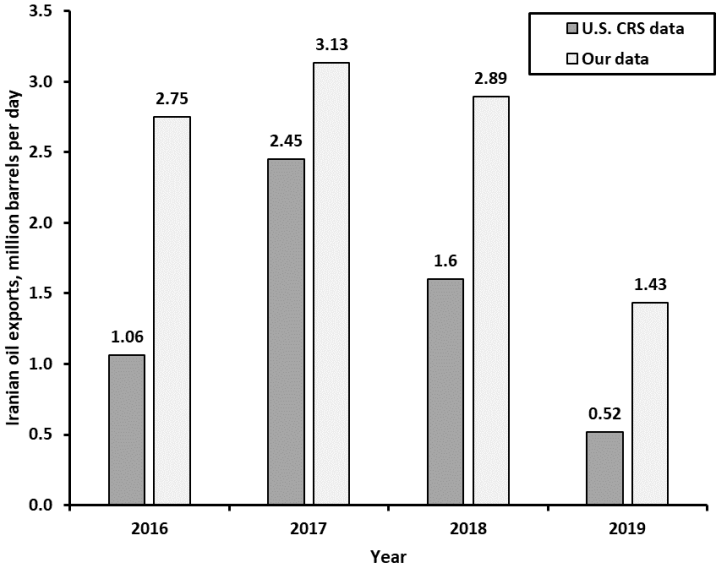

Figure 95. Iranian Oil Exports in 2016-2019 According to the U.S. CRS and Our Data.

In my opinion, new sanctions against Iran was a huge and dramatic geopolitical mistake because:

1. Several decades of negotiation ultimately brought to a success, and under Hassan Rouhani's presidentship on 14 July 2015 the Iran Nuclear Deal was signed. This deal opened gates of civilized world for Iran, created hope for better future in the weak civil society of this Islamic country. Velayat-e faqih system (Guardianship of the Islamic Jurist) was losing influence, and President Rouhani was able to implement modest rudimentary roots of democratization and market relations. President Trump's sanctions killed these positive movements within the Iranian society, and the ecclesiastic power regained momentum.
2. 3 years after the U.S. administration imposed new sanctions, Iran declared renewal of the nuclear program. The U.S. political figures and nonproliferation specialists clearly understood that further development of this program is enormously dangerous for the world

economic and political security [372] and may ultimately lead to fabrication of the nuclear weapon [373].

3. Serious studies show [374] that decision on the strategy, tactics, political and technical support, financing and other issues related to the Iran's nuclear program is made by the Islamic leader and state structures directly accountable to him including armed forces and intelligence agencies. Thus, the fragile equilibrium between the secular presidential and Islamic powers achieved during the first term of Mr. Rouhani's office, was switched in favor of the Revolutionary Guard Corp.
4. As Sepâh-e Pâsdârân controls Iranian Forex reserves and oil exports within the framework of rigid sanctions using methods strongly resembling to international smuggling, the Revolutionary Guard Corps is gaining ground in the economic life of the state. Moreover, it is trying to identify itself as a sole painkiller, a "Mahdi" of the country. Civil society commenced to lose the battle.
5. Within such framework, in addition to income from oil sales and management of Forex reserves, the Corps is gambling with the difference between official and commercial exchange rates of Iranian Rial and, correspondingly, obtains an additional profit. This way all spires of civil relations in the finance sector are killed even before being born.

Thus, as we have predicted [172], President Trump's new sanctions led just to the back effect they targeted to achieve. Instead of bringing the Iranian political power to its knees and obliging it to cancel financing of international Islamic terroristic organizations, the sanctions were politically and technically unable to entirely destroy the economy of Iran and, on the contrary, have strengthened the Guardianship of the Islamic Jurist.

In such conditions Iran met COVID-19 coronavirus pandemic.

5.3. IRAN ON INTERNATIONAL OIL MARKETS WITHIN THE FRAMEWORK OF COVID-19 CORONAVIRUS PANDEMIC

There is a number of publications where impact of COVID-19 coronavirus pandemic on Iran's economy is discussed, however I have not found any publication where Iran's position on international oil markets in 2020 is investigated. It is necessary to note that the Islamic response to the pandemic [377] including the Iran's social environment [378] cardinally differs from the behavior of other countries and consists in non-compliance of ultra-radical Islamic circles to imperative governmental orders on epidemiologic restrictions and lockdowns. For instance, in spite of governmental indications, the faithful groups permanently participated in crowded Friday congregational prayers, mainly in Mashhad and Qom, so the government was obliged to suppress protests against restrictions [379]. Protests continued till the army and the Revolutionary Guard Corps has been implied in maintaining civil order [378].

Practically all publications on Iran's economy in 2020 [380-383, etc.], outline that Iran was among countries where impact of COVID-19 coronavirus pandemic was extremely sever. Such negative effect was, of course, determined by the sad reality that the pandemic has not changed the President Trump's politics, and even the most vulnerable sanctions imposed on Iran has not been cancelled. However, in neither of these and analogous articles this conclusion is supported by statistical analysis of relevant data. So, we will try below to display the objective picture.

According to Worldometer [7], there was in total 1,225,143 SARS-CoV-2 infection cases by 31 December 2020 of which 988,833 people recovered, 55,223 patients died, and 181,087 persons were still sick. Table 40 contains a data bank on epidemic in Iran processed according to the methodology described in Chapter 1.

Figure 96 displays weekly COVID-19 coronavirus infection cases and the mortality rate. It may be seen that first infection cases and first deaths occurred by February 24.

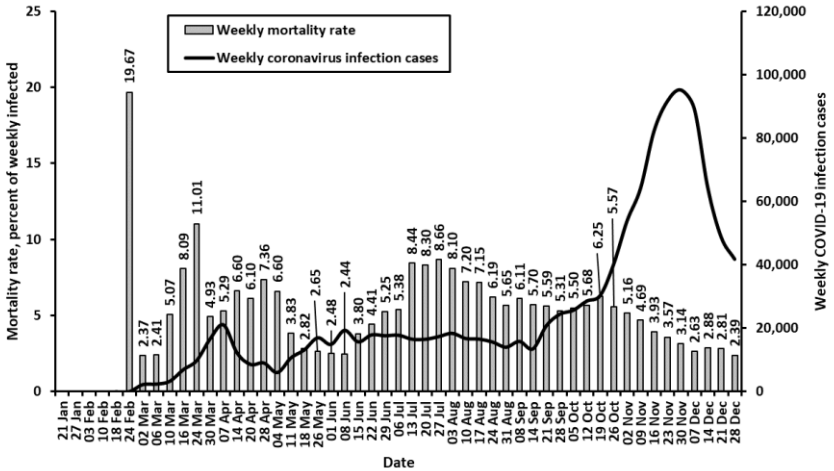

Figure 96. General Statistics on COVID-19 Coronavirus Pandemic in Iran.

Analysis of data in Table 40 and on Figure 96 shows that the mortality rate in Iran in average equals to 5.48% of weekly infected versus 3.39% of world average and of average 1.71% for Russia (Figure 97). However, the mortality started to gradually decrease from the rate of 8.66% for the week of 27 July to 2.39% for 28 December.

Figure 98 illustrates performance of the U.S. Dollar to Iranian Rial exchange rate at the background of diminishing oil prices in 21 January – 20 April 2020.

No correlation between these two parameters does exist, and from this point of view Iranian Rial is in stark contrast to free currencies (see Figure 70). This peculiarity of the Iranian monetary unit is an additional proof that Iranian finance sector is far from free market rules and is rigidly managed by the state despite of the real economic framework.

Information on Iranian oil production and exports is quite contradictory [384-387]. Unlike international oil and gas companies including Russian Gazprom and Rosneft, National Iranian Oil Company does not publish key economic parameters, and information on oil production and exports is strictly classified. In spite of the fact that South Korea, India, Japan, partly China have declared that they have stopped oil imports from Iran, there are clear indications [see, for instance, 388] that such exports are organized via

the third, intermediary countries, and first of all – Malaysia and Indonesia. As well, Iranian crude is thought to be rebranded into "Singma Blend" – Singapore and Malaysia, via falsifying certificates of origin [389].

Table 40. Data Bank on COVID-19 Coronavirus Pandemic in Iran

Date	Weekly coronavirus infection cases	Weekly deaths	Mortality rate, % of infected	Date	Weekly coronavirus infection cases	Weekly deaths	Mortality rate, % of infected
21 Jan	0	0	0	13 Jul	16,601	1,401	8.44
27 Jan	0	0	0	20 Jul	16,550	1,373	8.30
03 Feb	0	0	0	27 Jul	17,404	1,507	8.66
10 Feb	0	0	0	03 Aug	18,429	1,493	8.10
18 Feb	0	0	0	10 Aug	16,809	1,211	7.20
24 Feb	61	12	19.67	17 Aug	16,606	1,188	7.15
02 Mar	2,275	54	2.37	24 Aug	15,700	972	6.19
06 Mar	2,411	58	2.41	31 Aug	14,062	795	5.65
10 Mar	3,295	167	5.07	08 Sep	15,900	971	6.11
16 Mar	6,949	562	8.09	14 Sep	13,536	771	5.70
24 Mar	9,820	1,081	11.01	21 Sep	20,833	1,165	5.59
30 Mar	16,684	823	4.93	28 Sep	24,479	1,301	5.31
07 Apr	21,094	1,115	5.29	05 Oct	25,714	1,413	5.50
14 Apr	12,288	811	6.60	12 Oct	28,607	1,624	5.68
20 Apr	8,628	526	6.10	19 Oct	30,350	1,896	6.25
28 Apr	9,079	668	7.36	26 Oct	40,225	2,241	5.57
04 May	6,063	400	6.60	02 Nov	53,924	2,785	5.16
11 May	10,639	408	3.83	09 Nov	64,169	3,011	4.69
18 May	13,206	372	2.82	16 Nov	82,172	3,230	3.93
26 May	17,019	451	2.65	23 Nov	91,700	3,276	3.57
01 Jun	14,934	370	2.48	30 Nov	95,249	2,991	3.14
06 Jun	19,387	473	2.44	07 Dec	89,304	2,348	2.63
15 Jun	15,744	599	3.80	14 Dec	64,396	1,853	2.88
22 Jun	17,949	792	4.41	21 Dec	48,765	1,369	2.81
29 Jun	17,680	928	5.25	28 Dec	41,838	998	2.39
06 Jul	17,846	961	5.38	31 Dec	18,770	409	2.18

Based on thorough examination of the cited data, Table 41 was completed. The table contains our appraisal of Iranian oil production and exports on the monthly basis. Of course, this assessment may contain some errors but in my opinion its accuracy is within ±5% margins.

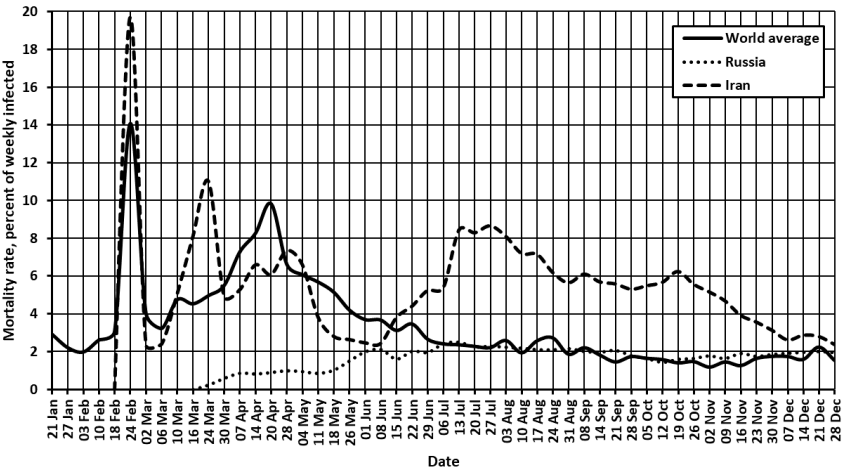

Figure 97. COVID-19 Coronavirus Mortality Rate in the World, Russia, and Iran.

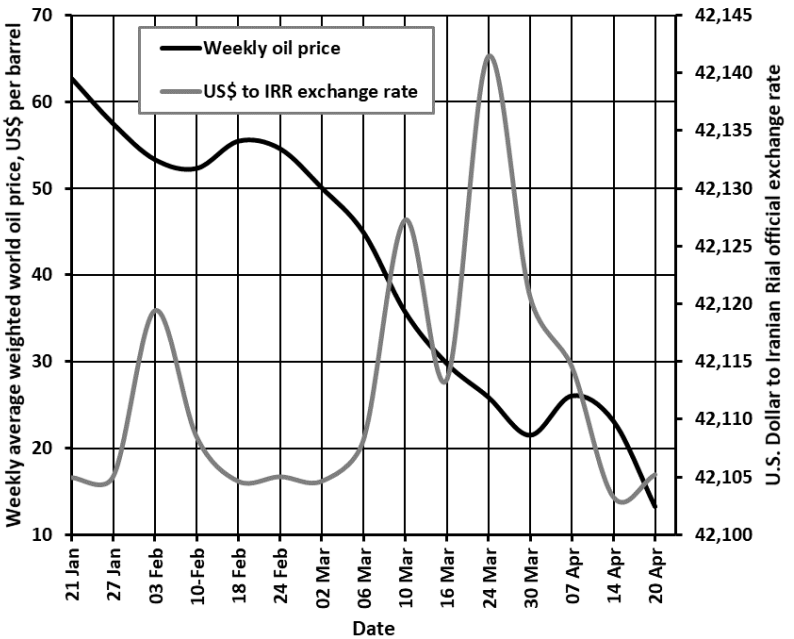

Figure 98. Weekly World Oil Prices and U.S. Dollar to Iranian Rial Exchange Rate in 21 January – 20 April 2020.

Table 41. Appraisal of Iranian Crude Oil Production and Exports in 2020

Month	Production		Exports	
	million barrels	Million t	million barrels	Million t
January	64.54	8.81	18.08	2.47
February	60.03	8.19	16.24	2.22
March	62.78	8.56	16.10	2.20
April	59.19	8.08	15.85	2.16
May	60.57	8.26	15.56	2.12
June	58.41	7.97	14.25	1.94
July	59.83	8.16	13.35	1.82
August	60.20	8.21	14.56	1.99
September	60.20	8.21	15.35	2.09
October	60.54	8.26	16.13	2.20
November	59.85	8.17	17.25	2.35
December	62.68	8.55	16.25	2.22
Total	728.83	99.43	188.97	25.78

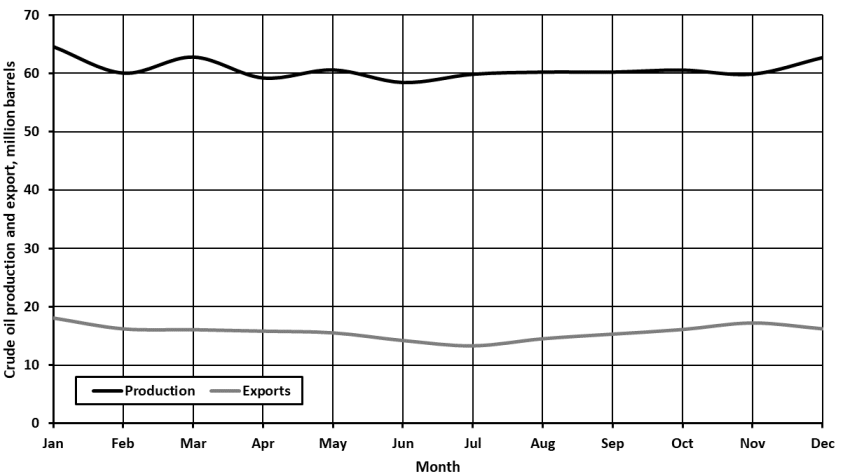

Figure 99. Dynamics of Iranian Oil Production and Exports in 2020.

Figure 99, drawn based on data in Table 41, shows that in 2020 production of oil in the Islamic Republic of Iran, and consequent exports, though low even compared with the year 2019, was sustainable enough. In other words, in spite of extremely severe challenges, Iran was able to meet

them with minimum possible social damage. For assessment of these data, first of all, value of oil exports shall be appraised.

Table 42. Assessment of Iranian Oil Production, Consumption, and Exports in 2019-2020

Index	**Year**	**Exports**	
		Million t	US$ billion
Production	2019	160.83	67.19
	2020	99.43	30.17
Consumption	2019	89.45	37.37
	2020	73.65	29.52
Exports	2019	71.38	29.82
	2020	25.78	7.85

Table 42 demonstrates oil production, consumption, and export volumes and values of 2020 versus 2019. Comparison of these data with those on Table 39 indicates that if the U.S. sanction against Iran determined decrease of oil exports volume by 50.45% in 2019 (72.69 million t less than in 2018); the negative effect of the world COVID-19 coronavirus pandemic was also huge, causing diminishing of international oil sales by additional 45.60 million t or 63.88% compared with the year 2019. In other words, in 2020 Iran exported 118.3 million tons less oil than in 2018.

The monetary effect of such bust has been tremendously challenging for Iran: in two years the country missed 87.22% or US$ 53.56 billion of its registered free currency income. Figure 100, which provides information on assessed oil exports volume and value in 2016-2020, visibly demonstrates this recession tendency. The World Bank Middle East and North Africa Region office has forecasted -4.5% Iran's GDP decline in 2020 in addition to -6.8% in 2019 [390, p. 10]. Hence, in my opinion real (and not registered!) decline will be much more sever and not less than 15%, if we thoroughly analyze the quadratic regression equation at Figure 91.

For sure, in such circumstances neither country with a liberal free market economic environment would avoid a default and a massive economic & financial crisis.

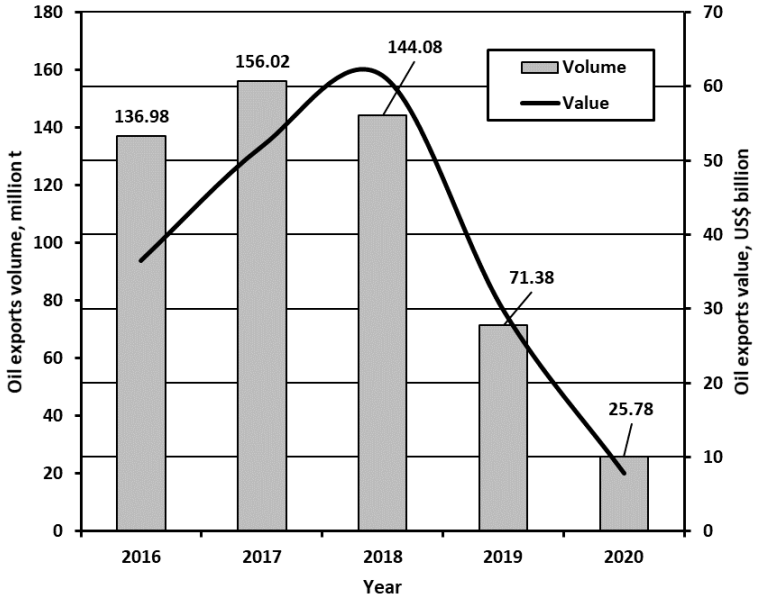

Figure 100. Assessed Volumes and Values of Iranian Oil Exports in 2016-2020.

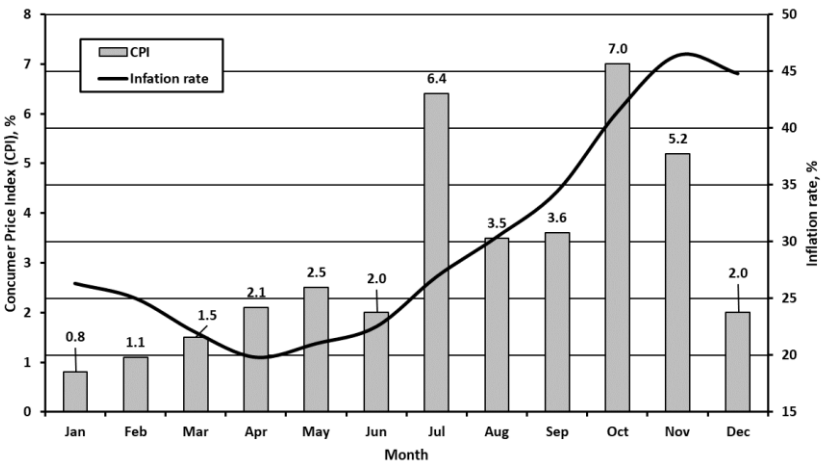

Figure 101. Dynamics of Consumer Prices and Inflation Rate in Iran in 2020.

Let remind, for instance, the case of Russia in 2014-2015 described above. Iran skirted mass increase of consumption prices as well as

manifestations of social unrest not only by rigid police behavior but also using some economic vehicles absolutely unusual for democratic countries.

Firstly, the state governing structures firmly managed consumer prices [391] and the inflation rate [392], as it is shown on Figure 101. For doing this, prices on all goods both imported and produced by state-controlled companies were strictly appointed by state at the rate, which was considered to be optimal.

Secondly, Iranian Forex reserves were used for imports of good and strategic commodities.

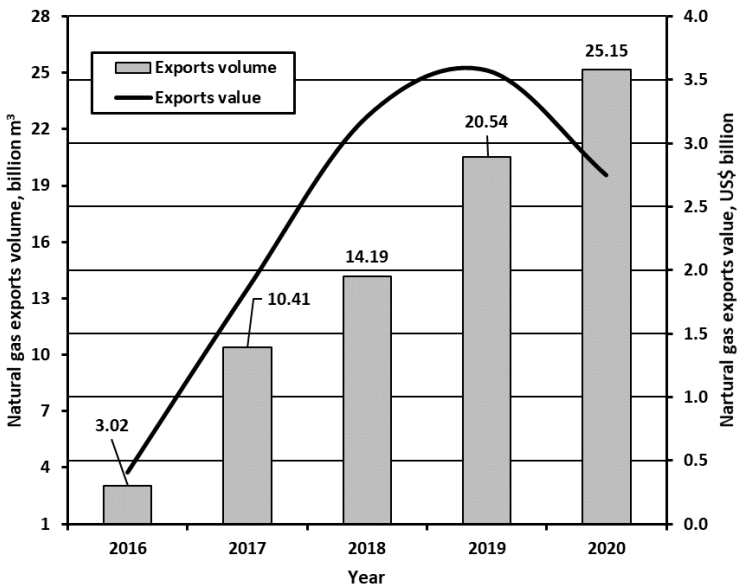

Figure 102. Assessment of Iranian Gas Exports Volumes and Values in 2016-2020.

Information on Iran's foreign currency assets abroad is uncertain and contradictory. In 2007 these assets were assessed to be about US$ 62 billion [393]. In 2019, according to different appraisals these assets were between 100 and 125 US$ billion [394]. According to the CIA Factbook [395], Iran's Forex reserves equaled US$ 132.6 billion in 2017 but diminished to US$ 86 billion by February 2020. For assessing movement of Iranian Forex reserves, several facts shall be considered.

1. Oil exports the value of which has already been reviewed.
2. Exports of gas. We have thoroughly processed available data [23. 26, etc.] and have concluded that the last years gas exports value never exceeded US$ 4 billion (Figure 102).
3. Exports of other commodities & goods. From primary commodities produced in Iran, the country is mainly exporting iron ore, steel, cathode copper, travertine, and agricultural products (mostly – fruits and vegetables). Having thoroughly processed the UNICTAD data base [396], we have calculated that this exports never exceeded US$ 1 billion.
4. Difference between official and free market exchange rates. I already have described instruments how additional free currency income originates from the difference between the official [328] and the commercial [329] exchange rates of Iranian Rial. As far as the finance sector including country's Forex reserves are basically managed by banks under control of the Islamic Revolutionary Guard Corps [397, 398], the latter is responsible for smooth provision of the country by imports, in addition, of course, to financing international Islamic organizations [399]. At the background of free currency deficit caused by diminished oil exports in 2020, the Corps managed to obtain additional free currency income gambling on difference between two exchange rate systems. Figure 103 explores the monthly U.S. Dollar to Iranian Rial exchange rates in 2020.

Thorough analysis of these four free currency sources led us to assessment of such income obtained by the country in 2016-2020 (Figure 104). The figure demonstrates that in 2016-2018 income gradually increased and then, due, primo, to the U.S. sanctions and, secondo, to the COVID-19 coronavirus pandemic began to trend downward.

Such study was necessary for appraising the dynamics of Iranian Forex reserves.

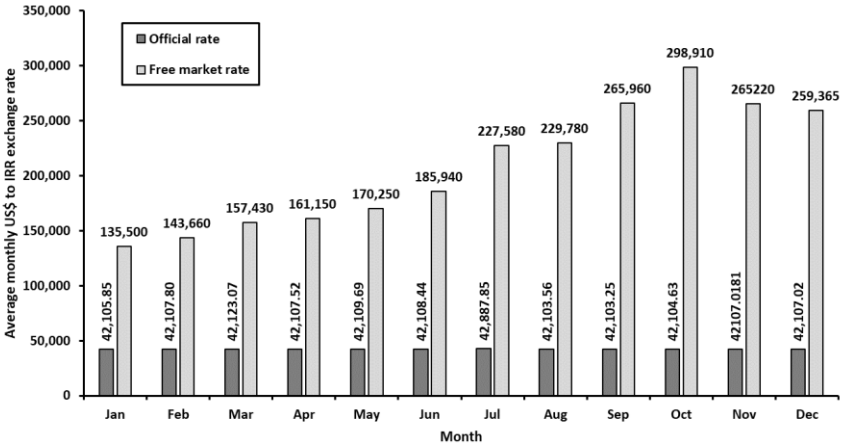

Figure 103. Average Monthly U.S. Dollar to Iranian Rial Exchange Rates in 2020.

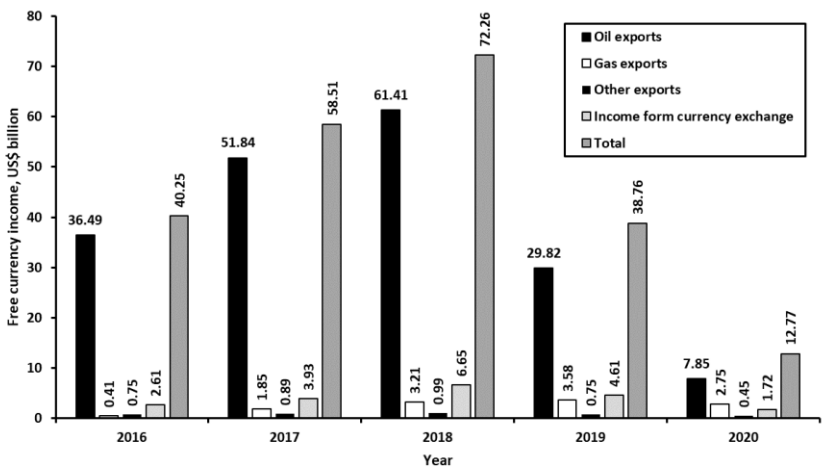

Figure 104. Assessment of Iran's Free Currency Income in 2016-2020.

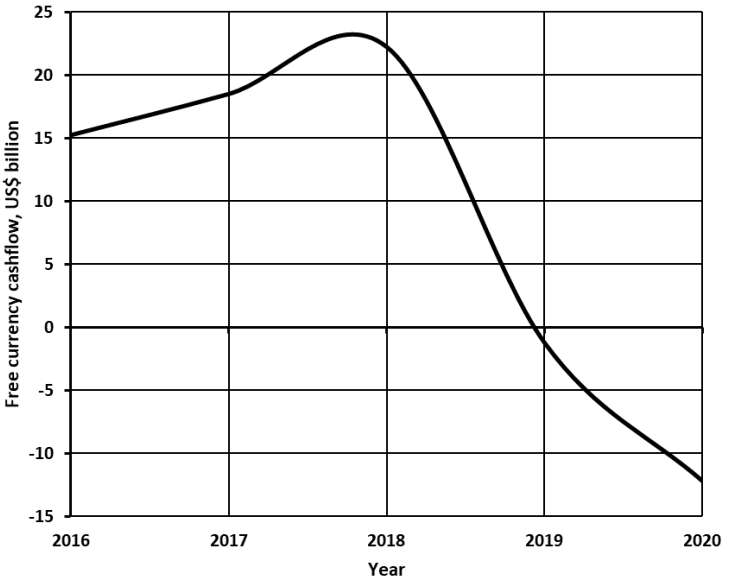

Figure 105. Iran's Free Currency Cashflow in 2016-2020.

Examination of the materials cited above has shown that Iran each year spends from US$ 25 billion to US$ 50 billion of free currency. In prosperous years the country spends more but according to my opinion, 25 billion of U.S. Dollars is a minimum necessary to maintain adequate social welfare in the country, for imports of weapon, military and strategic materials, and for support of international Islamic organizations.

Therefore, it is possible to roughly estimate the year-by-year free currency cashflow and, consequently, the movement of Forex reserves. Figure 105 represents our assessment.

Thus, starting from 2019 Iran was obliged to use its Forex reserves for covering necessary expenditure the state was considering to be essential for both maintaining more or less the country's inner social & economic equilibrium and to develop the Shia doctrine worldwide but basically in the Middle East.

5.4. MAIN FINDINGS

Iran is a rather unusual country, which has two parallel state governing structures. According to the awfully contradictory and eclectic Constitution, Iran is a unitary Islamic state, the supreme governing branch of which is presented by the *velayat-e faqih* system. Like the Communist Party in the Soviet Union, the Guardianship of the Islamic Jurist is responsible for the ideological climate in the country and for defense of Islamic values in Iran and beyond. This branch of power is governed by the Supreme Leader of Iran who is head of the state and the highest political and religious authority of the Islamic Republic of Iran. The Supreme Leader is elected by the Assembly of Experts, which is Iran's only constitutional body with the authority to appoint and dismiss the Supreme Leader [400]. Today, the Assembly of Experts is elected simultaneously with the Parliament [401].

The Supreme Leader by mandate does not interfere in routine governance of the country but key governmental organizations including army, intelligence, judicial system, state television, etc. are directly accountable to him. For execution of Supreme Leader's functions, Ayatollah Khomeini in 1979 founded *Sepâh-e Pâsdârân* – the Islamic Revolutionary Guard Corps, which represents an elite unite of the armed forces.

The parallel governing structure consists of a secular network of democratically elected president, parliament, governors of regions and local governments at municipal and even village levels.

Without any doubt, from the very beginning such dualistic philosophy of state governance created tensions between two branches of political power [402], because split of influence between the Supreme Leader and the president is volatile, and any time the Guardianship of the Islamic Jurist under request of the ecclesiastic leader may block any decision kept by president or decree issued by the parliament [403].

Usually, such contradictions have an implicit character but sometimes they become public as it happened, as noted above, with the 5th President of Iran Sayyid Mohammad Khatami, when his proposals of modest economic liberalization of the country were blocked by the Guardianship of the Islamic Jurist as inconsistent with the Constitution [335].

Such contradictions became clear for the world society when negotiations on the Iran Nuclear Deal started in mid-90ies. In his *fatwa* (e.g., "legal opinion on a point of Islamic law (sharia) given by a qualified jurist in response to a question posed by a private individual, judge or government" [404]) in October 2003 Ali Khamenei strongly criticized nuclear weapon proliferation but expressed neither positive nor negative opinion on the Nuclear Deal [405]. According to M. Rafizadeh [406], the Supreme Leader publicly said in mid-December 2020, e.g., after Jo Biden has been elected President of the United States and new possibilities for improving relations with the USA appeared: "I did not believe in the way the JCPOA was done, and I have made this clear to the president and the foreign minister on many occasions". Hence, according to the cited article, implicitly Ali Khamenei supports normalization of relations with the Western world and restoration of the Iran Nuclear Deal in whole volume.

In any case, the dualistic constitutional arrangement of the Islamic Republic of Iran binds government's arms and makes its margins of maneuver very narrow. Iran does not have state budget: Parliament is approving *Government Budget*, e.g., as it was mentioned above, those assets, revenue and expenditure that may be disposed by the central civil power. As it has been shown, these assets represent only a modest part of the state finances. Government practically has no access to Iran's Forex reserves, which are managed by the Guardianship of the Islamic Jurist via the Islamic Revolutionary Guard Corps.

Of course, the country cannot survive if the two governing branches are permanently arguing. Iran habituated to live under the pressure of permanent sanctions and during 42 years a certain equilibrium has established, though this balance is volatile because the Constitution does not precise exactly and clearly functions of either theocratic or secular structures and do not split their responsibilities. Thus, this margin is metastable and fluctuating and substantially depends on personal peculiarities of supreme leaders and presidents.

Hassan Rouhani, as described, from the very beginning of his presidency made a bid on liberalization of civil environment, development of market economic instruments, and civilized relations with the Western democracies.

He opened country's doors for western citizens and international companies and lobbied as strongly as he could privatization and corporatization of state-owned businesses. Unlike Mahmoud Ahmadinejad, under presidency of which Iran found itself within the framework of deep stagnation, Hassan Rouhani gained a strong support of both Iranian businesspeople and ordinary citizens, who began to feel hope for the better future. This support allowed to his administration to reconquer from Sepâh-e Pâsdârân some strategic branches, including electricity generation, mining, wholesale commerce, etc. Immediately corporatization of state-owned enterprises was launched, which implied such huge organizations as the Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO) and basic commodity producing (iron ore, steel, copper, base metals, coal, etc.) companies under its umbrella. However, latent obstruction of the medium-layer bureaucrats determined hampering of this process, and corporatization, reflected in the companies' statutes, in reality had a formal, superficial character. At the same time, one of the most important general reasons of the corporatization's failure was impossibility to get access to international capital and commodity markets. Unlike Russian commodity companies, which, as it was shown above, in whole volume conceived flavor of the globalized economy, Iranian leading businesses continued to stew in their own juice, isolated from the rest of the world. That is why they were and are losing a significant amount of the added value.

Hence, there were red lines Hassan Rouhani had no opportunity to cross. He never had access in whole amount to Iran's Forex reserves. He never could and never wanted to interfere in armed forces, intelligence, military industries and the Iran Nuclear Program. He never could manage Iran's oil sector.

As a great majority of countries with abundant oil resources, Iran's macroeconomic model is basically based on oil exports. Though, here also some features distinguishing Iran from, for instance, Russia shall be noted.

Firstly, due to sanctions Iran was obliged to become a self-sufficient country. This Islamic state is entirely supplied by the national agricultural product. At the same time, you would be unable to find medicaments widespread in the rest of the world and would be obliged to use Iranian

drugs, which in a great majority of cases are of low quality. At the background of skilled surgeons, access to hi-tech medical services like computer tomography, echoscopy, etc. is quite limited and inapproachable for the predominant majority of population.

From 1979 sanctions against Iran consisted in a ban on selling aircraft and repair parts to Iranian aviation companies [97]. It is obvious, that the country is unable to survive without the military and the civil aviation, and that is why Iran is obliged to use specific technologies to meet these challenges. Sepâh-e Pâsdârân is the structure responsible to manage this sector. In addition to back-to-back contracts with countries, which do not obey sanctions against Iran, Sepâh-e Pâsdârân is smuggling repair parts but also the enormous amount of different strategic materials and consumer goods. All computers, software, cell phones, luxurious cars, tracks, equipment and hundreds of other kinds of manufacture products is imported to Iran in black.

Secondly, Iran does not have access to international banking SWIFT system. For performing described imports, Sepâh-e Pâsdârân needs free currency assets. As far as the great majority of Iranian accounts were frozen in the U.S., European and, for instance, South Korean banks, Sepâh-e Pâsdârân was obliged to found a network of banks and open hundred thousands of accounts in western financial institutions. Of course, this information as well as volume of assets is strictly classified, because in case of information leakage the accounts are immediately frozen. That is why periodically these accounts are liquidated and new one opened. Now, for import of free currency in Iran, a system of so-called exchange agencies appeared. Headquarters of such agencies are basically located in Turkey. For a certain interest rate, the agencies provide you the agreed amount of Iranian Rials within the country. The Iranian Rial is not really a freely convertible currency, its exchange rate is rigidly imposed by the Central Bank of Iran, and, correspondingly, consumer prices have nothing in common with principles of the free market. For avoiding financial losses, the country introduced a complex and contradictory system of the exchange rate, which consists in existence of both official exchange rate, imposed by the Central bank of Iran, and a so-called free market or commercial exchange rate.

Analysis above has shown that difference between these two exchange rates may reach 400 and more percent. Manipulating with the level of exchange rates, Sepâh-e Pâsdârân is able to control inflow and outflow of free currency.

Thirdly, we have analyzed the free currency income of Iran and have proven that its lion's share is created by international crude oil sales (see Figure 104). Thus, Iran's position on international oil markets entirely determines welfare and social security of the country.

Due to these three features, Iran's position on international oil markets radically differs from those of other countries, for example, of Russia.

Statistical analysis has proven that the country's GDP is directly determined by oil exports. The latter is effectuated by National Iranian Oil Company – the state-owned entity, which is exclusively responsible for upstream, midstream, and downstream development of the oil sector. For fulfilment of this mission, the company has created a network of subsidiaries in form of a limited liability companies both in Iran and abroad. Oil shipment is performed by the state-owned National Iranian Tanker Company, which has the sixth world rank with the capacity of 13.8 million DWT.

As far as the National Iranian Oil Company is not registered at any commodity exchange, oil exports are effectuated under spot prices according to either intergovernmental agreements or back-to-back direct contracts of the National Iranian Oil Company with analogous corporations in China, India, South Korea, Turkey and other countries.

During decades Iran has created a stable network of its oil consumers, and started from 1990, with rare exceptions, Iran exported about 120-140 million tons of oil per year, till the U.S. sanctions were imposed in 2018. Among main Iran's oil importing countries China plays a leading role importing more than 30 million tons of crude oil each year – about 22.5% more than India, which has the second rank according to oil imports from Iran. For doing business with the National Iranian Oil Company, world oil giants, and, first of all, the China National Petroleum Corporation (CNPC), Sinopec (China), Indian Oil Corporation Ltd., etc. opened their affiliated offices in Iran, because international financial vehicles were not applicable. From European companies the most active was the French Total [407]. Even

after the re-imposition of U.S. sanctions, the Chinese and Indian companies, in spite of declarations of their governments (see above), were active in Iran. In August 2020 the State of California prohibited contracting with public entities the following companies for dealing with the National Iranian Oil Company [408]:

1. China National Petroleum Corporation
2. China Oilfield Services Limited
3. Sinopec (China)
4. SKS Ventures (China)
5. Indian Oil Corporation Ltd.
6. Oil and Natural Gas Corporation (India)
7. Oil India Limited
8. ONGC Videsh Ltd. (India)
9. Petrofield (Brazil), and
10. Petróleos de Venezuela, S.A

Before 2019 the following international banks were present in Iran [409]:

1. Future Bank – was founded in 2004 by Bank Saderat Iran, Bank Melli Iran and Ahli United Bank of Bahrain
2. British Standard Chartered PLC – opened its branch on Kish Island in 2006
3. Iraqi Islamic Cooperation Investment Bank – active in Iran since its foundation in 2006
4. Iranian-European Bank – founded in 2008
5. Iran-Venezuela Bi-National Bank – was established in 2010
6. Australian Bank – opened a credit line of € 1 billion in 2017
7. Industrial and Commercial Bank of China – opened an office in 2017
8. ICBC in 2016 considered a possibility of doing business in Iran but ultimately refused
9. Czech Raiffeisenbank – opened the office in 2016

10. Russian Gazprombank – opened the office in 2016, and
11. Russian VTB – opened the office in 2017.

It is clearly visible that the predominant majority of banks started to deal with Iran due to President Rouhani's foreign politics.

Such a framework was characteristic of the first term of Hassan Rouhani's office and till the end of 2018. In 2016 Iran exported 136.98 million tons of oil, in 2017 – 156.02 million t, the first half of 2018 oil exports volume also was increasing but after August, when President Trump's sanctions were announced, exports slightly diminished and the annual figure corresponded to 144.08 million tons (see Table 39). In 2019 exports volume dramatically decreased to 71.38 million tons.

President Trump aimed to entirely cancel oil exports from Iran, and this way to oblige this Islamic state to follow the U.S. directives concerning the Middle East politics.

It should be said that both the United States and Israel have the same sustainable goal in the Middle East – combat Hezbollah in particular and terrorism in general and oppose to acquiring the nuclear weapon by Iran. However, their approaches radically differed: under Obama's presidency the USA had a flexible, a soft approach whereas Israel insisted on radical measures. Such difference in foreign politics even created a certain tension between two countries during decades [410]. The situation radically changed under Donald Trump's presidency [411]: He started to dully follow the Israeli politics.

Already in December 2018 we have concluded that the main goal of President Trump was impossible to achieve [172]. Firstly, The U.S. administration entirely neglected the social psychology of Iranian nation – in times of troubles Iranians forget inner contradictions and consolidate behind their supreme leader. This way, the sexennial efforts of President Rouhani to combat the Islamic radicalism and to modernize the Iranian society fell into oblivion.

Secondly, vital national interests and energy security of influential countries were related to oil imports from Iran. Among them China, South Korea, India, partly Japan, a number of European states may be mentioned.

The basic negative effect, as we have shown, was switching of oil exports in shadow and involving intermediator countries for altering certificates of origin. Importance of Iranian oil was so high that even democratic states based on Rule of Law closed eyes on oil smuggling. Of course, such states bought Iranian oil only indirectly and only as a necessary supplement to transparent shipments, and such approach boldly decreased but not killed the international sales of Iranian oil.

Thirdly, within the framework of catastrophic lack of free currency income, Iran used the described unusual peculiarities of Iranian Rial, and artificially causing avalanche-like increase of the difference between the official and the commercial exchange rates nipped in the bud super inflation, catastrophic growth of consumer prices, and the financial crisis.

Fourthly, all these technologies concerning both shadow oil exports and gambling with Iranian Rial could be used only by the Islamic Revolutionary Guard Corps, of course, in synergy with the government. The latter had no other alternative. This way, the radical wing of Iranian society reconquered the lost social space.

In 2019 the great majority of the Western banks have withdrawn from Iran. Even Industrial and Commercial Bank of China closed its office in Teheran. The reason of withdrawal was the fact that Iran has not joined the Financial Action Task Force (FATF) rather than the American sanctions [412]. However, the Chinese oil policy makers needed a bank in Tehran, and immediately after withdrawal of the Industrial and Commercial Bank of China, its office representation was opened by the Bank of Kunlun, which is the daughter company of the China National Petroleum Corporation. Today, this bank is the sole Chinese banking institution in Iran [413].

In January 2019, the European Union launched a so-called Special Purpose Vehicle, the "Instrument in Support of Trade Exchanges" (INSTEX), aiming support of trade relations with Iran [407]. One of the basic goals of this vehicle is help Iran to repatriate oil revenue. However, as INSTEX does not offer a financial channel, in reality this support has a political rather than an economic sense, and money is still repatriated via mechanisms described above.

It is important to note that unlike China, South Korean huge companies like Samsung and LG Electronics as well as Hyundai and KIA Motors has withdrawn from Iran in 2020 [414]. According to the available information, the market share of two latter companies at the Iranian automotive market was 6.26%. [415]. Iranian government declared that there will be "no return" due to tight relations between two countries. The basic issue of misunderstanding are assets of US$ 9.5 billion frozen in South Korean banks [416].

Absolutely different policy was characteristic of Japanese companies. Japanese External Trade Organization (JETRO) has a representative office in Tehran [417]. JETRO promotes businesses of the following companies, which continue activities in spite of the U.S, sanctions [419]:

1. Komatsu – excavators & heavy vehicles
2. Tadano – mining equipment
3. Hitachi – mining equipment
4. Metal Van – tracks
5. Bridgestone – mining equipment
6. Mitsubishi – automobile production
7. Mazda – automobile production
8. Suzuki – automobile production
9. Nissan – automobile production
10. Honda – automobile production
11. INPEX – Oil and gas largest Japanese company
12. Mitsui – petrochemicals production
13. Fujikura – electronic equipment
14. OMETA – medical equipment
15. AS ONE – laboratory and medical equipment
16. MASKO – nanotechnology
17. Miho Japan Co., Ltd. – enzymes
18. Meito Sangyo Co., Ltd – enzymes
19. Tosoh – chlorine powder
20. WAKO – laboratory chemicals
21. Japan Tobacco International – tobacco.

It should be said that the share of Japanese companies at the Iranian automotive market is as high as 11.82% [415].

In August 2019, when Iranian Foreign Minister Mohammad Javad Zarif visited Beijing, the two countries agreed to amend a 25-year program signed in 2016, by including an article of US$ 400 billion of investment in the country's economy. By July 2020 the document was almost entirely ready [419], hence there are no indications that it has been already signed. In response, in October 2020 the U.S. administration has imposed sanctions on six Chinese maritime operators and their CEOs for dealing with the Islamic Republic of Iran Shipping Lines (IRISL) and its subsidiary Hafez Darya Arya Shipping Company (HDASCO). These shipping companies were suspected in weapon and military equipment freight. These Chinese companies are as follows [420]:

1. Reach Holding Group (Shanghai) Company Ltd.
2. Reach Shipping Lines
3. Delight Shipping Co., Ltd.
4. Gracious Shipping Co. Ltd.
5. Noble Shipping Co. Ltd., and
6. Supreme Shipping Co. Ltd.

It should be added that Chinese government and companies as a rule pay no attention on the U.S. sanctions and continue dealing with Iran.

Unlike Japanese and Chinese entities, the basic USA and European also some Russian companies, which have close relations with the USA, already in June 2018, immediately after President Trump's first indication, even before the sanctions entered in force, left Iran. Among them the following international giants shall be noted [421]:

1. Total SA – France
2. A.P. Moller-Maersk (Maersk) – Denmark
3. Peugeot PSA Group – France
4. General Electric and its subsidiary Baker Hughes, Inc. – USA
5. Honeywell International, Inc. – USA

6. Boeing – USA
7. Lukoil – Russia
8. Reliance Industries Ltd – India
9. Dover Corporation – USA, and
10. Siemens Corporation – Germany.

Such was the social & economic framework in Iran when unexpectedly COVID-coronavirus epidemic spread in the country.

As it was specially discussed above, social framework under press of pandemic in Muslim countries was quite specific. Ultra-radical Islamic circles disobeyed governmental restrictions and lockdowns, especially during the Friday congregational prayers in ecclesiastic centers [377, 378]. In Mashhad and Qom, the basic Muslim hubs of Iran, the government was obliged to suppress social unrests and break up the demonstrations against restrictions. However, such demonstrations, which requested free access to mosques at least at Fridays, took permanent character and spread over the whole country in such a way that the army and the Revolutionary Guard Corps has been implied in maintaining civil order [378].

These Friday prayers collected crowds of believers and led to fast distribution of disease as it is shown on Figure 96. Due to political isolation of the country, delays of SARS-CoV-2 tests supply, catastrophic deficiency of medicaments recommended by WHO guidelines, lack of expertise, infrastructural backwardness of the state and corresponding limited access to professional medical services for rural population determined a significant COVID-19 mortality rate, which started to diminish only by the end of summer 2020. Hence, there is no certainty that official statistics (see Table 40) reflects the real epidemiological situation: as we have mentioned above, on 18 July 2020 President Rouhani declared that about 25 million Iranians may have been infected with coronavirus [68]. This date, according to official data by WHO [7], 271,606 infection cases were registered in Iran. So, President allowed the possibility that 98.9% of SARS-CoV-2 infected were out of state medical control.

Paradoxically, however, the world COVID-19 coronavirus pandemic and related crash of world oil markets described in chapters 2 and 3,

significantly increased the role of the government in the social and, what is more important, the economic life of the country. The Islamic Revolutionary Guard Corps, well positioned under the new U.S. sanctions, was unable to meet challenges of the pandemic alone. Synergetic joint measures became necessary to diminish the negative impact of the disease to the possible minimum.

For doing this, the specific features of both Iran's economy and international oil trades were smartly used. Firstly, as it was shown above, Iranian Rial is a really "strange" currency, which has, at least two exchange rates to U.S. Dollar: (i) official, fixed by the Central Bank; and (ii) free market or commercial rates. In reality, however, two parallel structures of the state power are managing these markets, and when there is misunderstanding between them, the commercial exchange rate becomes uncontrollable. That is why at the background of COVID-19 coronavirus epidemic at least temporal agreement of both the government and the Revolutionary Guard Corps concerning economic issues became indispensable, and I am sure that such agreement, perhaps even unpronounced, was reached.

Secondly, due to sanctions, Iranian exclusive operator – the National Iranian Oil Company has no access to commodity exchanges and, therefore, to futures markets. That is why the collapse of oil futures market and, as consequence, sharp diminishing of futures contracts in April 2020, described in chapters 2 and 3, had no impact on Iran's economy. On the contrary, decrease of spot oil prices and diminished volume of exported oil determined by COVID-19 pandemic, was awfully vulnerable for Iran. For mitigation of these impact, synchronic actions of the mentioned branches of political power became necessary. Such actions implied: (i) oil smuggling to East Asia states using changing certificates of origin and redirecting export flows via the intermediator countries (ii) utilization of Iran's Forex reserves allocated in a huge number of banks in many countries on enormous number of accounts for import of weapon, military equipment and spare parts, consumer goods, etc.; (iii) targeted management of Iranian Rial's official and commercial exchange rates for, on one hand, obtaining additional free

currency income, as described above, and, on the other hand, ensuring acceptable growth of inflation and consumer prices.

As I already have noted, neither country with free market economy would be able to sustain under a doubled press of sanctions and the pandemic. Iran stood against these challenges and overpassed the most difficult times – spring and summer 2020. By autumn both epidemiologic situation and positioning at oil markets began to improve: mortality rate was diminishing, oil prices at the background of slightly but consistently growing exports went upward.

In November 2000 Jo Biden won presidential elections in the USA. Today Iran is on a crossroad: either the United States will be successful in negotiations, and the both countries will return to Iran Nuclear Deal or this opportunity will be lost. In the first case, a new chance of positive changes will be given to Iran. In the second case, the country will follow the itinerary of fundamentalism and Islamic radicalism, which ultimately may provoke a whole-scale Middle East war.

Chapter 6

GEOPOLITICAL AND GEOECONOMIC CONSEQUENCES OF WORLD COVID-19 CORONAVIRUS PANDEMIC

There is spectacularly large amount of publications, which deal with geopolitical and geoeconomic consequences of the world COVID-19 coronavirus pandemic. The London-based Centre for Economic Policy Research published a special issue [422] where different aspects of this problems are highlighted and different opinions are expressed. Beatrice Weder di Mauro [423] believes that the main macroeconomic problem of the pandemic consists in diminished supply and demand of goods, and that governments should mitigate this problem by adequate fiscal policies. Boone et al. [424] predicted the decrease of GDP in different countries up to -2.5% but according to the authors the main factor of recession is decrease of demand whereas impact of commodity prices is suggested to be relatively low. Hence, as I have shown in this book, the situation happened to be vice versa, at least, for a significant number of oil exporter countries. In the interesting article of McKibbin and Fernando [425] among the basic reasons of economic decline disruption of global supply chains, panic among consumers and firms, and response of financial markets to the changes provoking plunge of global stock indices were nominated. They predicted

the GDP decline in developed economies by more than -8%. Arezki and Nguyen [426] from the World Bank correctly mentioned decrease of oil prices, abruption of value chain in addition to practically entire cancelling of tourism and travel amongst the basic reasons of the economic crisis. For Richard Baldwin and Eiichi Tomiura [427] the main negative impact of the pandemic consists in diminished trade indices whereas for Thorsten Beck [428] as well as for Stephen G. Cecchetti and Kermit L. Schoenholtz [429] – the disequilibrium at financial markets and uncertainty in the banking sphere. At least, John H. Cochrane believes that the U.S. administration as response to the world COVID-19 coronavirus pandemic should change the monetary policy and diminish the interest rate [430].

The World Bank analysts [431] have identified four negative impacts of COVID-19 pandemic on the world economy: (i) Diminished oil prices, which however, were interpreted as a result of decreased demand on oil; (ii) The previous oil price plunges were "unwound" within three years, thus, recovery form the COVI-19 shock also will take several years; (iii) Decrease of oil prices left limited possibilities to boost the global economy and provide a support for energy-exporting and developing countries, and (iv) Many less developed countries faced public health crisis, and the current situation is a good opportunity to review energy-pricing policies.

Josef Braml [432] called the year 2020 "The end of the end of history" (p. 52) meaning that the world COVID-19 coronavirus pandemic has created a new reality, which allows China to challenge the U.S. Dollar hegemony at commodity and financial markets. Correspondingly, Nicole Koenig and Anna Stahl [433] believe that at such background the role of the European Union as a leader of the globalized world may be ensured. The same idea is supported by François Heisbourg [434] who, however, outlines that "the most important and unpredictable factor in determining geopolitical transformation will likely be the ongoing changes… of the pandemic" (p. 20). Quite opposite opinion has expressed Richard Youngs [435]: he thinks that the EU, on the contrary, displayed only narrow conceptions of self-interest.

According to the Policy Department of the European Parliament [436], the pandemics has changed the geopolitical realities, and therefore the

"European foreign policy is entering an era of re-definition" (p. 52) meaning that the bilateral relations with the USA, Russia, and China should be reconsidered. However, for instance, G. Terranova [437] outlined that the pandemic obliged the great majority of states to close their borders and to minimize interstate relations. From this point of view, the pandemic has accelerated beginning of the new global era. At the same time, according to Claudia Schmucker's opinion [438], the pandemic significantly deteriorated the EU-USA relations, because President Trump threatened the fundamental basis for multilateral cooperation, whereas the EU defended of them. The author hopes that under Jo Biden's presidency the relations will be restored on the former friendly basis.

This brief review of some available publications demonstrates drastic geopolitical and geoeconomic changes imposed by the COVID-19 coronavirus pandemic on the globalized world. Viorel Mionel, Silviu Neguț, and Oana Mionel [439] even proposed to introduce a new term – "Pandemopolitics", because according to their judgement the pandemics has entirely altered the global political and economic relations. They suggest that "humanity has entered a new geopolitical cycle" (p. 400) in which China will play gradually increasing role.

At least, in two rather interesting articles influence of different factors determining fluctuations of oil prices are econometrically studied. In the first one [440] multiple reasons are shown but in the second publication [441] influence of daily newspapers publications on market uncertainty and of the latter on oil prices are numerically calculated. So, the authors' conclusions confirm our vision expressed in chapters 2 and 3.

In all these investigations extremely important but particular geopolitical and geoeconomic features of the globalized world within the framework of COVID-19 coronavirus pandemic are illustrated. At our opinion, however, the pandemic gave us a good lesson, which allows to formulate the most general, political & economic features of international oil markets.

In the three consecutive well-known books [442-444], Nobel Prize Winner Ilya Prigogine and Isabelle Stengers, in addition to fundamental, epistemological problems of the origin of Universe and subsistence were

interested also in regularities of social systems. Being specialist in nonequilibrium thermodynamics, Ilya Prigogine asked himself if basic rules of closed systems are applicable to the social medium. Unfortunately, this fruitful alliance of a natural scientist and a philosopher has not explored the mentioned problem in depth.

Some thirty years ago, having unexpectedly participated in a philosophic seminar in memory of the well-known Georgian philosopher Merab Mamardashvili in Moscow, I have published the sole philosophic article in my life where this problem has been considered [445]. Later, on 8 April 2011 I developed some ideas of this publication at Merab Mamardashvili philosophic seminar. Unfortunately, I neglected to publish later my presentation. Ideas of this approach are very simple: If Ilya Prigogine and Isabelle Stengers are right, then the oil market may be considered as a semi-closed bivariant system, which is characterized by two degrees of freedom. Within the system behavior of its elements, in this case – of investors and speculators, has a high uncertainty degree, however, system's stability is determined by two external factors: amount of oil to be contracted at each stage, and number of contracts signed, which are assured by this amount.

If so, then the simple mathematical apparatus is applicable for determining main properties of oil markets.

The added value created at the oil market is a function of derivatives contracts signed at a benchmark price imposed by the exchange:

$$V = f(h), \tag{7}$$

where $V =$ added value derived from derivatives contracts and $h =$ number of contracts.

In this case, infinite function $f(\infty)$ corresponds to the added value $V(\infty)$. Because oil markets have their external margins, the added value originated in them is limited by $\tilde{h} < \infty$, and $V(\infty)$ is also limited and the system may be described by marginal conditions:

$$\begin{Bmatrix} f(\tilde{h}) \to \infty \\ V \to \infty \end{Bmatrix}, \tag{8}$$

Statistical analysis of these regularities is possible by differentiation of the above functions and by introduction of the additional function $\varphi(h)$:

$$\frac{\partial(f)}{\partial(h)} = \varphi(h) = \frac{\partial(V)}{\partial(h)} \approx \frac{\Delta(V)}{\Delta(h)}. \quad (9)$$

If it is stated that ΔV is determined by the number of derivatives contracts, then it will be possible to define $f(h)$ by a simple integral equation:

$$f(h) = \int_0^h f(x)d(x) = V_h. \quad (10)$$

This function has an exponential character, and its analytical solution is simple.

If

$$\varphi(h) = Ke^{-Bh}, \quad (11)$$

Then:

$$f(h) = \frac{K - Ke^{-Bh}}{B}. \quad (12)$$

Thus, the analytical solution of the interdependence between added value originated at oil markets and number of contracts consists in definition of coefficients K and B.

It should be noted that such approach is applicable for analysis of practically any semi-closed system with the finite external parameters. For instance, M.K. Hubbert [446] as early as in 1960 used approximately the same mathematical approach to evaluate oil markets of the USA, and de Verte Harris [447] updated Hubbert's mathematical apparatus for appraisal of mineral endowment of the globe.

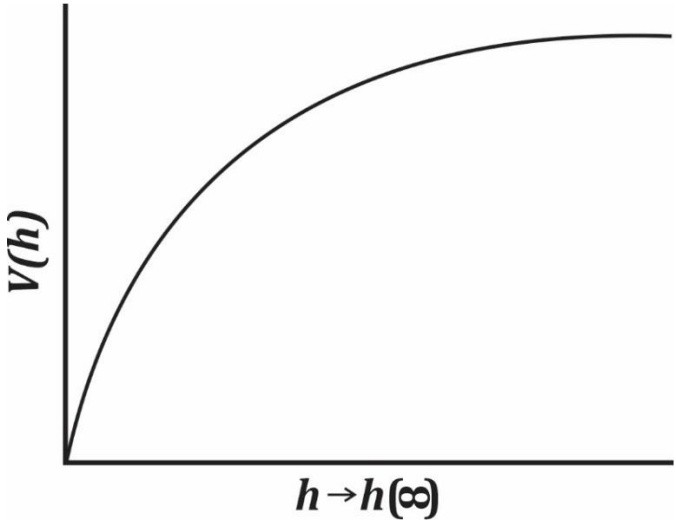

Figure 106. Exponential Model of Oil Markets.

The sophisticated mathematical methods were elaborated for ad hoc analysis of such systems. However, in this book the most important conclusion for us is the exponential character of the equation (12), which allows formulation of basic principles for oil markets. The exponential model is displayed on Figure 106.

These principles are as follows:

1. Oil markets represent a semi-closed self-regulating system, which has two degree of freedom and the marginal conditions of which are set up by two parameters: amount oil to be contracted and number of futures contracts concluded on this amount or the length of derivatives chain
2. The model of such system represents an exponential equation meaning that the added value created within the market is limited by the exponent
3. As long as the values of two external parameters do not exceed critical levels, the system is stable and in equilibrium
4. Within such conditions, the system is self-regulated and tries to immediately suppress any external shocks and to regain equilibrium

5. However, if imposed shocks exceed values of external parameters, the system loses possibilities of self-regulation, and outside intervention becomes necessary.

The regularities of oil markets before and during the COVID-19 coronavirus pandemic, described in previous chapters, entirely correspond to these five rules.

The exponential dependence of the added value derived from derivatives contracts at oil markets designs limits for the volume of contracts to be sighed for smart management of commodity exchanges via setting optimum quotes and tickers. If these limits are overpassed, then the markets become unmanageable, as it happened by June 2008. On the other hand, this dependence clearly displays red lines within which the targeted "oil weapon" may be used without damaging the integrity of markets. If our conclusions are correct, if epigraphs to the Introduction of this book are still in force, then the international oil markets are basic drivers of the global economy, and their sustainability directly results in political & economic sustainability of the globalized world. For this very reason, unreasonable application of the "oil weapon," when the strength of applied financial instruments surpasses systemic resistance of oil markets, directly leads to global economic crises, as it happened in 2008-2009. On the other hand, smart and weighted planning of such campaigns, which takes in consideration sustainability of the markets, is an extremely powerful measure of targeted "punishment" of a country without significant negative impact to world economy.

Natural disasters and catastrophes, other challenges like pandemics, which are beyond the financial vehicles of the globalized world, provoke short-term shocks, which are quickly auto-mitigated despite how vulnerable they could be. That is why already in early spring 2020 we disagreed with pessimistic forecasts of oil markets and predicted that by mid-summer they will regain equilibrium [see 40, 41].

Though, restoration of equilibrium absolutely does not mean that all economic indices were recovered. A bivariant system may be in equilibrium

under different values of external parameters, and the stability of oil markets, let say, in 2016 radically differed from the equilibrium in 2019.

From this point of view, 2020 was economically the worst year of the new Millennium. As it was shown in Chapter 2, in December 24.47% less oil futures contracts were signed than in January, and average oil price was 33.05% less. At the same time, in 2020 4.89 times less derivatives contracts were signed than in 2019 (see Figure 43).

In general, geopolitically and geoeconomically the world commodity market including oil are ruled by the United States of America. In Americas, and first of all, in the USA more than 90% of world derivatives contracts are signed (see Figure 37); main market for the West Texas Intermediate (WTI) oil is New York Mercantile Exchange, member of CME Group, and for Brent Blend – Intercontinental Exchange. Let remined that just these two oil benchmarks represent a certain standard for oil prices and indicator for futures and options contracts.

The world COVID-19 coronavirus pandemic has had a huge impact on all the world countries but oil exporting states found themselves in the worst situation. Crash of oil markets in spring 2020 and then restoration of equilibrium on significantly lower level than in 2019 determined much more severe decline of their GDP compared with the world average figure, saying nothing on leading world economies. In-depth analysis of social & economic environment in Russia and Iran – two states, which try to pursue their own oil geopolitics, demonstrated that economic recession in these nations was extremely vulnerable. Hence, both states have more or less avoided the finance bankruptcy using, however, different strategies. Russia was able to survive due to aggressive positioning of its leading hydrocarbon companies at international oil markets whereas Iran has used peculiarities of both its social & political structure and unusual features of political economy described above. Simultaneously, neither of them will be able to stand against new challenges if international oil markets are not significantly improved.

Coronavirus pandemic highlighted contradictions between the main geoeconomic playmakers of the world – the USA, the EU, China and partly Russia. Experts of the European Parliament and independent European

researchers even believe that the world influence of the EU will significantly increase versus the USA; others considers China and possibly Russia as countries with growing geopolitical and geoeconomic role. However, at my opinion neither of them has corresponding economic vehicles and instruments for ruling international oil markets and, consequently, the world economy.

That is why the basic international institutions of the world leaded by the United Nations should be vitally interested in sustainable, adequate and smart foreign politics and geoeconomic policy of the United States. First signs of such positive changes were displayed by the newly elected President of the USA.

CONCLUSION

Each chapter of this book contains main findings made after processing the corresponding statistical materials. That is why I would like to highlight here only the most important conclusions, which have general importance for understanding both oil markets and COVID-19 coronavirus pandemic's influence on them.

The "oil market" is an extremely complex and multi-layered notion, understood by different stakeholders according to their philosophy, psychology, and professional skills. For a predominant number of analysts oil market represents an environment where equilibrium between crude oil supply and demand is established. For OPEC secretariat it signifies an option to maintain sustainability of the organization's member countries. For oil exporting states it is practically a sole possibility to ensure national social & economic development. For energy resource rich post-Soviet nations oil market is a shortest itinerary, which allows them to get access to the economy of the globalized world. For powerful western economies it is a tool of political pressure. For commodity exchanges oil market guarantees liquidity, and for investors it is a platform where it is possible to gamble with options and futures and this way to earn money. In my opinion, all these approaches are valid, and in reality, oil market is a composite, often contradictory, and metastable node of all these interests.

Formally, the oil market may be considered as a semi-closed bivariant system characterized by two degrees of freedom. Within the system behavior of its elements, e.g. of investors and speculators, has a high uncertainty degree, however, system's stability is determined by two external factors: amount of oil to be contracted at a given stage, and number of contracts signed, which are assured by this amount. The model of such system represents an exponential equation meaning that the added value created within the market is limited by the exponent. As long as the values of two external parameters (amount of oil to be contracted and number of contracts signed) do not exceed critical levels, the system is stable and in equilibrium. Within such conditions, the system is self-regulated and tries to immediately suppress any external shocks and to regain equilibrium. However, if imposed shocks exceed values of external parameters, the system loses possibilities of self-regulation, and outside intervention becomes necessary.

In its modern shape the oil market was formed only in the globalized world, after collapse of the USSR and "colored revolutions" in the Eastern Europe and the Newly Independent States. Moreover, it is a continuously developing and live changing structural conglomerate. From this point of view, essential modernization of the oil market started by the end of the past century, when the first roots of oil "financialization" originated. Oil, as any other primary commodity, acquired characteristics of financial assets and money, and the theory of commodity currencies was elaborated.

Crucial importance of oil markets for the economy of the globalized world is determined by several factors:

1. According to our calculations, the nominal value of world oil consumption was as high as US$ 1.507 trillion in 2019, exceeding by 54.14% those of coal (second rank) and by 54.29% those of natural gas (third rank).
2. Oil price represents a certain benchmark for other commodities' prices linked to oil price by a significant and strong correlation.
3. Oil determines development of the world infrastructure, namely refining business, production of combustibles, construction and

management of pipelines, maritime cargo, newbuildings in tanker fleet, etc.

4. Oil is the most popular commodity traded at commodity exchanges. In 2019 the nominal value of oil contracts equaled to 47.43% of agglomerated value of all derivatives signed at commodity exchanges.
5. Oil price is rather sensitive to political events, and this feature of petroleum is often used for achieving political targets. From this point of view, the U.S. President Ronald Reagan successfully used the "oil weapon" to "combat the enemy", e.g., to destroy of the communist regime in the USSR. In the XXI century "the new political economy of oil" was used, at least, three times to achieve geopolitical targets.
6. Economy of oil exporting countries practically entirely depends on the value of exported petroleum. In two case studies (Russia and Iran) we have shown that such dependence has a dualistic character: on one hand, it allows ensuring accelerated economic growth derived from extensive oil production and exports but on the other hand, these countries are extremely sensitive to any fluctuation of either oil price or its consumption obliging those states to respect international order and agreements despite of their geopolitical and geoeconomic goals.
7. Due to their unique role in the globalized world, oil markets represent, as we have shown, the main driver of the world geoeconomic stability.

At all markets oil is quoted, directly or indirectly, in U.S. Dollars. That is why The U.S. administration and Federal Reserve persistently maintaining the desired exchange rate with Euro, may ensure the needed international oil price and this way, firstly, impact on oil markets, and secondly, achieve geopolitical and geoeconomic goals. This is the most appropriate implication of "oil weapon". We have explored in-depth impact of the strong U.S. Dollar policy maintained by President Obama in 2014-

2015 and have proven that it determined sustainable decrease of world oil prices and this way caused financial & economic crisis in Russia.

Impact of COVID-19 coronavirus pandemic on global economy, in general, and on international oil markets, in particular, was enormously vulnerable. Statistical analysis and modelling have shown that:

1. COVID-19 coronavirus pandemic may be divided into two periods: (i) 21 January to 20 April 2020, and (ii) after 20 April till today.
2. The dramatic failure of crude oil prices from January 21 to April 20, 2020 was determined by negative expectations of investors and speculators at the commodity markets. Just due this fact, from January to April 2020 the number of oil futures contracts at New York Mercantile and Intercontinental exchanges diminished by more than by 400 percent. Within this period a significative and strong negative correlation existed between weekly world COVID-19 coronavirus infection cases and average weighted crude oil price.
3. Simultaneously, correlation between the world oil price and Euro to U.S. Dollar disappeared demonstrating drastic equilibrium breakage at international oil markets.
4. After 20 April 2020 situation radically changed. At the background of exponential spread of SARS-CoV-2 disease, oil prices were led by the COVID-19 mortality rate, which started to diminish gradually followed by step-by-step increase of oil prices. Negative correlation between these two indices is so strong that allowed us to draw a statistical model of such interdependence expressed by a quadratic regression equation. Therefore, analysis of COVID-19 coronavirus comparative mortality rate provides investors with a tangible tool to assess oil markets in a medium-term run and, consequently, to return to commodity exchanges.
5. Starting from late April – early May 2020 oil markets began to recover, and this is proven by the restored correlation between oil prices and Euro to U.S. Dollar exchange rate.
6. At our opinion, oil markets gained stability already in mid-July 2020.

7. However, 2020 was economically the worst year of the new Millennium: In December 24.47% less oil futures contracts were signed than in January, and average oil price was 33.05% less. At the same time, in 2020 4.89 times less derivatives contracts were signed than in 2019.
8. Correspondingly, the world COVID-19 coronavirus pandemic has had a huge impact on the all world countries but oil exporting states found themselves in the worst situation. In-depth analysis of social & economic environment in Russia and Iran – two states, which try to pursue their own oil geopolitics, demonstrated that economic recession there was extremely vulnerable. At the same time, both states have avoided the finance bankruptcy using, however, different strategies. Russia has been able to survive due to aggressive positioning of its leading hydrocarbon companies at international oil markets whereas Iran has used peculiarities of both its social & political structure and unusual features of political economy described above. Hence, neither of them will be able to stand against new challenges if international oil markets are not significantly improved.
9. Impact of COVID-19 coronavirus pandemic on international oil markets is indirect. As it has been shown above, pandemic parameters directly predetermine number of futures contracts signed at basic commodity exchanges and the latter, in turn, exerts influence on oil prices worldwide.

Coronavirus pandemic highlighted contradictions between the main geoeconomic playmakers of the world – the USA, the EU, China and partly Russia. Experts of the European Parliament and independent European researchers even believe that the world influence of the EU will significantly increase versus the USA; others considers China and possibly Russia as countries with growing geopolitical and geoeconomic role. However, in my opinion neither of them has corresponding economic vehicles and instruments for ruling international oil markets and, consequently, the world economy.

That is why the basic international institutions of the world leaded by the United Nations should be vitally interested in sustainable, adequate and smart foreign politics and geoeconomic policy of the United States. First signs of such positive changes were displayed by the newly elected President of the USA.

REFERENCES

[1] *World Development Indicators*. The World Bank Group. https://databank.worldbank.org/source/world-development-indicators. Accessed on 15 January, 2021.

[2] Liu, Y. C., Kuo, R. L. and Shih, S. R. (2020). COVID-19: The first documented coronavirus pandemic in history. *Biomedical Journal*, 43, 328-333.

[3] Chan, J. F., Youan, S., Kok, K. H., To, K. K. W., Chu, H. C., et al. (2020). A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*, 345, 514-523.

[4] *Pneumonia of unknown cause – China* (2020). Disease outbreak news 5 January 2020. WHO. https://www.who.int/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/. Accessed on 15 January, 2021.

[5] *Novel Coronavirus (2019-nCoV)* (2020). Situation Report 23 January 2020. Geneva: WHO.

[6] *WHO Timeline – COVID-19*. WHO. https://www.who.int/news/item/27-04-2020-who-timeline---covid-19. Accessed on 15 January, 2021.

[7] *COVID-19 Coronavirus Pandemic*. Worldometer. https://www.worldometers.info/coronavirus/. Accessed on 18 January 2021.

[8] Park, K. B., Jong, J. and Jung, Y. (2020). Do they or do they not have COVID-19 inside North Korea? *38 North*, April 23. https://www.38north.org/2020/04/kparkjjongyjung042320/. Accessed on 15 January 2021.

[9] Kim, J. and Kasulis, K. (2020). Kim Jong Un apologizes for lethal shooting of South Korean official. *NK News*, September 25. https://www.nknews.org/2020/09/kim-jong-un-apologizes-for-lethal-shooting-of-south-korean-official/. Accessed on 15 January 2021.

[10] Kakissis, J. (2020). Turkmenistan has banned use of the word "coronavirus". *Coronavirus Updates, March 31*. https://www.npr.org/sections/coronavirus-live-updates/2020/03/31/824611607/turkmenistan-has-banned-use-of-the-word-coronavirus. Accessed on 15 January 2021.

[11] Jordà, Ò., Singh, S. R. and Taylor, A. M. (2020). *Longer-run economic consequences of pandemics. Working Paper 2020-09*. San Francisco: Federal Reserve Bank of San Francisco.

[12] *Coronavirus (COVID-19) risks major setbacks for financing for sustainable development* (2020). OECD. http://www.oecd.org/coronavirus/policy-responses/the-impact-of-the-coronavirus-covid-19-crisis-on-development-finance-9de00b3b/. Accessed on 29 July, 2020.

[13] Boshkoska, M. and Jankulovski, N. (2020). Coronavirus impact on global economy. *Annals of the „Constantin Brâncuşi" University of Târgu Jiu, Economy Series*, 4, 18-24.

[14] Ozili, P. K. and Arun, T. (2020). *Spillover of COVID-19: Impact on the global economy*. https://ssrn.com/abstract=3562570 or http://dx.doi.org/10.2139/ssrn.3562570. Accessed on 19 January 2021.

[15] *Measuring the impact of COVID-19 with a view to reactivation* (2020). COVId-19 Response, Issue № 2. New York: United Nations, ECLAC.

[16] Malden, K. and Stephens, S. (2020). *Cascading economic impacts of the COVID-19 outbreak in China*. Washington, DC: U.S. – China Economic and Security Review Commission.

[17] *The Covid-19 pandemic and trade-related developments in LDCS* (2020). Geneva: WTO.

[18] Kuroda, H. (2020). *COVID-19 and the global economy: Impact and challenges*. Keynote Speech at the 62nd Annual Meeting of the National Association for Business Economics. Tokyo.

[19] *COVID-19 pandemic on trade and development* (2020). Geneva: United Nations Publications.

[20] Gujrati, R. and Uygun, G. H. (2020). Covid-19: Impact on global economics. *Amity Journal of Computational Sciences*, 4(1), 24-29.

[21] Mishra, M. K. (2020). *The world after COVID-19 and its impact on Global Economy*. Kiel – Hamburg: ZBW – Leibniz Information Centre for Economics.

[22] Tvalchrelidze, A. G. (2020). Chapter 3. Energy and economic security of the South Caucasus and neighboring countries. In A. Tavidze (ed.) *Progress in Economics Research*, Vol. 44. (pp. 85-127). New York: Nova Science Publishers, Inc.

[23] *Statistical review of world energy* (2020). 69th edition. London: BP.

[24] Newell, R. G., Raimi, D. Villanueva, S. and Prest, B. (2020). *Global energy outlook 2020: Energy transition or energy addition?* Report 20-05. Washington, DC: Resources for Future.

[25] Tvalchrelidze, A. G. (2011). *Economics of commodities and commodity prices*. New York: Nova Science Publishers, Inc.

[26] *IMF primary commodity prices*. https://www.imf.org/en/Research/commodity-prices. Accessed on 5 January 2021.

[27] *CIA Factbook* (2020). https://www.cia.gov/library/publications/the-world-factbook/fields/383.html. Accessed on 3 January 2021.

[28] *Capacity of oil tankers in seaborne trade from 1980 to 2020 (in million dwt)*. Statista. https://www.statista.com/statistics/267605/capacity-of-oil-tankers-in-the-world-maritime-trade-since-1980/. Accessed on 19 January 2021.

[29] Rüdiger, M. (2014). The 1973 oil crisis and the designing of a Danish energy policy. *Historical Social Research*, 39(4), 94-112.

[30] Hanke, S. H. (2004). Oil and politics. *Forbes*, August 16.

[31] Morse, E. L. (1999). New political economy of oil. *Journal of International Affairs*, 53, 1-29.

[32] Strayer, R. W. (1998). *Why did the Soviet Union collapse? Understanding historical changes*. New York: M. E. Sharpe.

[33] Stoner-Weiss, K. and McFaul, M. (2009). *Domestic and international influences on the collapse of the Soviet Union (1991) and Russia's initial transition to democracy (1993)*. Stanford CA: Stanford University Press.

[34] Alie, N. and Gizewski, P. (2010). *Strategic shock: The collapse of the Soviet Union: 1989*. Ottawa: Centre for Operational Research and Analysis, Defence R&D Canada.

[35] Albulescu, C. (2020). Coronavirus and oil price crash. *HAL archives-ouvertes.fr, hal-02507184v2*.

[36] Aloui, C., Goutte, S., Guesmi, K. and Hchaichi, R. (2020). COVID 19's impact on crude oil and natural gas S&P GS Indexes. *Halshs Archives ouvertes, halshs-02613280*.

[37] Sharif, A., Aloui, C. and Yarovaya, L. (2020). COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the waveletbased approach. *International Review of Financial Analysis*, 70, Article 101496.

[38] *Coronavirus: the impact on global shipping* (2020). Regulation. https://ship.nridigital.com/ship_may20/coronavirus_impact_global_shipping. Accessed on 28 July 2020.

[39] Liang, L. H. (2020). Crude tanker spot rates face negative impact in late-2020 and into 2021. *Seatrade Maritime News*, May 22.

[40] Tvalchrelidze, A. and Silagadze, A. (2020). COVID-19 coronavirus pandemic influence on crude oil prices: A preliminary statistical analysis. *Economics and Business*, XII(2), 82-88.

[41] Tvalchrelidze, A. and Silagadze, A. (2020). Influence of COVID-19 coronavirus pandemic on international oil markets. *Scientific Journals of the Maritime University of Szczecin*, 63(135), 97-103.

[42] *WHO coronavirus disease (COVID-19) dashboard*. World Health Organization. https://covid19.who.int/. Accessed on 31 December 2020.

[43] *Coronavirus Disease 2019*. Centers of Disease Control and Prevention. https://www.cdc.gov/. Accessed on 19 January 2021.

[44] *COVID-19 in Virginia*. Virginia Department of Health. https://www.vdh.virginia.gov/coronavirus/. Accessed on 19 January 2021.

[45] *Coronavirus (COVID-19)*. NHS. https://www.nhs.uk/conditions/coronavirus-covid-19/. Accessed on 10 January 2021.

[46] *Coronavirus Pandemic (COVID-19)*. Our World in Data. https://ourworldindata.org/coronavirus. Accessed on 15 January 2021.

[47] *Coronavirus disease (COVID-19)*. Government of Canada. https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19.html. Accessed on 19 January 2021.

[48] *Informations Coronavirus*. Gouvernement. https://www.gouvernement.fr/info-coronavirus. Accessed on 19 January 2021.

[49] *Weekly Brent, OPEC basket, and WTI crude oil prices from December 30, 2019 to January 11, 2021*. Statista. https://www.statista.com/statistics/326017/weekly-crude-oil-prices/. Accessed on 15 January 2021.

[50] Pearson, K. (1895). Notes on regression and inheritance in the case of two parents. *Proceedings of the Royal Society of London*, 58, 240–242.

[51] *Table of critical values: Pearson correlation*. StatisticsSolution. https://www.statisticssolutions.com/table-of-critical-values-pearson-correlation/. Accessed on 15 November 2020 and 15 January 2021.

[52] Tvalchrelidze, A. and Silagadze, A. (2013). Macroeconomic model for oil-exporting countries. *Central Asia and the Caucasus*, 14(4), 118-144.

[53] Sawyer, S. F. (2009). Analysis of variance: The fundamental concepts. *The Journal of Manual & Manipulative Therapy*, 17(2), E-27-E38.

[54] Alashhaba, Z. R., Anbara, M., Singh, M., M., Leauc, Y-B., Al-Sai, Z. A. and Alhayja'a, S. A. (2020). Impact of coronavirus pandemic crisis

on technologies and cloud computing applications. *Journal of Electronic Science and Technology*, https://doi.org/10.1016/j.jnlest.2020. Article 100059.

[55] George, G., Lakhani, K.R. and Puranam, P. (2020). What has changed? The impact of Covid pandemic on the technology and innovation management research agenda. *Journal of Management Studies. DOI: 10.1111/joms.12634*.

[56] Kummitha, R. K. R. (2020). Smart technologies for fighting pandemics: The techno- and human- driven approaches in controlling the virus transmission. *Government Information Quarterly*, 37, Article 101481.

[57] Robson, D. (2020). The fear of coronavirus is changing our psychology. *BBC Future*, 2nd April. https://www.bbc.com/future/article/20200401-covid-19-how-fear-of-coronavirus-is-changing-our-psychology. Accessed on 21 January 2021.

[58] Ao, B. (2020). The psychology behind why it's hard for us to accept a pandemic. *The Philadelphia Inquirer*, May 4.

[59] Scott, M. (2020). The Covid-19 pandemic has changed everything. *Change Incorporated*, 4 June. https://www.changeincorporated.com/possibilities/the-covid-19-pandemic-has-changed-everything. Accessed on 21 January 2021.

[60] Qian, K. and Yahara, T. (2020). Mentality and behavior in COVID-19 emergency status in Japan: Influence of personality, morality and ideology. *Plos One*, https://doi.org/10.1371/journal.pone.0235883.

[61] *Coronavirus (COVID-19) Vaccinations*. Our World in Data. https://ourworldindata.org/covid-vaccinations. Accessed on 21 January 2021.

[62] *COVAX: Working for global equitable access to COVID-19 vaccines*. WHO. https://www.who.int/initiatives/act-accelerator/covax. Accessed on 21 January 2021.

[63] *COVID-19 vaccine country readiness and delivery*. WHO. https://www.who.int/initiatives/act-accelerator/covax/covid-19-vaccine-country-readiness-and-delivery. Accessed on 21 January 2021.

[64] *Human rights and access to COVID-19 vaccines* (2021). Human rights at the heart of response. New York: United Nations Human Rights, Office of the High Commissioner.

[65] Beiner, G. (2006). Out in the cold and back: New-found interest in the Great Flu. *Cultural and Social History*. 3(4), 496–500.

[66] Siddharth, C., Christensen, J. and Shimon Likhtman, S. (2020). Connectivity and seasonality: The 1918 influenza and COVID-19 pandemics in global perspective. *Journal of Global History*, 15(3), 408-420.

[67] Roberts, R. S. (1966). Tercentenary of the Plague of London 1665. London: *Proceedings of the Royal Society of Medicine, Section of the History of Medicine*, 101-105.

[68] *Rouhani says 25 million Iranians may have been infected with coronavirus*. https://www.reuters.com/article/us-health-coronavirus-iran-idUSKBN24J07V. Accessed on 10 October 2020.

[69] Rutledge, P.E. (2020). Trump, COVID-19, and the war on expertise. *American Review of Public Administration*, 50(6-7), 505 –511.

[70] Albert, S., Desir, K. M., Getachew, Y., Iacobucci, L., Rotman, B., Ryan, P. S. and Timmons, B. (2020). *International disregard: Trump's authoritarianism during the COVID-19 pandemic*. Washington, DC: Common Cause.

[71] Newbery, D. M. G. and Stiglitz, J. E. (1979). The theory of commodity price stabilisation rules: Welfare impacts and supply responses. *Economic Journal*, 89(356), 799-817.

[72] Deaton, A. and Laroque, G. (1992). On the behavior of commodity prices. *Review of Economic Studies*, 59, 1-23.

[73] Pirrong, C. (2001). *Commodity price dynamics: a structural approach*. Huston: Bauer College of Business, University of Houston.

[74] Wang, C. W. (2008). *Commodity price dynamics: evidence and theory*. Nashville, Tennessee: Graduate School of Vanderbilt University.

[75] Lautier, D. (2009). Term structure models of commodity prices. *Cahier de recherche du Cereg n° 2003-9.* Paris: Centre de Recherches sur la Gestion, Université Paris Dauphine.

[76] *Commodity price variability: its nature and causes* (1993). Paris: Organisation for Economic Co-Operation and Development.

[77] Alquist, R. and Coibion, O. (2014). *Commodity price co-movement and global economic activity*. Bank of Canada Working Paper 2014-32. Ottawa: Bank of Canada.

[78] Tvalchrelidze, A., Berberashvili, T. and Otarashvili, M 92016). *Economics of commodities. Role of commodities in the globalized world*. Tbilisi: Nekeri Publ. (in Georgian).

[79] Browne, F. and Cronin, D. (2007). *Commodity prices, money, and inflation*. Working Paper Series, No 738. Frankfurt am Main: European Central Bank.

[80] Chen, Y. and Rogoff, K. (2003). Commodity currencies. *Journal of International Economics*, 60(1), 133-160.

[81] Cashin, P., Céspedes, L.-F., and Sahay, R. (2003). *Commodity currencies and the real exchange rate*. Working Paper, No 236. Santiago: Central Bank of Chile.

[82] Keyfitz, R. (2004). *Currencies and commodities: modeling the impact of exchange rates on commodity prices in the world market*. Washington, DC: The World Bank.

[83] Frankel, J. (2006). *The effect of monetary policy on real commodity prices*. Chicago: University of Chicago Press.

[84] *CFTC Fact Sheet* (2008). Washington, DC: Commodity Futures Trading Commission, Document 202.418.5080.

[85] Wallace, E. (2008). Oil prices are all speculations. *Business Week*, June 27.

[86] *CFTC announces Multiple Energy Market Initiatives* (2008). Release Number 5503-08, May 29. Washington, DC: Commodity Futures Trading Commission.

[87] Baumeister, C. and Kilian, L. (2016). Forty years of oil price fluctuations: Why the price of oil may still surprise us. *Journal of Economic Perspectives*, 30(1), 139–160.

[88] *Historical crude oil prices (Table)*. InflationData.com. https://inflationdata.com/articles/inflation-adjusted-prices/historical-crude-oil-prices-table/. Accessed on 22 January 2021.

[89] Jafari, P. (2018). Fluid history: Oil workers and the Iranian Revolution. In: T. Atabaki, E. Bini, and K. Ehsani (Eds.*) Working for Oil: Comparative Social Histories of Labor in the Global Oil Industry* (pp. 69-98). London – Paris – New York – Manchester – Berlin – Birmingham: Palgrave Macmillan.

[90] Mohaddesaand, M. and Pesaran, M. H. (2013). *One hundred years of oil income and the Iranian economy: A curse or a blessing?* Working Paper, No 771. Cairo: Economic Research Forum.

[91] Archer, L., Barnes, P., Caffarra, C., Dargay, J., Horsnell, P, van der Linde, C, Skeet, I. and AI-Yousef, A. (1990). *The first Oil War: Implications of the Gulf crisis in the oil market*. Edited by R. Mabro. Oxford: Oxford Institute for Energy Studies.

[92] Lee, S. H., Sung, H. M. and Urrutia, J. L. (1996). The impact on the prices of LDC's loans. *Journal of Financial Services Research*, 10, 143-162.

[93] *The politics of the Asian economic crisis* (1999). Edited by T. J. Pempel. New York: Cornel University Press.

[94] *Overview of the U.S. and EU sanctions on Russia* (2014). Special Update. London: ReedSmith.

[95] De Galbert, S. (2015). *A year of sanctions against Russia – now what?* Lanham – Boulder – New York – London: Center for Strategic & International Studies, Rowman & Littlefield.

[96] Buchan, J. (2013). *Days of God: The revolution in Iran and its consequences*. New York: Simon & Schuster.

[97] Haidar, J. I. (2017). Sanctions and export deflection: evidence from Iran. *Economic Policy*, 32(90), 319-355.

[98] Joyner, D. (2016). *Iran's nuclear program and international law: from confrontation to accord*. Oxford: Oxford University Press.

[99] Harris, G. and Ewing, J. (2018). U.S. to restore sanctions on Iran, deepening divide with Europe. *The New York Times*, August 6.

[100] Wintour, P. (2018). US ready to drive Iranian oil exports to zero, says US national security adviser. *The Guardian*, August 22.

[101] U.N. court says U.S. must lift Iran sanctions on "humanitarian" goods. (2018). *CBS News*, October 3.

[102] Rampton, R., Wroughton, L. and van den Berg, S. (2018). U.S. withdraws from international accords, says U.N. world court "politicized". *Reuters*, October 4.

[103] *Crude Oil Prices: West Texas Intermediate (WTI) - Cushing, Oklahoma*. Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/DCOILWTICO. Accessed on 23 January 2021.

[104] *Commodity market outlook* (2020). Washington, DC: International Bank for Reconstruction and Development, World Bank.

[105] *OPEC monthly oil market report. January* (2021). Vienna: Organization of the Oil Exporting Countries.

[106] *Global oil and gas contract activity reports downtrend amid COVID-19 outbreak during Q1 2020*. GlobalData, 11 May 2020. https://www.globaldata.com/global-oil-and-gas-contract-activity-reports-downtrend-amid-covid-19-outbreak-during-q1-2020/. Accessed on 24 January 2021.

[107] Thanh, L. T., Andreadakis, Z., Kumar A., Gómez R. R., Tollefsen, S. and Saville, M. (2020). The COVID-19 vaccine development landscape. *Nature Reviews Drug Discovery*, 19(5), 305–306.

[108] WHO backed China's emergency use' of experimental Covid-19 vaccines (2020). *South China Morning Post*, 25 September.

[109] Kramer, A. E, (2020). Russia is slow to administer virus vaccine despite Kremlin's approval. *The New York Times*, 19 September.

[110] Gallagher, J. (2020). Covid vaccine: First 'milestone' vaccine offers 90% protection. *BBC News*, 9 November.

[111] *Study to describe the safety, tolerability, immunogenicity, and efficacy of RNA vaccine candidates Against COVID-19 in healthy individuals*. United Nations Library of Medicine. https://clinicaltrials.gov/ct2/show/NCT04368728. Accessed on 25 January 2021.

[112] Ebel, R. E. (2002). *Geopolitics of Energy into the 21st Century*. Presentation. IGAD Symposium, 16-18 August 2002. Washington DC: Center for Strategic and International Studies (CSIS).

[113] Sinytsin, N. V. (2017). Increase of global competition in crude oil and oil products trade. In S. V. Zhukov (ed.) *International Oil and Natural*

Gas Markets: Competition Toughening (pp. 5-9). Moscow: Institute for World Economics and International Relations (in Russian).

[114] Ivanov, N. A. (2017). American shale revolution and its impact on international oil market. In S. V. Zhukov (ed.) *International Oil and Natural Gas Markets: Competition Toughening* (pp. 10-23). Moscow: Institute for World Economics and International Relations (in Russian).

[115] Malova T. A. and Sisoeva V. I. (2016). The world oil market: The search for balance in the new "oil" reality. *MGIMO Review of International Relations*, 6(51), 115-124. (in Russian).

[116] *Oil market: Simply on tough* (2019). Moscow: Gazprom. (in Russian).

[117] Hubbert, M. K. (1956). *Nuclear energy and the fossil fuels*. Huston: American Petroleum Institute.

[118] Campbell, C. J. (2002). The assessment and importance of oil depletion. *Energy Exploration & Exploitation*, 20(6), 407-436.

[119] Bentley, R. W. (2002). Oil forecasts, past and present. *Energy Exploration & Exploitation*, 20(6), 481-492.

[120] Korpela, S. A. (2006) Oil depletion in the world. *Current Science*, 91(10), 1148-1152.

[121] Zhukov, S. V. (2019). World oil market in process of modernization. In *Proceedings of the Seminar "Economic Problems of the Energy Sector," 180th Meeting* (pp. 4-22). Moscow: Institute of Economic Prediction, Russian Academy of Sciences (in Russian).

[122] Rogoff, R. (2005). *Oil and the global economy*. Riyadh: International Energy Forum Secretariat.

[123] Mommer, B. (2000). *The governance of international oil: The changing rules of the game*. Oxford: Oxford Institute for Energy Studies.

[124] Francis, M. G. (2002). *The world oil market*. Washington, DC: Special Report to US Government.

[125] Kaufmann, R. K. (2005). *World oil markets: living off the past, planning for the future*. Boston: Boston University and the Center for Energy and Environmental Studies.

[126] Grant, K., Ownby, D, and Peterson, S. R. (2006). *Understanding today's crude oil and products market*. A policy Analysis Study by Lexecon, and FTI Co. New York: Wall Marts Inc.

[127] Hamilton, J. D. (2009). *World oil markets: Implications for consumers, producers, and the world economy*. San Diego: University of California.

[128] Maugeri, L. (2016). *The global oil market: No safe haven for prices*. Cambridge MA: Harvard Kennedy School.

[129] Kolomeytseva, A. A. (2019). Global oil market trends, *Revista Espacios*, 40(03), 1-13.

[130] *International energy outlook 2019 with projections to 2050* (2019). Washington, DC: Energy Information Administration.

[131] *World oil outlook 2040* (2019). Vienna: Organization of the Petroleum Exporting Countries.

[132] Fattouh, B. (2011). *An anatomy of the crude oil pricing system*. Oxford: The Oxford Institute for Energy Studies.

[133] *Putting a price on energy. International pricing mechanisms for oil and gas* (2007). Brussels: Energy Charter Secretarial.

[134] Huntington, H., Al-Fattah, S. M., Huang, Z., Gucwa, M. and Nouri, A. (2013). *Oil markets and price movements: A Survey of models*. USAEE Working Paper No. 13-129. Huston: United States Association for Energy Economics.

[135] *New World Bank country classifications by income level: 2020-2021*. World Bank Group. https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021. Accessed on 27 January 2021.

[136] *Average fuel consumption of new light-duty vehicles sold, 2005-17, and SDS trajectory to 2030.* IEA. https://www.iea.org/reports/fuel-consumption-of-cars-and-vans. Accessed on 27 January 2021.

[137] *The WFE's Derivatives Report 2019* (2020). London: World Federation of Exchanges.

[138] *Average annual crude oil futures contract three prices in the U.S. from 1990 to 2019 (U.S. dollars per barrel)* Statista. https://www.

statista.com/statistics/209581/average-annual-futures-contract-3-price-of-crude-oil/. Accessed on 27 January 2021.

[139] Rothbard, M. N. *(2000). America's Great Depression.* 5th Edition. Vienna: Ludwig von Mises Institute.

[140] *International financial history of the twentieth century. System and anarchy* (2003). Edited by M. Flandreau, C.-L. Holtfrerich and H. James. Cambridge: Cambridge University Press.

[141] Bordo, M. D. (1993). The Bretton Woods international monetary system: A historical overview. In M. D. Bordo and B. Eichengreen (eds.) *A Retrospective on the Bretton Woods System: Lessons for International Monetary Reform* (pp. 3-108). Chicago: University of Chicago Press.

[142] Kramer, M. (2012). The demise of the Soviet Bloc. In V. Tismaneanu and B. C. Iacob (eds.) *The End and the Beginning: The Revolutions of 1989 and the Resurgence of History* (pp. 171-254). Budapest: Central European University Press.

[143] Mărăcau, P. C. (2015). Short analysis of the fall of communist regimes in Central and Eastern Europe in 1989 and the domino effect. *Astra Salvensis - revista de istorie si cultura*, 5, 158-162.

[144] Brzezinski, Z. (1998). *The grand chessboard: American primacy and its geostrategic imperatives*. New York: Perseus Books Group.

[145] *The Baku-Tbilisi-Ceyhan Pipeline: oil window to the West* (2005). Edited by S. F. Starr and S. E. Cornell. Vienna: The Central Asia – Caucasus Institute, Silk Road Studies Program.

[146] Boughton, J. M. (2001). *Silent revolution: The International Monetary Fund, 1979–1989*. Washington, DC: International Monetary Fund.

[147] *Making globalization work for all*. (2007). New York: United Nations Development Programme.

[148] Ali, A., Winter, G. and May, D. (2007). Globalization: Its effects. *International Business & Economics Research Journal*, 6(1), 89-96.

[149] Carroué, L. (2009). Dossier crise des subprimes: la fin de l'hégémonie américaine*?* In *Images économiques du monde. Géopolitique, géoéconomie* (pp. 1-18) Paris: Éditions Arman Colin [Carroué, L.

(2009). The subprime crisis dossier: the end of American hegemony. In *Images économiques du monde. Géopolitique, géoéconomie* (pp. 1-18). Paris: Éditions Arman Colin].

[150] de Hoop Scheffer, A., Kinane, R., Quencez, M. and Wickett, X. (2016). *The future of US global leadership: Implications for Europe, Canada and Transatlantic Cooperation*. Berlin – London: German Marshall Fund of the United States and Chatham House.

[151] *Triennial Central Bank Survey 2007* (2007). Basel: Bank for International Settlements.

[152] *World energy outlook 2008* (2008). Paris: International Energy Agency.

[153] *Uranium 2007: resources, production and demand* (2008). Paris: OECD Nuclear Energy Agency and International Atomic Energy Agency.

[154] *Copper. Commodity profile* (2008). Keyworth, Nottingham: British Geological Survey, Natural Environment Research Council.

[155] Anyadike, N. (2002). *Lead and zinc: threats and opportunities in the years ahead*. Cambridge: Woodhead Publ.

[156] Launay, L. (2009). *The World's gold, its geology, extraction, and political economy*. Charleston, SC: BiblioBazaar, LLC Press.

[157] T*he state of food industry in the world: economic crises – impacts and lessons learned* (2009). Rome: Food and Agriculture Organization of the United Nations.

[158] Saner, R., Yiu, L. and Bhatia, A. (2009). *Commodity development strategy in the integrated framework*. New York – Geneva: United Nations Development Programme.

[159] Nichol, J. (2008*). Russia-Georgia conflict in South Ossetia: Context and implications for U.S. interests*. CRS Report for Congress, Order Code RL34618, Washington DC: Congressional Research Service.

[160] Cohen, A. and Hamilton, R. E. (2011). *The Russian military and the Georgia war: Lessons and implications*. Carlisle, PA: Strategic Studies Institute, U.S. Army War College.

[161] *U.S. – Russia relations in the aftermath of the Georgia crisis* (2008). Hearing before the Committee of Foreign Affairs, House of

Representatives, One Hundred Tenth Congress, Second Session. Serial No. 110–221. Washington, DC: U.S. Government Printing Office.

[162] *Selected speeches of President George W. Bush* (2009). Washington, DC: Office of the White House Press Secretary.

[163] *Euro foreign exchange reference rates.* European Central Bank. https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/index.en.html. Accessed on 29 January 2021.

[164] *Obama on economic crisis: 'The fire is now out'* (2009). Agence France Press, juin 20.

[165] Korobkov, A. (2019). Donald Trump and evolving U.S.-Russia relationship. *Perception*, XXIV(1), 39-58.

[166] Naacke, G., Penistone, E. and Chekanova, T. (2015). *WFE/IOMA 2014 Derivatives Market Survey*. London: World Federation of Exchanges.

[167] *WFE/IOMA 2015 derivatives market survey* (2016). London: World Federation of Exchanges.

[168] *WFE IOMA 2016 derivatives report* (2017). London: World Federation of Exchanges.

[169] *WFE IOMA 2017 derivatives report* (2018). London: World Federation of Exchanges.

[170] *WFE IOMA 2018 derivatives report* (2019). London: World Federation of Exchanges.

[171] *Trading in NYMEX WTI crude oil futures contract leading up to, on, and around April 20, 2020* (2020). Interim Staff Report. Washington, DC: CFTC.

[172] Tvalchrelidze, A. G. and Tabagari, Kh. (2019). American new sanction against Iran: Challenges for economic growth. *Elixir Social Studies*, 126, 52504-52513.

[173] *Oil – exports (bbl/day).* Indexmundi. https://www.indexmundi.com/g/r.aspx?v=95. Accessed on 29 January 2021.

[174] *Member countries*. Organization of the Petroleum Exporting Countries. https://www.opec.org/opec_web/en/about_us/25.htm. Accessed on 29 January 2021.

[175] *Top ten companies by oil production*. Offshore Technology. https://www.offshore-technology.com/features/companies-by-oil-production/. Accessed on 15 December 2020.

[176] Tvalchrelidze, A. G. and Kervalishvili, P. J. (2015). Energy security of the Southern Caucasus: opportunities and challenges. *Nanotechnology Perceptions*, 11, 88-105.

[177] Orazgaliyev, S. (2019). *State ownership and nationalization in energy sector: The case of Kazakhstan's oil industry*. ADBI Working Paper Series, No. 1042. Tokyo: Asian Development Bank Institute.

[178] Ulmishek, G. F. (2001). *Petroleum geology and resources of the North Caspian Basin, Kazakhstan and Russia*. U.S. Geological Survey Bulletin 2201-B. Reston, VA: U.S. Geological Survey, U.S. Department of the Interior.

[179] *Background reference: Kazakhstan* (2019). Washington, DC: U.S. Energy Information Administration.

[180] *Company overview*. Tengizcheroil. http://www.tengizchevroil.com/about/overview. Accessed on 30 January 2021.

[181] *NCOC*. http://www.ncoc.kz/en/default.aspx. Accessed on 30 January 2021.

[182] *Karachaganak Petroleum Operating Co. (KPO)*. https://www.kpo.kz/en/about-kpo/parent-companies.html. Accessed on 30 January 2021.

[183] *Precious metals prices*. LBMA. http://www.lbma.org.uk/precious-metal-prices#/table. Accessed on 29 January 2021.

[184] Tvalchrelidze, A. G. (2016). *Geopolitics of gold*. 4th International Mine and Mine Industries Congress & 6th Iranian Mine Engineering Conference. 6-8 November 2016. Keynote Speaker Papers. Tehran: eBook, Http://www.mineconf.ir.

[185] Lau, H., Khosrawipour, V., Kocbach, P., Mikolajczyk, A., Schubert, J., Bania, J. and Khosrawipour, T. (2020). The positive impact of

lockdown in Wuhan on containing the COVID-19 outbreak in China. *Journal of Travel Medicine*, 27(3), 1-7.

[186] *World economic outlook update: A Crisis like no other, an uncertain recovery* (2020). Washington, DC: International Monetary Fund.

[187] Stet, C. (2020). Oil prices in negative territory? In power markets frequent negative prices could become the norm. In: *IAEE Energy Forum, Special Covid-19 Edition* (pp. 17-19). Cleveland, Oh: The International Association of Energy Economists.

[188] *OPEC monthly oil market report. August* (2020). Vienna: Organization of the Oil Exporting Countries.

[189] Putin, V. V. (1999). Mineral and raw resources in the strategy of Russia's economic development. *Mining Institute Transactions*, 144, 3-17 (in Russian).

[190] Åslund, A. (2008). An assessment of Putin's economic policy. *CESifo Forum*, 2, 16-21.

[191] Mankoff, J. (2010). *The Russian economic crisis*. New York: Council on Foreign Relations, Inc.

[192] Kollmorgen, R. (2013). Theories of postcommunist transformation. Approaches, debates, and problems of theory building in the second decade of research. *Studies of Transition States and Societies*, 5(2), 88-105.

[193] Roaf, J., Atoyan, R., Joshi, B., Krogulski, K. & and IMF staff team. (2014). *25 years of transition. Post-Communist Europe and the IMF*. Washington, D.C.: International Monetary Fund.

[194] Atanelishvili, T., Silagadze, A., and Silagadze, L. (2020) Some economic problems of the post-soviet states after the global financial crisis. *Bulletin of the Georgian National Academy of Sciences*, 14(3), 149-154.

[195] Huskey, E. (1995). Democracy and institutional design in Russia. *Demokratizatsiya*, 4(4), 453-473.

[196] Ellison, H. J. (2006). *Boris Yeltsin and Russia's democratic transformation*. Seattle: University of Washington Press.

[197] Evans Jr, A. (2011). The failure of democratization in Russia: A comparative perspective. *Journal of Eurasian Studies*, 2(1), 40-51.

[198] Shinar, C. (2015). The Russian oligarchs, from Yeltsin to Putin. *European Review*, 23(4), 583-596.

[199] Newcombe, A. (2015). Yukos Universal Limited (Isle of Man) v the Russian Federation: An introduction to the Agora. *ICSID Review – Foreign Investment Law Journal*, 30(2), 283–292.

[200] Gololobov, D. (2007). The Yukos money laundering case: A never-ending story. *Michigan Journal of International Law*, 28(4), 711-764.

[201] *Boris Berezovsky "found with ligature around his neck"* (2013). BBC News, 28 March.

[202] *Police study Georgia mogul death* (2008). BBC News, 13 February.

[203] *Forecast of the long-term social & economic development of the Russian Federation for the period till 2030* (2013). Moscow: Ministry of Economic Development (in Russian).

[204] *Report on Russia's economy – Beginning of new economic era?* (2015). Moscow: The World Bank Group (in Russian).

[205] Lisovolik, Y. (2017). *Economic overview of the Russian Federation*. Moscow: Eurasian Development Bank (in Russian).

[206] *Strategy – 2020: New model of economic growth – New social policy* (2013). Edited by V. A. Mau and Y. I. Kuzminova. Russian Academy of Economy and State Service and National Research University Higher School of Economics. Vol. 1. Moscow: Publishing House Delo, (in Russian).

[207] Workman, D. (2020). *Russia's Top 10 Exports*. World's Top Exports. http://www.worldstopexports.com/russias-top-10-exports/. Accessed on 12 January 2021.

[208] Brown, T. J., Idoine, N. E., Wrighton, C. E., Raycraft, E. R., Hobbs, S. F., Shaw, R. A., Everett, P., Deady, E. A. and Kresse, C. (2021). *World mineral production 2015-2019*. Keyworth, Nottingham: The British Geological Survey.

[209] *FAO Cereal Supply and Demand Brief* (2020). Food and Agriculture Organization of the United Nations. http://www.fao.org/worldfoodsituation/csdb/en/. Accessed on 1 February 2021.

[210] *Sugar production worldwide.* Statista. www.statista.com/statistics/495973/sugar-production-worldwide/. Accessed on 1 February 2021.

[211] *The list of strategic enterprises* (2006). Ministry of Economic Development of the Russian Federation. 6 December. http://old.economy.gov.ru/minec/about/structure/depsectoreconom/2016061201. Accessed on 3 February 2021.

[212] *Metalloinvest: Resources create opportunities*. https://m.metalloinvest.com/en/company-profile/. Accessed on 2 February 2021.

[213] *Equity*. Metalloinvest. https://www.metalloinvest.com/en/investors/share-capital/. Accessed on 2 February 2021.

[214] *#83 Alisher Usmanov*. *Forbes*. https://www.forbes.com/profile/alisher-usmanov/?sh=53910b7c6e73. Accessed on 1 February 2021.

[215] *#241 Andrei Skoch & family*. *Forbes*. https://www.forbes.com/profile/andrei-skoch/?sh=38e8509c6c75. . Accessed on 1 February 2021.

[216] *#945 Farhad Moshiri*. *Forbes*. https://www.forbes.com/profile/farhad-moshiri/?sh=b3e6df5568ac. Accessed on 2 February 2021.

[217] *BHP Annual report 2019* (2020). Melbourne: BHP Billiton.

[218] *Annual report 2019* (2020). London: Rio Tinto.

[219] *Vale's Performance in 4Q19* (2020). Rio de Janeiro: Vale.

[220] *Annual Report FY 2019*. (2020). East Perth, WA: Forescue.

[221] *Annual report 2019*. (2020). Luxembourg: ArcelorMittal.

[222] *Integrated annual report 2019* (2020). London: Anglo American plc.

[223] *Metalloinvest Annual report 2019* (2020). Moscow: Metalloinvest.

[224] *India's No 1 merchant iron ore producer. Annual report 2018-19* (2020). Hyderabad, Telangana: NMDC Limited.

[225] *Creating stronger ties – Annual report 2019*. (2020). Mariupol: Metivest.

[226] *2019 Annual report – Building the future* (2020). Cleveland, OH: Cleveland Cliffs Inc.

[227] *About us*. Rusal. https://rusal.ru/en/about/. Accessed on 2 February 2021.

[228] *Crafting a green future: annual report 2019* (2020). Moscow – Hong Kong: Rusal.

[229] *Expanding the horizons of sustainable growth. Annual report 2019.* (2020). Moscow: MMC Norilsk Nickel.
[230] *Alrosa. Annual report 2019* (2020). Moscow: Alrosa.
[231] *World silver survey 2019* (2020). London – Washington, DC: REFINITIV and World Silver Institute.
[232] *Uranium 2020: Resources, production and demand* (2020). Paris: Nuclear Energy Agency, Organization for Economic Co-Operation and Development.
[233] *History of Rosneft.* Rosneft. https://www.rosneft.com/about/History/. Accessed on 3 February 2021.
[234] *Shareholder structure.* Rosneft. https://www.rosneft.com/Investors/Equity/Shareholder_structure/. Accessed on 3 February 2021.
[235] *History brief.* Gazprom. https://www.gazprom.com/about/history/company/. Accessed on 3 February 2021.
[236] *Shares.* Gazprom. https://www.gazprom.com/investors/stock/. Accessed on 3 February 2021.
[237] *PJSC Gazprom Annual report 2019* (2020). Moscow: Gazprom.
[238] *Grade oil ECO. Annual Report 2019* (2020). Moscow: Rosneft.
[239] *The future. KPC Annual report 2017/2018* (2019). Safat: Kuwait Petroleum Corporation.
[240] *This is energy, this is Aramco. Saudi Aramco Annual report 2019* (2020). Dhahran: Saudi Aramco.
[241] *2019 Annual review* (2020). Beijing: China National Petroleum Corporation.
[242] *Iraq National Oil Company.* https://oil.gov.iq/index.php?name=Pages&op=page&pid=77. Accessed on 3 February 2021.
[243] *National Iranian Oil Company.* https://en.nioc.ir/portal/home/. Accessed on 3 February 2021.
[244] *ExxonMobil, 2019 Summary Annual Report* (2020). Irving, Texas: ExxonMobil.
[245] *Management Report 2019* (2020). Rio de Janeiro: Petrobras.
[246] *Petrochina Company Limited. 2019 Annual report* (2020). Beijing: Petrochina.

[247] *Rapport annuel 2019* (2020). Algiers: Sonatrach [*Annual report 2019* (2020). Algiers: Sonatrach].

[248] *Chevron: The human energy company. 2019 annual report* (2020). San Ramon, Ca: Chevron Corporation.

[249] *Energy with purpose. BP Annual report and Form 20-F 2019* (2020). London: BP.

[250] *PEMEX. Main statistics of production* (2020). Mexico: Pemex.

[251] Victor, D., Jaffe, A. M. and Hayes, M. H. (2006). *Natural gas and geopolitics: from 1970 to 2040*. Edited by D. Victor. Cambridge: Cambridge University Press.

[252] Stern, J. (2006). *Russia-Ukraine gas crisis of January 2006*. Oxford: Oxford Institute for Energy Studies.

[253] Kovacevic, A. (2009). *The impact of the Russia – Ukraine gas crisis in the South Eastern Europe*. Oxford: Oxford Institute for Energy Studies.

[254] Kosowska, K. and Kosowski, P. (2016). The geopolitics of Gazprom's pipelines. *AGH Drilling, Oil, Gas*, 33(4), 757-768.

[255] *Secure energy for Europe: The Nord Stream pipeline project* (2012). Zug: Nord Stream AG.

[256] Dickel, R., Hassanzadeh, E., Henderson, J., Honore, A., El-Katiri, L., Pirani, S., Rogers, H., Stern, J. and Yafimava, K. (2014). *Reducing European dependence on Russian gas: Distinguishing natural gas security from geopolitics*. Oxford: Oxford Institute for Energy Studies.

[257] Loskot-Strachota, A. (2016). Nord Stream 2: policy dilemmas and the future of EU gas market, *Policy Brief*, 2. Oslo: Norwegian Institute of International Affairs.

[258] Lang, K. O. and Westphal, K. (2017). *Nord Stream 2 – A political and economic contextualisation*. Berlin: Stiftung Wissenschaft und Politik.

[259] Tvalchrélidzé, A. a Gogobéridzé, I. (1995). Desintegratión economica e integratión: los Estatos de la ex URSS ayer y mañana. *Cuadrenios Americanos. Nueva Época*, 5, 209-215 [Tvalchrelidze, A. and Gogoberidze, I. (1995). Economic disintegration and integration: The

states of the former USSR yesterday and tomorrow. *American Quadreniums. New Epoch*, 5, 209-215].

[260] *US Dollar to Russian Ruble exchange rate converter*. X-Rates. https://www.x-rates.com/graph/?from=USD&to=RUB&amount=1. Accessed on 1 September 2020.

[261] Dubinin, S. K. (2015). Finance crisis 2014-2015. *Strategy of economic development and the future of Russian economy*, 2(26), 219-225 (in Russian).

[262] *2014-2015: Economic crisis – social dimension* (2015). Edited by T. M. Maleeva and A. G. Polyakova. Moscow: Russian Academy of Economy and State Service and National Research University Higher School of Economics (in Russian).

[263] *The economic and financial crisis in Russia: Background, symptoms and prospects for the future* (2015). Edited by A. Łabuszewska. Warsaw: Centre for Eastern Studies, Ośrodek Studiów Wschodnich im. Marka Karpia.

[264] Viktorov, I. and Abramov, A. (2020). The 2014–15 financial crisis in Russia and the foundations of weak monetary power autonomy in the international political economy. *New Political Economy*, 25(4), 487-510.

[265] Frieden, J. A. (2015). *Currency politics: The political economy of exchange rate policy*. Princeton – Oxford: Princeton University Press.

[266] Golyashev, A., Lobanova, A. and Pavlyushina, V. (2017). *Dynamics of consumer prices: 2017 results*. Moscow: Analytical Center, Government of the Russian Federation (in Russian).

[267] Antonova, Z. G. (2012). Strategic development of Russia at the modern stage. *Bulletin of Tomsk Polytechnical University*, 321(6), 37-43 (in Russian).

[268] Medvedev, D. A. (2018). Russia 2024: Strategy of social & economic development. *Problems of Economy*, 10, 5-28 (in Russian).

[269] *Russia: recession and growth under a shadow of pandemic* (2020). Edited by C. Pala. Washington, DC: The World Bank.

[270] Nigmatulin, R. I. and Nigmatulin, B. I. (2020). *Pandemic. The world crisis. Economic framework of Russia*. A special report. Moscow: Russian Academy of Sciences (in Russian).

[271] Dzobelova, V. B., Olisaeva, A. V., Sharopatova, A. V., and Parshukov, D. V. (2020). Economy of Russian regions in the context of the coronavirus epidemic. *IOP Conf. Ser.: Earth Environmental Sciences*, 548, article 022103.

[272] Sagramoso, D. (2020). The COVID-19 pandemic: Global socio-economic and geopolitical implications. *Contribution to Forum on IMEMO Report, New Perspectives*, pp. 1-12.

[273] Yermakov, V. and Henderson, J. (2020). *The new deal for oil markets: Implications for Russia's short-term tactics and long-term strategy*. Oxford: University of Oxford Press.

[274] Finley, M., Krane, J., and Medlock III, K. B. (2020). *Price war and pandemic: The oil market reaction*. Houston, TX: Rice University's Baker Institute for Public Policy.

[275] A review of the impact of Covid-19 corona virus on the oil sector (2020). *Oil and Energy Trends*, 45, 9–15.

[276] *OPEC monthly oil market report. April* (2020). Vienna: Organization of the Oil Exporting Countries.

[277] Perper, R. and Bostock, B. (2020). Oil is down 21% after its biggest drop in decades following Saudi price cuts that sparked a race to the bottom with Russia. *Insider*, March 9.

[278] Brown, Ph. (2020). *Low oil prices: Prospects for global oil market balance*. Washington, DC: Insight, Congressional Research Service.

[279] Sukhankin, S. (2020). *Russian geopolitical objectives in the current oil price crisis and the implications for Canada*. Calgary: University of Calgary, The School of Public Policy Publications.

[280] *Swedish Krona (SEK) to US Dollar (USD) exchange rate history*. Exchange Rates. https://www.exchangerates.org.uk/SEK-USD-exchange-rate-history.html. Accessed on 6 February 2021.

[281] *Czech Koruna (CZK) to US Dollar (USD) exchange rate history*. Exchange Rates. https://www.exchangerates.org.uk/CZK-USD-exchange-rate-history.html. Accessed on 6 February 2021.

[282] *Polish Zloty (PLN) to US Dollar (USD) exchange rate history*. Exchange Rates. https://www.exchangerates.org.uk/PLN-USD-exchange-rate-history.html. Accessed on 6 February 2021.

[283] *US Dollar (USD) to Turkish Lira (TRY) exchange rate history*. Exchange Rates. https://www.exchangerates.org.uk/USD-TRY-exchange-rate-history.html. Accessed on 6 February 2021.

[284] *Swedish Krona to US Dollar monthly average exchange rate*. X-Rates. https://www.x-rates.com/average/?from=SEK&to=USD&amount=1&year=2015. Accessed on 7 February 2021.

[285] *Statistics*. Ministry of Energy of the Russian Federation. https://minenergo.gov.ru/en/activity/statistic. Accessed on 1 February 2021.

[286] *London's economic outlook: Spring 2020. The GLA's medium-term planning projections* (2020). London: Greater London Authority.

[287] *European economic forecast* (2020). Institutional Paper 125. Luxembourg: Publications Office of the European Union.

[288] *World economic situation and prospects as of mid-2020* (2020). New York: United Nations.

[289] *Russia's economy losses momentum amidst COVID-19 resurgence; awaits relief from vaccine* (2020). Russia Economic Report 44. Washington, DC: International Bank for Reconstruction and Development/The World Bank.

[290] *Forecast real gross domestic product (GDP) growth rate due to the coronavirus (COVID-19) in Russia in 2020 and 2021, by scenario*. Statista. https://www.statista.com/statistics/1102674/coronavirus-effect-on-russian-gdp-growth-by-scenario/. Accessed on 7 February 2021.

[291] *Global economic outlook – March 2020* (2020). New York: Fitch Rating.

[292] Desai, P. (2005). Russian retrospectives on reforms from Yeltsin to Putin. *Journal of Economic Perspectives*, 19(1), 87–106.

[293] Shleifer, A. (1997). Agenda for Russian reforms. *Economics of Transition*, 5(I), 227-231.

[294] Elliott, J. E. and Hall, T. (1999). Boris Yeltsin and Russia's rocky road to capitalism: the early years. *International Journal of Social Economics*, 26(12), 1389-1417.

[295] Hough, J. F. (2001). *The logic of economic reform in Russia*. Washington, DC: Brookings Institution Press.

[296] Intriligator, M. D. (1997). A new economic policy for Russia. *Economics of Transition*, 5(I), 225-227.

[297] Haras, H., Pinto, B. and Ulatov, S. (2001). An analysis of Russia's 1998 meltdown: Fundamentals and market signals. *Brookings Papers on Economic Activity*, 1, 1-68.

[298] Perotti, E. (2001). *Lessons from the Russian meltdown: The economics of soft legal constraints*. Working Paper No. 379. Amsterdam: University of Amsterdam.

[299] Sutela, P. (2012). *The political economy of Putin's Russia*. London – New York: Routledge, Taylor & Francis.

[300] Djankov, S. (2015). Russia's economy under Putin: From crony capitalism to state capitalism. *Policy Brief*, No 15-18. Washington, DC: Peterson Institute for International Economics.

[301] Megginson, W. L. (2017). Privatization, state capitalism, and state ownership of business in the 21st Century. *Foundations and Trends in Finance*, 11(1-2), 1-153.

[302] Awan, A. G. (2015). State versus free market capitalism: A comparative analysis. *Journal of Economics and Sustainable Development*, 6(1), 166-176.

[303] Papava, V. and Tokmazishvili, M. (2010). Russian energy politics and the EU: How to change the paradigm. *Caucasian Review of International Affairs*, 4(2), 103-111.

[304] Górnikiewicz, M., Kozicki, B. and Bryczek-Wróbel, P. (2020). The Impact of the coronavirus pandemic on Russia's economic security: Analysis of exchange rates of selected currencies and energy resources. *European Research Studies Journal*, XXIII, Special Issue 3, 228-238.

[305] Menakir, P. A. (2020). Pandemic economy: The Russian way. *Spatial Economics*, 16(2), 7–18 (in Russian).

[306] Galeotti, M. (2020). *The Navalny poisoning case through the hybrid warfare lens*. Hybrid CoE Paper 4. Helsinki: The European Centre of Excellence for Countering Hybrid Threats.

[307] Austrian, C. (2021). *The detention of the Russian opposition politician Aleksey Navalny*. Vienna: United States Mission to the OSCE, January 21.

[308] *Human development report of the Islamic Republic of Iran* (1999). Tehran: United Nations Development Programme.

[309] *Country profile –Iran (Islamic Republic of)* (2008). Rome: Food and Agriculture Organization of the United Nations.

[310] *Country background note: Iran* (2019). Version 6.0. London: Home Office.

[311] *Country policy and information note. Iran: Military service* (2020). London: Home Office.

[312] *Iran: A country study* (2008). Edited by G. E. Curtis, and E. J. Hooglund, Fifth Edition. Washington, DC: U.S. Government Printing Office.

[313] *Country analysis brief: Iran* (2018). Washington, DC: U.S. Energy Information Administration.

[314] *DFAT Country information report: Iran* (2018). Canberra: Australian Government, Department of Foreign Affairs and Trade.

[315] Katouzian, H. (1981). *The political economy of modern Iran*. London – Paris – New York – Manchester – Berlin – Birmingham: Palgrave Macmillan.

[316] Rakel, E. P. (2008). *The Iranian political elite, state and society relations, and foreign relations since the Islamic Revolution*. Amsterdam: University of Amsterdam.

[317] Gohardani, F. and Tizro, Z. (2019). *The political economy of Iran: Development, revolution and political violence (political economy of Islam)*. London – Paris – New York – Manchester – Berlin – Birmingham: Palgrave Macmillan.

[318] *Iran: History and modernity* (2014). Edited by L. M. Kulagina and N. M. Mamedova. Moscow: Institute of Orientalism, Russian Academy of Sciences. (in Russian).

[319] Krasnov K. G. and Yurtaev V. I. (2016). The foreign policy of Iran in the Middle East and the American strategy of "system containment". *Vestnik RUDN. International Relations*, 16(4), 616-627.

[320] The Constitution of the Islamic Republic of Iran (1989 Edition) (2014). *Iranian Studies*, 47(1), 159-200.

[321] Kurun, I. (2017). Iranian Political System: "Mullocracy?". *Journal of Management and Economics Research*, 15(1), 113-129.

[322] Sherko, F. (2018). *Ayatollah Khamenei: Shifting from velayat-e faqih to military control*. Washington, DC: The Washington Institute.

[323] Tvalchrelidze, A. G. and Tabagari, K. (2020). Iran's economy within the framework of Covid-19 coronavirus pandemic. *IOSR Journal of Economics and Finance (IOSR-JEF)*, 1(6), 41-52.

[324] Sajjad, F. D. (2013). Financial sanctions and Iranian Banks' performance. *Journal of Money and Economy*, 8(4), 99-136.

[325] Katzman, K. (2020). *Iran Sanctions.* Report RS20871. Washington, DC: Congressional Research Service.

[326] Motamedi, M (2019). Why does Iran have three foreign exchange rates? *Al Jazeera*, 2 July.

[327] Aslan, M. and Alizadeh, N. (2018). *Exchange rates in Iran: Past, present and future*. Ankara: Center for Iranian Studies in Ankara.

[328] *US Dollar (USD) to Iran Rial (IRR) exchange rate history*. Exchange Rates. https://www.exchangerates.org.uk/USD-IRR-exchange-rate-history.html. Accessed on 4 January 2021.

[329] *Live exchange rates of Iran's free market*. Bonbast. https://www.bonbast.com/graph/usd/. Accesses on 4 January 2021.

[330] Stone, P. (2019). A look at Iran's 2020-2021 budget. *Iran Focus*, December 10.

[331] *Iran population (live)*. Worldometer. https://www.worldometers.info/world-population/iran-population/. Accessed on 15 October 2020.

[332] *Iran GDP per capita*. CEIC. https://www.ceicdata.com/en/indicator/iran/gdp-per-capita. Accessed on 10 February 2021.

[333] *How transparency can help the Middle East and North Africa* (2020). World Bank Middle East and North Africa Region. Washington, DC:

International Bank for Reconstruction and Development and The World Bank.

[334] Workman, D. *Iran's top 10 exports.* World Top Exports. http://www.worldstopexports.com/irans-top-10-exports/. Accessed on 14 June 2020.

[335] Behravesh, M. (2014). Iran's reform movement: The enduring relevance of an alternative discourse. *Digest of Middle East Studies*, 23(2), 262-278.

[336] Şen, G. (2015). *Iran's reform movement during Rouhani's presidency: Assessing the impact of nuclear talks and forthcoming parliamentary elections*. Ankara: Center for Middle East Studies.

[337] Parsi, R. (2016). *Great expectations: The Iranian economy after the Nuclear Deal*. Bonn – Berlin: Friedrich-Ebert-Stiftung.

[338] Ghodsi, M., Astrov, V., Grieveson, R. and Stehrer, R. (2018). *The Iranian economy: Challenges and opportunities*. Research Report 429. Vienna: The Vienna Institute for International Economic Studies.

[339] Alipour, M. (2013). Has privatization of state-owned enterprises in Iran led to improved performance? *International Journal of Commerce and Management*, 23(4), 281-305.

[340] Naseri, A., Gholipour, R and Mashayekhi, B. (2018). Iran's privatization policy analysis based on good corporate governance principles. In: *Sustainability and Social Responsibility: Regulation and Reporting* (pp. 369-390). Singapore: Springer Singapore Verlag.

[341] Toumaj, A. (2014). *Iran's economy of resistance: Implications for future sanctions*. Washington, DC: The American Enterprise Institute.

[342] Khavand, F. (2019). The 10 nightmares of the Iranian economy. *Radio Farda*, 15 February. https://en.radiofarda.com/a/the-10-nightmares-of-the-iranian-economy/29772346.html. Accessed on 11 February 2021.

[343] Manpower (2019*).* In *Statistical Yearbook of Iran 2017-2018* (pp. 181-216). Tehran: Statistical Center of Iran.

[344] *Iran: Unemployment rate from 1999 to 2020*. Statista. https://www.statista.com/statistics/294305/iran-unemployment-rate/. Accessed on 11 February 2021.

[345] *Iran Inflation Rate 1960-2021*. Macrotrends. https://www.macrotrends.net/countries/IRN/iran/inflation-rate-cpi, Accessed on 11 February 2021.

[346] *Iran Inflation Rate*. Trading Economics. https://tradingeconomics.com/iran/inflation-cpi. Accessed on 11 February 2021.

[347] Salehi-Isfahani, D. (2017). Poverty and income inequality in the Islamic Republic of Iran. *Revue internationale des études du développement*, 229, 113-136. [*International Journal of Development Studies*]

[348] Chamlou, N. (2019). Iran's economic performance since the 1979 Revolution. *Atlantic Council*, February 1. https://www.atlanticcouncil.org/blogs/iransource/iran-s-economic-performance-since-the-1979-revolution/. Accessed on 11 February 2021.

[349] *Gini index (World Bank estimate) – Iran, Islamic Rep*. The World Bank. https://data.worldbank.org/indicator/SI.POV.GINI?locations=IR. Accessed on 11 February 2021.

[350] *Iran: Gini inequality index*. The Global Economy.com. https://www.theglobaleconomy.com/Iran/gini_inequality_index/. Accessed on 11 February 2021.

[351] Bellù, L. G. and Liberati, P. (2006). *Inequality analysis: The Gini index*. Module 040. Rome: Food and Agriculture Organization of the United Nations.

[352] *Corruption Perceptions Index 2020* (2021). Berlin: Transparency International.

[353] Marden, B., Micklin, P., and Wurtsbaugh, W. (2014). *Lake Urmia crisis and roadmap for ecological restoration of Lake Urmia*. Tehran: UNDP and Department of Environment of the Islamic Republic of Iran.

[354] Zarrineh, N. and Azari Najaf Abad, M. (2014). Integrated water resources management in Iran: Environmental, socio-economic and

political review of drought in Lake Urmia. *International Journal of Water Resources and Environmental Engineering*, 6(1), 40-48.

[355] Isanezhad, R., Zarifian, S., Raheli, H., Kouhestani, H. and Beheshti Nahand, S. (2015). Assessing the effects of optimal cropping pattern in Lake Urmia basin on restoration of Lake Urmia. *GMP Review*, 15(2), 498-502.

[356] *Towards a solution for Iran's drying wetlands* (2014). International Technical Round Table 16-18 March 2014. Tehran: UNDP and Department of Environment of the Islamic Republic of Iran.

[357] Iran: Largest fuel subsidizer in 2018 (2019). *Financial Tribune*, July 16.

[358] *Foreign direct investment (FDI) in Iran*. Nordea. https://www.nordeatrade.com/en/explore-new-market/iran/investment. Accessed on 12 February 2021.

[359] Mostafazadeh, R. and Jalalpoo, S. (2017). Nationalization of the oil industry in Iran and the Fadaiean of Islam. *Journal of History Culture and Art Research*, 6(1), 81-87.

[360] Mohaddes, K. and Pesaran, M. H. (2013). *One hundred years of oil income and the Iranian economy: A curse or a blessing?* Cambridge Working Papers in Economics (CWPE 1302). Cambridge: University of Cambridge Press.

[361] Top 30 tanker companies. (2018). *Tanker Operator*, March, 26-36.

[362] *NIOC's subsidiaries*. National Iranian Oil Co. https://en.nioc.ir/portal/home/?generaltext/69698/198910/199034/. Accessed on 12 February 2021.

[363] *National Iranian Oil Company subsidiaries*. Iran Tracker. http://www.jpoasanctions.org/nioc.html. Accessed on 12 February 2021.

[364] Li, C., He, C., and Lin, C. (2018). Economic impacts of the possible China–US trade war. *Emerging Markets Finance and Trade*, 54(7), 1557-1577.

[365] Reid, D. (2018). China ignores Trump threat on Iran, says business there will continue. *World News, CNBC*, August 8. https://www.cnbc.com/2018/08/08/china-ignores-trump-threat-on-iran-says-business-there-will-continue.html. Accessed on 13 February 2021.

[366] Shesgreen, D. (2018). Iran sanctions: Trump administration exempts eight countries, including China, from new penalties. *USA Today*, November 5.

[367] Meyer, G. (2018). US approves sale from strategic oil reserve as Iran sanctions loom. *Financial Times*, August 20.

[368] *U.S. Ending Stocks SPR of Crude Oil and Petroleum Products*. U.S. Energy Information Administration. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M_EP00_SAS_NUS_MBBL&f=M. Accessed on 13 February 2021.

[369] McCarthy, N. (2019). Who imports Iranian oil? *Statista*. https://www.statista.com/chart/17774/oil-imports-from-iran/. Accessed on 13 February 2021.

[370] Raydan, N. (2020). Iran's oil flow holds ground in Syria as market share lost to battling OPEC members. *The Fuse*, https://energyfuse.org/irans-oil-flow-holds-ground-in-syria-as-market-share-lost-to-battling-opec-members/. Accessed on 13 February 2021.

[371] Szakola, A. (2020). Iran oil shipping network yield to new Syria refineries. *Levant Networks*, January 4. http://www.levantnetworks.com/2020/01/04/iran-oil-shipping-network-tied-to-new-syria-refineries/. Accessed 13 February 2021.

[372] Kerr, P. K. (2019). *Iran's nuclear program: Status*. Washington, DC: U.S. Congressional Research Service, Report RL34544.

[373] Kerr, P. K. (2020). *Iran's nuclear program and U.N. sanctions reimposition*. Washington, DC: U.S. Congressional Research Service.

[374] Tabatabai, A. (2020). *Nuclear decision-making in Iran: Implications for US nonproliferation efforts*. New York: Colombia University, SIPA – Center on Global Energy Policy.

[375] Blandenier, E., Habibi, Z., Kousi, T., Sestito, P., Flahault, A. and Rozanova, L. (2020). Initial COVID-19 outbreak: An epidemiological and socioeconomic case review of Iran. *International Journal of Environmental Research and Public Health*, 17(24), Article 9593.

[376] Abdoli, A. (2020). Iran, sanctions, and the COVID-19 crisis. *Journal of Medical Economics*, 16, 1-8.

[377] Thurston, A. (2020). Islamic responses to COVID-19. In *The COVID-19 Pandemic in the Middle East and North Africa* (pp. 15-18). Washington, DC: The Project on Middle East Political Science, POMEPS Studies 39.

[378] Sharif, S. (2020). How robust is the authoritarian social contract? Social dissent during Iran's COVID-19 outbreak. In *The COVID-19 Pandemic in the Middle East and North Africa* (pp. 41-43). Washington, DC: The Project on Middle East Political Science, POMEPS Studies 39.

[379] Sherwood, H. (2020. Iranian police disperse crowds from shrines after Covid-19 closures. *The Guardian*, 17 March.

[380] Palik, J. (2020). *Iran and COVID-19: Timing matters*. Oslo: Peace Research Institute, Middle East Policy Brief.

[381] Zandifar, A. and Badrfam, R. (2020). Fighting COVID-19 in Iran; economic challenges ahead. *Archives of Iranian Medicine*, 23(4), 284-284.

[382] Khajehpour, B. (2020). *Anatomy of the Iranian economy*. Stockholm: The Swedish Institute of International Affairs.

[383] Cole, J. (2020). Missed opportunities: The Trump administration, Iran, and the coronavirus pandemic. *Gulf Insights*, 31, 1-5.

[384] *Crude Oil Exports for Iran, Islamic Republic of*. Federal Reserve Bank of St Louis. https://fred.stlouisfed.org/series/IRNNXGOCMBD. Accessed on 14 February 2021.

[385] *Iran Crude Oil: Production*. CEIC. https://www.ceicdata.com/en/indicator/iran/crude-oil-production. Accessed on 14 February 2021.

[386] *Iran Crude Oil Production*. Ycharts. https://ycharts.com/indicators/iran_crude_oil_production/chart/. Accessed on 15 February 2021.

[387] *Crude Oil Production in Iran increased to 2084 BBL/D/1K in January from 2022 BBL/D/1K in December of 2020*. Trading Economics. https://tradingeconomics.com/iran/crude-oil-production. Accessed on 15 February 2021.

[388] Kennedy, C, (2020). Iranian oil exports much higher than official data suggests. *Oil Price, August 11*. https://oilprice.com/Energy/Crude-

Oil/Iranian-Oil-Exports-Much-Higher-Than-Official-Data-Suggests.html. Accessed on 15 February 2021.

[389] Hong, B. (2021). China is still brimming with Iranian oil. *Atlantic Council*, February 10.

[390] *Trading together: Revising Middle East and North Africa regional integration in post-Covid era* (2020). World Bank Middle East and North Africa Region. Washington, DC: International Bank for Reconstruction and Development and The World Bank.

[391] *Iran Inflation Rate MoM*. Trading Economics. https://tradingeconomics.com/iran/inflation-rate-mom. Accessed on 15 February 2021.

[392] *Iran Inflation Rate*. Trading Economics. https://tradingeconomics.com/iran/inflation-cpi. Accessed on 15 February 2021.

[393] *Iran's foreign assets surpass $62b* (2007). Mehrnews, June 6.

[394] Lipin, M. (2019). US: Sanctions have cut Iran's accessible foreign currency to $10 billion (2019). *VOA News, December 12*.

[395] *The world factbook*. CIA. https://www.cia.gov/library/publications/the-world-factbook/rankorder/2188rank.html. Accessed on 5 January 2021.

[396] *Services (BPM6): Trade and growth by main service-category, quarterly*. UNICTAD Stat. https://unctadstat.unctad.org/wds/TableViewer/dimView.aspx. Accessed on 15 February 2021.

[397] Forozan, H. and Shahi, A. (2017). The military and the state in Iran: The economic rise of the Revolutionary Guards. *The Middle East Journal*, 71(1), 67-86.

[398] Erdoğan, S., Gedikli, A. and Derindağ, M. R. (2020). An investigation of Iran's banking system: Challenges and remedies. *Bilimname*, XLI(1), 957-990.

[399] Freeman, M. (2011). The sources of terrorist financing: Theory and typology. *Studies in Conflict & Terrorism*, 34, 461–475.

[400] Farhi, F. (2011). *The Assembly of Experts*. Washington, DC: United States Institute for Peace.

[401] Alem, Y. (2011). *Duality by design: The Iranian electoral system*. Washington, DC: International Foundation for Electoral Systems.

[402] *Iran: A conflict over authority, or a dispute over responsibilities?* (2011). Doha: Arab Center for Research & Policy Studies.

[403] Fisher, M. (2013). How do Iran's supreme leader and president split power? Here's a chart explaining it. *The Washington Post*, June 14.

[404] *Encyclopedia of Islam and the Muslim world* (2016). Edited by R. C. Martin. New York: Macmillan Publishers USA.

[405] Kessler, G. (2013). Did Iran's supreme leader issue a fatwa against the development of nuclear weapons? *The Washington Post*, November 27.

[406] Rafizadeh, M. (2020). Khamenei's double game with the nuclear deal. *Arab News*, December 28.

[407] Jalilvand, D. R. (2019). *Back to square one? Iranian energy after the re-imposition of US sanctions*. Oxford: Oxford Institute for Energy Studies.

[408] *Entities prohibited from contracting with public entities in California per the Iranian Contracting Act, 2010* (2020). West Sacramento, CA: Department of General Services.

[409] Foreign Banks in Iran (2021). *Financial Tribune*, Thursday, February 18.

[410] Waxman, D. (2012). The real problem in U.S. – Israeli relations. *The Washington Quarterly*, 35(2), 71-87.

[411] Zanotti, J. (2021). *Israel: Background and U.S. relations in brief*. Report R44245. Washington, DC: Congressional Research Service.

[412] Garlick, J. and Havlová, R. (2020). China's "Belt and Road" economic diplomacy in the Persian Gulf: Strategic hedging amidst Saudi-Iranian regional rivalry. *Journal of Current Chinese Affairs*, 49(1), 82-105.

[413] *Bank of Kunlun*. United Against Nuclear Iran. https://www.unitedagainstnucleariran.com/company/bank-of-kunlun. Accessed on 18 February 2021.

[414] Fallahi, E. (2020). S. Korean companies leave Iran: Such a pity! But for them. *Tehran Times*, February 18.

[415] *Market overview of automotive sector in Iran* (2016). Rome: Italian Trade Agency.

[416] Uddin, I. (2021). Over $9.5B in Iranian funds frozen in S. Korea: Report. *Asia – Pacific*, 5 January.

[417] *JETRO worldwide offices*. Japanese External Trade Organization. https://www.jetro.go.jp/en/jetro/worldwide/middle_east.html. Accessed on 19 February 2021.

[418] *Active Japanese companies in Iran*. Iran-Japan Joint Committee of Commerce. http://en.ijcc.ir/japanese-companies-active-in-iran-2/. Accessed on 19 February 2021.

[419] Shukla, S. (2020). The China-Iran strategic partnership, and how it can change geopolitics in the Middle East. *The Print*, July 14.

[420] Li, M. (2020). IRISL's Chinese partner Reach Group blacklisted for sanctions breach. *Container News*, October 21.

[421] Wald, E. R. (2018). 10 companies leaving Iran as Trump's sanctions close in. *Forbes*, June 6.

[422] *Economics in the time of COVID-19* (2020). Edited by R. Baldwin and B. W. di Mauro. London: CEPR Press.

[423] di Mauro, B. W. (2020). Macroeconomics of the flu. In R. Baldwin and B. W. di Mauro (eds.) *Economics in the time of COVID-19* (pp. 31-35). London: CEPR Press, 31-35.

[424] Boone, L., Haugh, D., Pain, N. and Salins, V. (2020). Tackling the fallout from COVID-19. In R. Baldwin and B. W. di Mauro (eds.) *Economics in the time of COVID-19* (pp. 37-43). London: CEPR Press.

[425] McKibbin, W. and Fernando, R. (2020). The economic impact of COVID-19. In R. Baldwin and B. W. di Mauro (eds.) *Economics in the time of COVID-19* (pp. 45-51). London: CEPR Press.

[426] Arezki, R. and Nguyen, H. (2020). Novel coronavirus hurts the Middle East and North Africa through many channels. In R. Baldwin and B. W. di Mauro (eds.) *Economics in the time of COVID-19* (pp. 53-58). London: CEPR Press.

[427] Baldwin, R. and Tomiura, E. (2020). Thinking ahead about the trade impact of COVID-19. In R. Baldwin and B. W. di Mauro (eds.) *Economics in the time of COVID-19* (pp. 59-71). London: CEPR Press.

[428] Beck, T. (2020). Finance in the times of coronavirus. In R. Baldwin and B. W. di Mauro (eds.) *Economics in the time of COVID-19* (pp. 73-76). London: CEPR Press.

[429] Cecchetti, S. G. and Schoenholtz, K. L. (2020). Contagion: Bank runs and COVID-19. In R. Baldwin and B. W. di Mauro (eds.) *Economics in the time of COVID-19* (pp. 77-80). London: CEPR Press.

[430] Cochra ne, J. H. (2020). Coronavirus monetary policy. In R. Baldwin and B.W. di Mauro (eds.) *Economics in the time of COVID-19* (pp. 105-108). London: CEPR Press.

[431] Wheeler, C. M., Baffes, J., Kabundi, A., Kindberg-Hanlon, G., Nagle, P. S. and Ohnsorge, F. L. (2020). *Adding fuel to the fire: Cheap oil during the COVID-19 pandemic*. Policy Research Working Paper 9320. Washington, DC: World Bank Group.

[432] Braml, J. (2020). *The European Union in the corona world economic crisis: Perspectives and options in the geo-economic competition between the US and China*. Munich: Hanns-Seidel-Stiftung e.V.

[433] Koenig, N. and Stahl, A. (2020). *How the coronavirus pandemic affects the EU's geopolitical agenda*. Berlin: Hertie School gGmbH, Jaques Delors Centre.

[434] Heisbourg, F. (2020) From Wuhan to the world: How the pandemic will reshape geopolitics. *Survival*, 62(3), 7-24.

[435] Youngs, R. (2020). *Geopolitics and the Covid-19 pandemic: a distorted turn in EU external relations*. Stockholm: Swedish Institute for European Policy Studies.

[436] *The geopolitical implications of the COVID-19 pandemic* (2020). Strasburg: The European Parliament.

[437] Terranova, G. (2020). Geopolitics of Covid-19: global challenge at national borders. *AIMS Geosciences*, 6(4), 515–524.

[438] Schmucker, C. (2020). The effects of the COVID-19 pandemic on US and European commitment to the multilateral economic order. *IAI Papers 20 | 39*. Rome: Istituto Affari Internazionai.

[439] Mionel, V., Neguț, S. and Mionel, M. (2020). Pandemopolitics. How a public health problem become a geopolitical and geoeconomic issue. *Eurasian Geography and Economics*, 61(4-5), 389-403.

[440] Peng, J., Li, Z. and Drakeford, B. M. (2020). Dynamic characteristics of crude oil price fluctuation – from the perspective of crude oil price influence mechanism. *Energies*, 13, Article 4465.

[441] Bouri, E., Demirer, R., Gupta, R. and Pierdzioch, C. (2020). Infectious diseases, market uncertainty and oil market volatility. *Energies*, 13, Article 4090.

[442] Prigogine, I. and Stengers, I. (1984). *Order out of Chaos: Man's new dialogue with nature*. Toronto – New York – London – Sidney: Bantam Books.

[443] Prigogine, I. et Stengers, I. (1986). *La nouvelle alliance*. Paris: Gallimard [Prigogine, I. and Stengers, I. (1986). *The new alliance*. Paris: Gallimard].

[444] Prigogine, I. et Stengers, I. (1988). *Entre le temps et l'éternité*. Paris: Fayard [Prigogine, I. and Stengers, I. (1988) Between time and eternity. Paris: Fayard].

[445] Tvalchrelidze, A. G. (1991). Merab Mamardashvili and modern physics. *Problems of Philosophy*, 5, 17-19 (in Russian).

[446] Hubbert, M. K. (1960). Energy resources, In: *Resources and Man (A Study and Recommendations by the Committee on Resources and Man* (pp. 157-242). National Academy of Sciences, National Research Council. San Francisco: W. H. Freeman & Co.

[447] de Verte Harris P. (1984). *Mineral resources appraisal: Mineral endowment, resources, and potential supply concepts, methods, and cases*. London: Clarendon Press.

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