
The Impact of the Coronavirus Pandemic on Russia's Economic Security: Analysis of Exchange Rates of Selected Currencies and Energy Resources

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Abstract:

This study aims to analyze primary data regarding foreign exchange rates of the following currencies: ruble, euro, dollar, and yuan (renminbi) as well as petroleum and gas prices from a dynamic perspective as it pertains to the impact of the coronavirus pandemic on the economic situation in Russia.

The authors have analyzed the literature concerning foreign exchange rates, petroleum prices, gas prices, and the coronavirus pandemic. It analyzed the available literature on the subject. The study began comparing foreign exchange rates of the Russian ruble, euro, American dollar, and Chinese yuan (renminbi – Chinese currency) for each day in 2020. The following research techniques have been used: line graphs, bar graphs, grouping.

The article analyzes the foreign exchange rate of the aforementioned currencies and petroleum and gas prices from a dynamic perspective.

Multi-dimensional analysis of petroleum and gas prices was conducted in dynamic terms.

Keywords: Foreign exchange rate, oil/petroleum price, gas price, Russian policy.

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1. Introduction and Literature Review

Critical analysis of the literature shows that Russia has been pursuing a policy in the Middle East for many years to gain a strong influence on world oil prices. Russia's policy relates to the conflict in Syria, the sale of a weapon to Iran, and the weakening of Saudi Arabia's position as the leader, in terms of the size of its oil resources in the region and dictating its world prices (Leguka, 2017). The study attempts to analyze exchange rate quotations, petroleum/oil, and gas prices before and during the coronavirus pandemic in the context of their impact on Russia and economic security. The literature analysis shows that safety is considered the certainty of existence and survival, the state of ownership, and the functioning and development of an entity (Zięba, 2018). However, one type of security is economic security, which means the smooth functioning of economies in terms of maintaining basic development indicators and a comparative balance with other countries' economies. One of the threats to the economic security of countries has become COVID-19 disease.

The first cases of COVID-19 infectious disease were observed in Wuhan, China in December 2019 (Gadzela, 2020). The World Health Organization as a result of the rapid global spread and high mortality rate on March 11, 2020 identified the infectious disease COVID-19 as a pandemic (Plus Medycyny, 2020.)

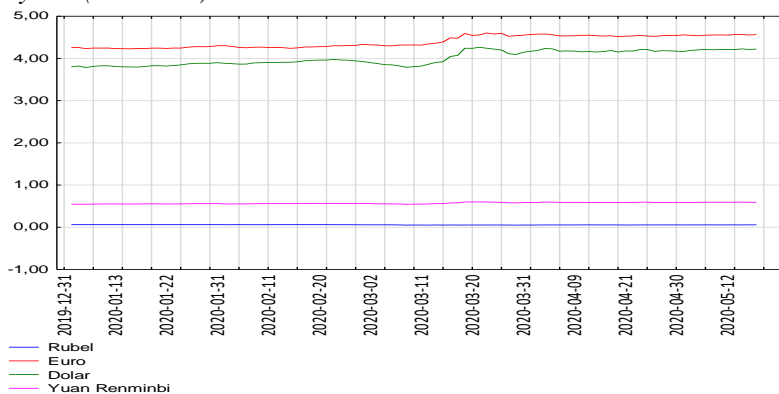
The situation has led to a slowdown, even stoppage, of all world economies (Luisetto, *et al.*, 2020; Grima *et al.*, 2020). The borders became closed, many purchase and sale transactions have been stopped. The observation shows that in many countries, there has been an increase in unemployment and the prices of certain products, and decreases, increases in exchange rates and energy resources (Estrada, 2020; Yilmazkuday, 2020; Ismail, 2020). From mid-May 2020, the slow unlocking of world economies began-various professions were resumed. Governments publish the first dates to inform about the opening of borders.

One of the effects of the coronavirus's impact since March 2020 are changes in exchange rate quotations and petroleum/oil and gas prices. In the literature, there are various interpretations of the "price" term. The basic definition is as follows: It is the value, expressed in money, of a good, a service, other money (currency), and production factors. What is more, it is not the prices themselves that are crucial for financial phenomena, but first of all, the mechanism of their shaping and the effects of applying prices by economic entities (Owsiak, 2015). The next stage of the study will be to research primary data.

2. Analysis and Evaluation of Exchange Rate Quotations

Figure 1 presents the quotations of four currency rates daily from January to May 2020 by using a linear chart and assigning one scale, described on the Y-axis (left side), to four functions.

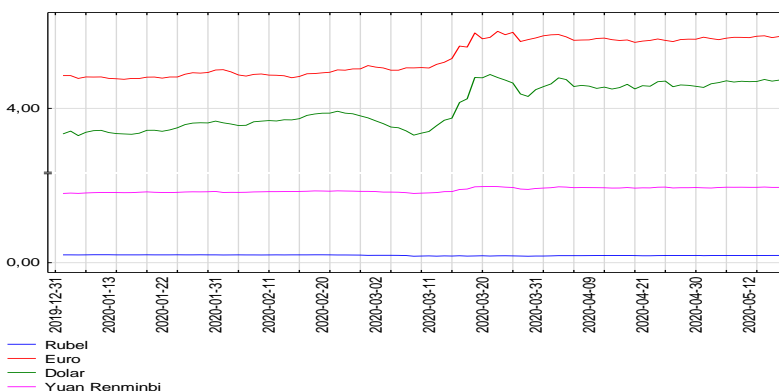
Figure 1. The linear chart of primary data on a daily basis, in 2020, which such data concern the quotations of the following currencies: US dollar, Russian rouble, euro and yuan (renminbi).



Source: In-house elaboration based on data copied from the website: <https://www.money.pl/> [the state as of 05.18.2020]

The data presented in Figure 1 shows that on March 11th, due to the coronavirus pandemic, there was a slight increase in quotations, mainly of the dollar and the euro. However, the yuan (renminbi) course has not changed in trend. To notice the graph's hidden trends, the part of the scale assigned to the Y-axis was cut out (range from 0.7 to 3). The results are shown in Figure 2.

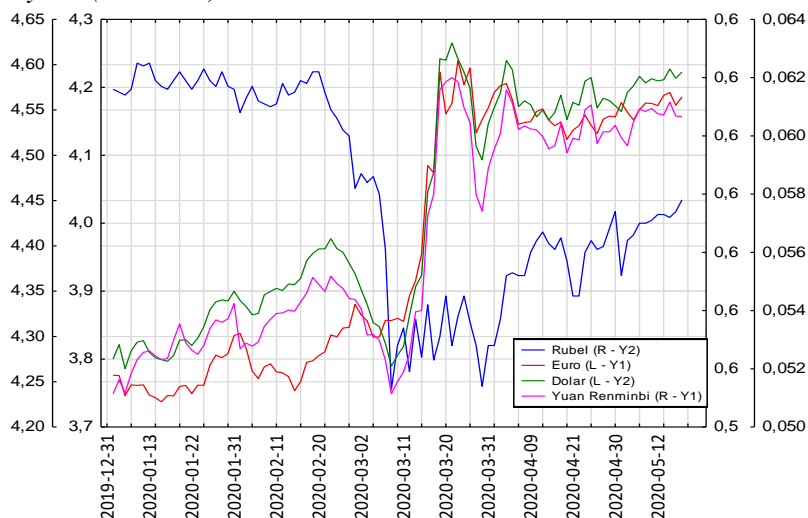
Figure 2. The linear chart of primary data on a daily basis, in 2020, which such data concern the quotations of the following currencies: US dollar, Russian rouble, euro and yuan (renminbi) – cut-off scale of the Y axis in the range from 0.7 to 3.



Source: In-house elaboration based on data copied from the website: <https://www.money.pl/> [the state as of 05.18.2020]

Figure 2 clearly shows the upward trend in the dollar and euro exchange rates since March 11, 2020. To detect and present all relevant trends, each currency has been assigned a separate scale and compared in the same time frame.

Figure 3. The linear chart of primary data on a daily basis, in 2020, which such data concern the quotations of the following currencies: US dollar, Russian rouble, euro and yuan (renminbi).



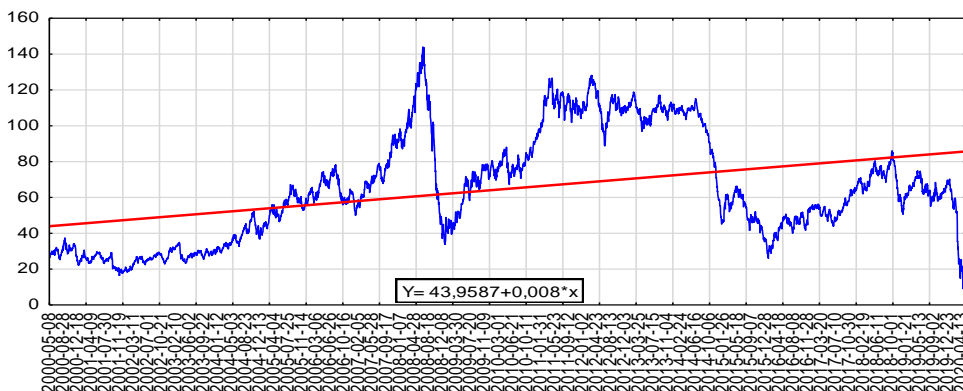
Source: In-house elaboration based on data copied from the website: <https://www.money.pl/> [the state as of 05.18.2020]

Figure 3 shows a linear chart of primary data on the ruble's exchange rates euro, dollar, and yuan (renminbi) daily from January to May 2020. We can observe a huge change in the exchange rate quotations in March 2020. The cause of this phenomenon was the spreading coronavirus pandemic worldwide. For research purposes, each currency is assigned a separate Y-axis scale. This measure aimed to observe trends from a dynamic perspective.

The highest increase in exchange rate quotations was observed for the US dollar (left second Y-axis). A large increase in the exchange rate is also visible for the euro (left first Y-axis). A slight increase in the exchange rate was noticeable for yuan (renminbi), the right first Y-axis. The ruble, on the other hand, showed a decreasing trend (the right second Y-axis). By assigning four different functions to separate scales and placing them in the same time frame, it was possible to compare the occurring increases and decreases of individual currencies clearly.

To sum up, it was possible to observe the percentage increase and decrease of individual currencies concerning each other, where the increase of the euro, the dollar, and the yuan concerning their own values corresponded to almost the same decrease of the exchange rate of the Russian ruble. The reason for the ruble's low price is the drop in oil and gas prices since March 2020. The further part of the research will be devoted to analyzing and evaluating oil and gas prices from a dynamic perspective. The analysis of oil prices began with a linear chart of primary data on oil prices daily for 2000-2020.

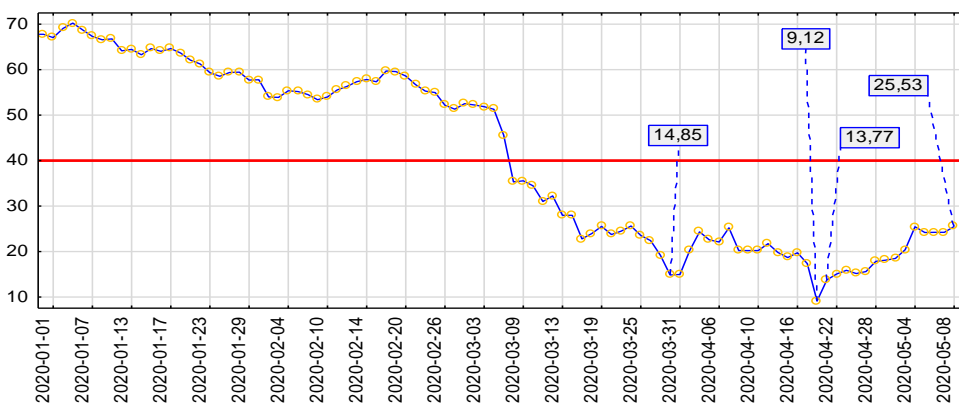
Figure 4. The linear chart of primary data on the oil price on a daily basis for the years 2000-2020.



Source: In-house elaboration based on data obtained from the website: <https://fred.stlouisfed.org> [the state as of May 18, 2020].

Figure 4 shows the three periods in which oil prices worldwide have changed. The first period is 2008. At the same time, there have been large decreases in oil prices caused by the financial crisis. Critical analysis of the literature allows us to conclude that it was initiated in the USA. The reason for this is the inefficiency of the banking system associated with sub-prime loans. The second period was 2014, when a drop in oil prices was also observed. This time it was influenced by the annexation of Crimea by Russia. Since March 2020, the lowest oil prices have been recorded for many years. Such a low-price results from the coronavirus pandemic spreading around the world. The third period of the fall in oil prices has been studied in detail. The first stage was to draw a linear graph of oil prices daily from January to May 2020 (Figure 5).

Figure 5. The linear chart of primary data on the oil price on a daily basis for the year 2020.

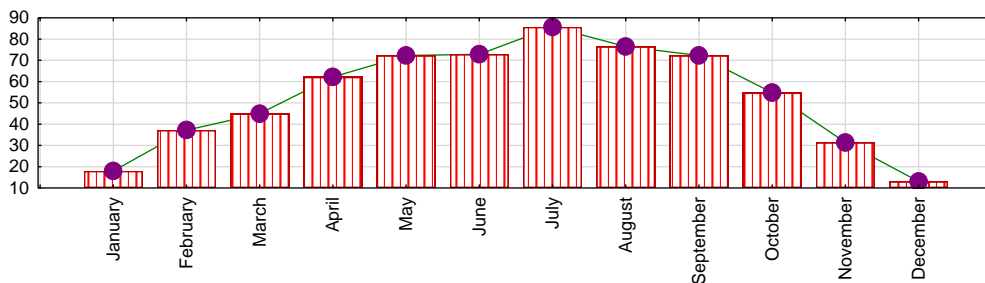


Source: In-house elaboration based on data obtained from the website: <https://fred.stlouisfed.org> [the state as of May 18, 2020].

The information presented in the linear chart (Figure 5) shows low prices per barrel of oil from March to May 2020. The lowest price is 9.12 dollars per barrel of oil and the highest at 25.53. The arithmetic mean value in April and May is 19.67 dollars per barrel. A critical analysis of the literature shows that the price below 40 dollars per barrel of oil is very unfavorable for Russia.

A further stage was to group the primary data on oil prices daily in the years 2000-2020 into twelve-monthly dependent variables. Next, the resulting dependent variables and their explanatory variables are summarized in a bar chart, which outlines the arithmetic mean value of oil prices on a monthly basis (Figure 6).

Figure 6. Categorized bar chart of primary oil price data on a daily basis from May 2000 to May 2020.



Source: In-house elaboration based on data obtained from the website: <https://fred.stlouisfed.org> [the state as of May 18, 2020].

Observation of the data presented in Figure 6 shows that the highest oil price in 2000-2020 was in July, August, September, June, and May. The lowest oil price was in December and January. The observed regularities result from holiday and vacation periods when air traffic increases, and thus the oil demand is increased.

For illustrative purposes, Table 1 presents an analysis of descriptive statistics of a group of month-dependent variables and their explanatory variables in the form of daily crude oil prices from a dynamic perspective.

Table 1. Analysis of descriptive statistics of primary diesel oil price data on a daily basis from May 2000 to May 2020.

Month	Arithmetic average	N	Standard Deviation	Q25	Median	Q75
January	61.70	446	28.86	25.60	42.71	64.14
February	63.38	403	30.04	27.11	41.00	55.33
March	64.06	441	31.30	23.69	24.78	27.98
April	65.57	429	32.68	18.69	23.47	25.76
May	66.45	448	31.16	27.22	28.19	28.97
June	66.50	427	30.76	28.86	29.94	30.71
July	67.62	442	31.87	26.68	28.46	30.62

August	66.82	445	29.54	28.01	30.00	32.38
September	66.45	426	28.31	31.08	33.48	35.72
October	64.92	445	27.11	30.15	30.98	31.31
November	62.87	429	27.62	31.62	32.56	33.33
December	61.27	440	28.06	22.58	24.44	27.28
In total	64.81	5221	29.86	25.60	28.74	31.65

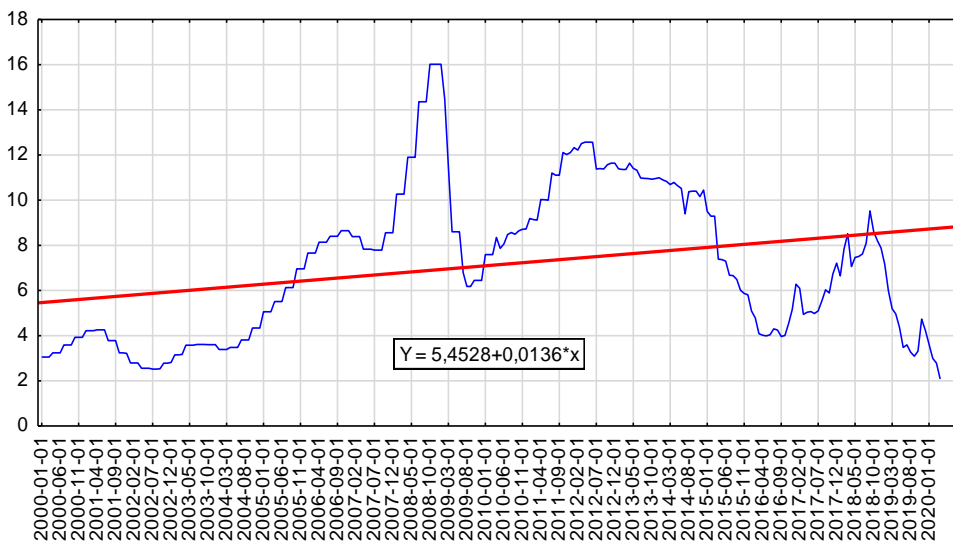
Source: In-house elaboration based on data obtained from the website: <https://fred.stlouisfed.org> [the state as of May 18, 2020].

The analysis of descriptive statistics, performed in Table 1, allows us to conclude that the arithmetic average/mean value of petroleum/oil prices in 2000-2020 was 64.81. It should be mentioned that the obtained arithmetic average/mean value is 3.29 times higher than the average/mean reported in March-April 2020. The median in the years 2000-2020 oscillated around 28.74. The next stage of the analysis was the study of gas prices in 2000-2020.

3. Gas Price Analysis and Evaluation

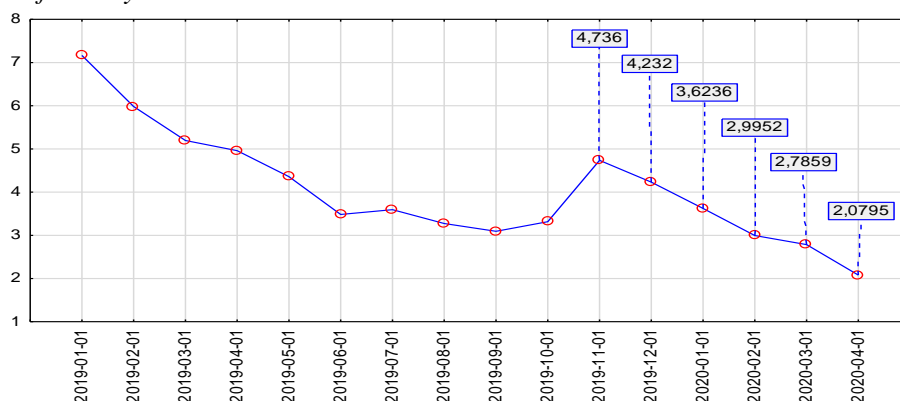
The study started with a linear chart of monthly data on the price of natural gas in the years 2000-2020 (Figure 7).

Figure 7. The linear chart of primary data on the natural gas price on a monthly basis for the period 2000-2020.



Source: In-house elaboration based on data obtained from the website: <https://fred.stlouisfed.org> [the state as of May 18, 2020].

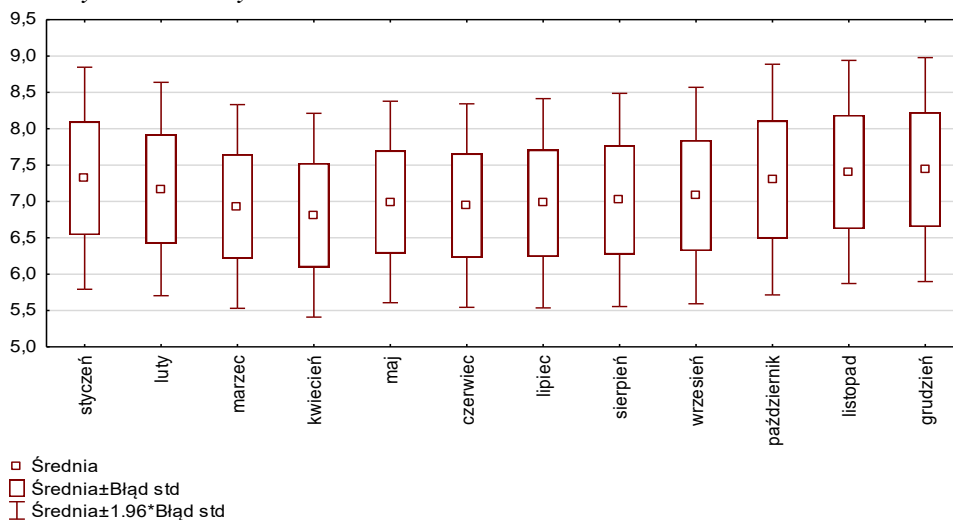
Figure 8. The linear chart of primary data on the natural gas price on a monthly basis for the year 2020.



Source: In-house elaboration based on data obtained from the website: <https://fred.stlouisfed.org> [the state as of May 18, 2020].

The data presented in Figure 8 allows us to observe a downward trend in gas prices from December 2019 to April 2020. The lowest reported gas price was 2.0795 in April 2020. From November 2019 to April 2020, the price dropped 2.08 times. Then the primary variables concerning gas prices every month in the years 2000-2020 were grouped into dependent variables in the form of months and into the variables explaining them. For the analysis, the research tool was used in the form of a categorized frame-and-hinge chart. The results are shown in Figure 9.

Figure 9. Categorized bar chart of primary oil price data on a monthly basis from January 2000 to May 2020.



Source: In-house elaboration based on data copied from the website: <https://fred.stlouisfed.org> [as of 05.18.2020]

The data presented in Figure 9 shows that the price for gas between 2000 and 2020 oscillated around USD 7. The highest gas prices were reported in December, November, and January. In the remaining months, the price was slightly lower. The high price of gas is most likely caused by the heating season and the increased demand for the energy resource in question during this period. For illustrative purposes, Table 2 analyses descriptive statistics of gas prices every month in the years 200-2020 in the group of months dependent variables.

Table 2. Analysis of descriptive statistics of primary natural gas price data on a monthly basis from January 2000 to May 2020.

Months	Arithmetic average	N	Standard Deviation	Q25	Median	Q75
January	7.32	21	3.57	4.22	7.17	9.50
February	7.17	21	3.43	4.22	7.59	9.29
March	6.93	21	3.27	4.09	7.59	9.29
April	6.81	21	3.28	4.02	7.06	8.60
May	6.99	20	3.16	4.13	7.42	9.31
June	6.94	20	3.19	3.81	7.41	9.30
July	6.98	20	3.28	3.80	6.74	8.94
August	7.02	20	3.35	3.80	6.42	9.48
September	7.08	20	3.40	3.80	6.34	9.96
October	7.30	20	3.62	3.97	6.71	9.53
November	7.41	20	3.50	4.44	6.85	9.44
December	7.44	20	3.51	4.29	7.09	9.59
In total	7.12	244	3.31	3.98	6.96	9.45

Source: In-house elaboration based on data obtained from the website: <https://fred.stlouisfed.org> [the state as of May 18, 2020].

The analysis of descriptive statistics of gas prices every month in 2000-2020 (Table 2) shows that the arithmetic average/mean value was 7.12 and was slightly higher than the median, which oscillated around 6.96. The first quartile was 3.98, and the third one was 9.45. The standard deviation from the arithmetic average/mean gas price was 3.31. From the primary data considered in the group of months, it is finally clear that individual months show similar price trends in dynamic perspective with slight deviations caused by factors such as the heating season. The months from March 2020, on the other hand, show low gas prices every month, which may be a premise for irreversible changes in such an economical and military powerhouse as Russia.

4. Summary and Conclusions

The research shows that the rate of the ruble during the coronavirus pandemic shows a decreasing tendency. In contrast, the dollar and the euro's exchange-rates in the March-May 2020 period showed strong upward trends. A slight upward trend characterizes the yuan (renminbi) course at the time. The exchange rate rises

during a pandemic are interpreted differently, and world leaders blame others for releasing the virus outside the labs against ordinary citizens.

The standard chart of exchange rates does not show trends (changes in the function flow). This is due to the different denominators of exchange rate quotations. Only through such a comparison (Figure 1), it is possible to identify which quotations increased the most. In Figure 2, after cutting the scale, we can see an emphasis on the dollar and the euro trends. On the other hand, the third figure shows all the trends but hides the quantities that distinguish the individual exchange rate quotations. Interestingly, great changes in trends are visible at the same time.

During the pandemic, large decreases in petroleum/oil and gas prices could be observed. Such low prices have not been reported for many years. It should be emphasized that Russia's main income, making 57 percent of all Russia income, comes from the sale of petroleum/oil. For two months now, its extraction has been unprofitable because the market price is below its extraction costs, and this directly translates into meager budget revenues.

The literature analysis shows that Russia has been conducting political actions in the Middle East to "dictate" the level of world petroleum/oil prices. These activities resulted from selling weapons and demonstrating their own military power.

It may be that the geopolitical situation that has arisen has become a premise for a price fight, the aim of which may be to weaken Russia heavily. The continuation of low oil prices in the world may lead to negative, even irreversible changes in the Russian economy caused by the lack of budget revenues from a dynamic perspective.

The consequence of the economic changes taking place may be the desire of Russian decision-makers, watched over the past decades, to create armed conflicts in various parts of the world, which would force Washington to stabilize the prices of energy resources more quickly at the level expected by Moscow. In Europe, such trouble spots could be eastern Ukraine, western Belarus, the Baltic States, especially northern and north-eastern Estonia, and eastern and north-eastern Latvia. Precise identification of potential trouble spots caused by the Russian economy's degradation would require an in-depth forecast based on both quantitative and qualitative forecasting methods.

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