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The impact of the russian-ukrainian war on economic processes in russia: analysis and forecasting

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Abstract. In this article, the author examines the impact of the war in Ukraine on the Russian economy, analyzes and forecasts some of the main factors. The relevance of the issue under consideration is due to the fact that the economic situation in Russia directly affects Russia's ability to continue the war in Ukraine. Therefore, the purpose of the article is to analyze and forecast the impact of the Russian-Ukrainian war on economic processes in Russia. Despite the fact that official statistics are mostly classified or distorted by Rosstat, the analysis shows that the economic situation in Russia is getting worse. For the past six years, the Russian economy has been experiencing strong inflation, and in the current environment, inflationary processes have intensified significantly. Eventually, the Kremlin will face a problem: either to continue fighting in Ukraine, or to boost the economy, or to move to a large-scale money issue, which will lead to even higher prices. The National Welfare Fund has shrunk by almost a third and continues to shrink. That is, without additional investments of foreign capital, Russia will not be able to raise the economy and conduct military operations.

The key policy rate was forecasted using neural networks based on the method of group consideration of arguments using the GMDH Shell program. The forecast shows that in 2023 the key policy rate may increase to 23%.

The article shows how the national welfare fund of Russia has been reduced, and the federal budget expenditures are analyzed. The author gives the estimated expenditures of the Russian Federation for the first year of the war and the budget deficit. According to experts' estimates, an approximate figure of the need for funds to support combat operations in the current conditions is provided. The materials of the article are of practical value for analysts, economists and anyone who studies the Russian-Ukrainian war from the point of view of the economic component.

Keywords: Russian-Ukrainian war, economic processes, National Welfare Fund, key rate, inflation, military spending, budget.

Introduction

The Russian-Ukrainian war has a negative impact on economic processes in the Russian Federation, which, in the absence of external support and investment, as well as the closure of foreign markets, has devastating consequences for the Russian economy and, ultimately, the socio-economic situation of the country. According to experts, 88% of the Russian Federation budget for 2023 was spent in January-February (2.6 trillion rubles, or $ 0.31 trillion). This resulted in its deficit at the end of the year (2.9 trillion rubles, which is about 1.5% of GDP according to Rosstat) and increased destructive processes in the economy. Due to exorbitant costs that the military and political leadership of the Russian Federation failed to forecast, the country is now falling into a "deficit hole". This is also due to a drop in almost half of revenues from oil and gas exports. Currently, according to analysts, the Russian Federation is losing about $500 million per day (Melov V., 07.03.2023, Melov V., 31.12.2023). Since these destructive processes directly affect Russia's ability to continue the war, the study of issues related to the decline of the Russian economy is relevant.

Many experts from all over the world, including economists, financiers, demographers, and political scientists, are engaged in analyzing and forecasting the impact of the Russian-Ukrainian war on economic processes in Russia. The authors of *The Economist* analyze how the Russian economy is withstanding the war ("The Russian Economy Can Withstand ...", 2023; "The Russian economy is dangerously overheated...", 2023). How the costs of the war affect Russian citizens is investigated in ("Russia's expenses for the war in Ukraine...", 2023). How the fall of the ruble affects the ability of the Russian Federation to conduct hostilities in Ukraine is covered in ("What does the fall of the ruble mean...", 2023). Experts of the Center for Countering Disinformation study issues related to the impact of the Russian banking crisis on the ability to conduct hostilities in Ukraine ("How the banking crisis in Russia...", 2023). Experts from the International Research Institute for Food Policy (Aizenman N., 2022 and Bloomberg (Bloomberg, 2022) consider scenarios for the development of the economy, including the Russian one, during the war in Ukraine. How the war affects the banking system in the Russian Federation and the International Monetary Fund is investigated in (The Worldwide Effects of Russia's Invasion of Ukraine, 2022). Russia’s military actions against Ukraine affect not only the industry of the Russian Federation itself, but also global food security (Glauber J., 2022). The global socio-economic consequences of the Russian-Ukrainian war are explored in (Chaliuk Y. O., 2022). The processes of degradation of the Russian economy and the inevitability of the crisis are considered in (Kovalenko E., 2023). War, mobilization, sanctions, and the mass exodus of Russians abroad have undermined many people's sense of confidence in the future. According to (Enikolopov R., 2023), its absence will determine the development of the economy for the coming years.

However, when analyzing the impact of the Russian-Ukrainian war on the economy of the Russian Federation, only certain indicators are mostly considered, while the forecasts provided are empirical in nature without an attempt to make an analytical description of the processes under study.

Materials and Methods

According to the analysis by the Center for Strategic and International Studies CSIS (Russia lost in Ukraine..., 2023), in the first year of the war in Ukraine, Russia suffered more losses than in all wars and conflicts in which it has participated since World War II. The average number of Russian soldiers killed per month is 25 times higher than in Chechnya and 35 times higher than in Afghanistan. But the question arises: how do such large losses affect the economic situation of the Russian Federation and what indicators can be assessed for this? (Development Analysis..., 2022) have already considered such indicators as changes in the exchange rate of the Russian ruble, changes in

military spending, and the demographic aspect. The author believes that the main indicators that most clearly reflect the real state of Russia's economy extend to military spending, including funds that the Russian Federation spent during the one year of the war in Ukraine; changes in the National Welfare Fund (NWF); the industrial production index; inflation; a drop in industrial production in 2022; Russia's oil and gas and non-oil revenues; changes in the price of URALS oil in 2022 ($ per barrel); freight turnover of transport in the Russian Federation in 2022; unemployment rate; and the key rate of the Central Bank of the Russian Federation. As part of this study, let us look into some of them. Key rate forecasting is carried out using neural networks based on the Group Method of Data Handling applying GMDH Shell.

Results and Discussions

The NWF was created as part of the mechanism of pension provision for citizens for the long term. That is, one of the functions of this fund is to ensure the balance (covering the deficit) of the budget of the pension fund of the Russian Federation. However, due to the fact that the war against Ukraine is protracting, many expenditure items that have not been taken into account have been added, so the NWF is inevitably being spent. The fund cut down during 2022 is shown in Fig. 1.

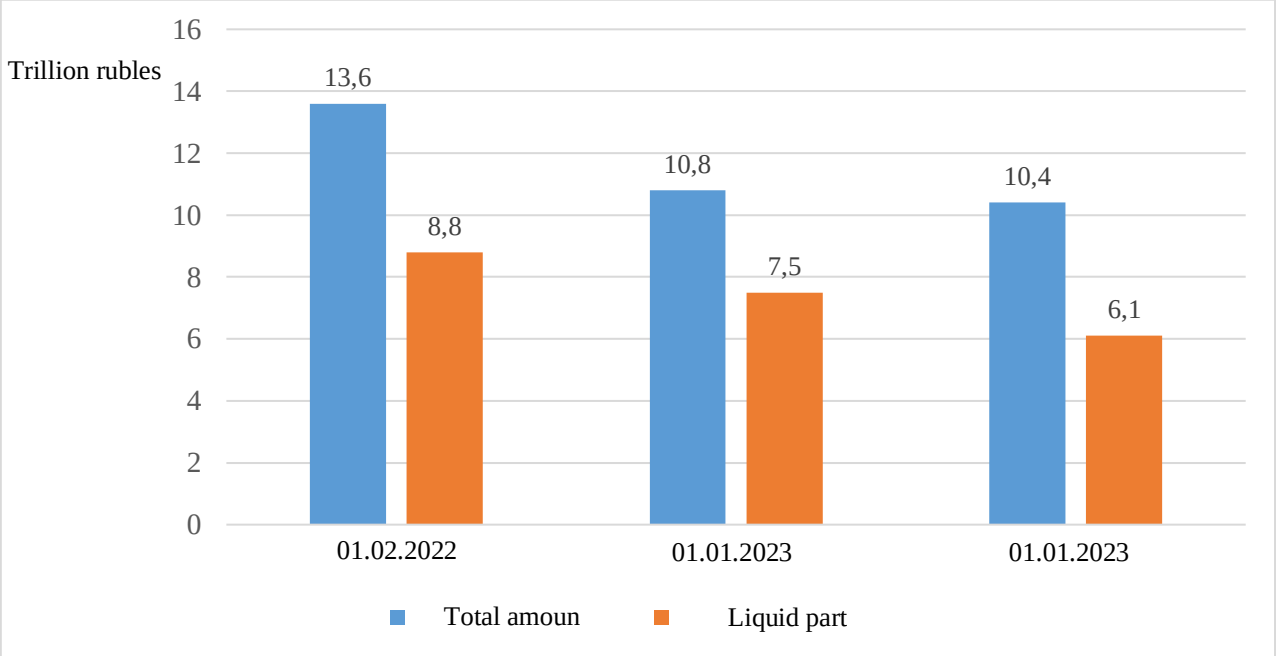


Figure 1. Changes in the NWF of the Russian Federation, 01.02.2022 - 01.01.2023

As can be seen in Fig.1, in the first year of the war, the NWF decreased by almost the same amount, making 3.2 trillion rubles ($0.038 trillion). In the first quarter of 2023, the budget deficit amounted to 2.4 trillion rubles, with expenditures reaching 28% of the annual plan. This is 83% of the planned annual deficit. Therefore, it can be argued that, according to the forecast, the total volume of the NWF and its liquid part will continue to fall, and this is the issue of financing the war in Ukraine. (The liquid part is the government's money in bank accounts.)

Consider the distribution of *expenditures of the federal budget of the Russian Federation* in 2022 (Fig. 2) (Melov V., 06.04.2023).

As already noted, the budget deficit of the Russian Federation in 2022 amounted to almost 3.3 trillion rubles, judging by the distribution of the federal budget expenditures, this is the amount spent on defense.

Russia's military expenditures are shown in Fig. 3.

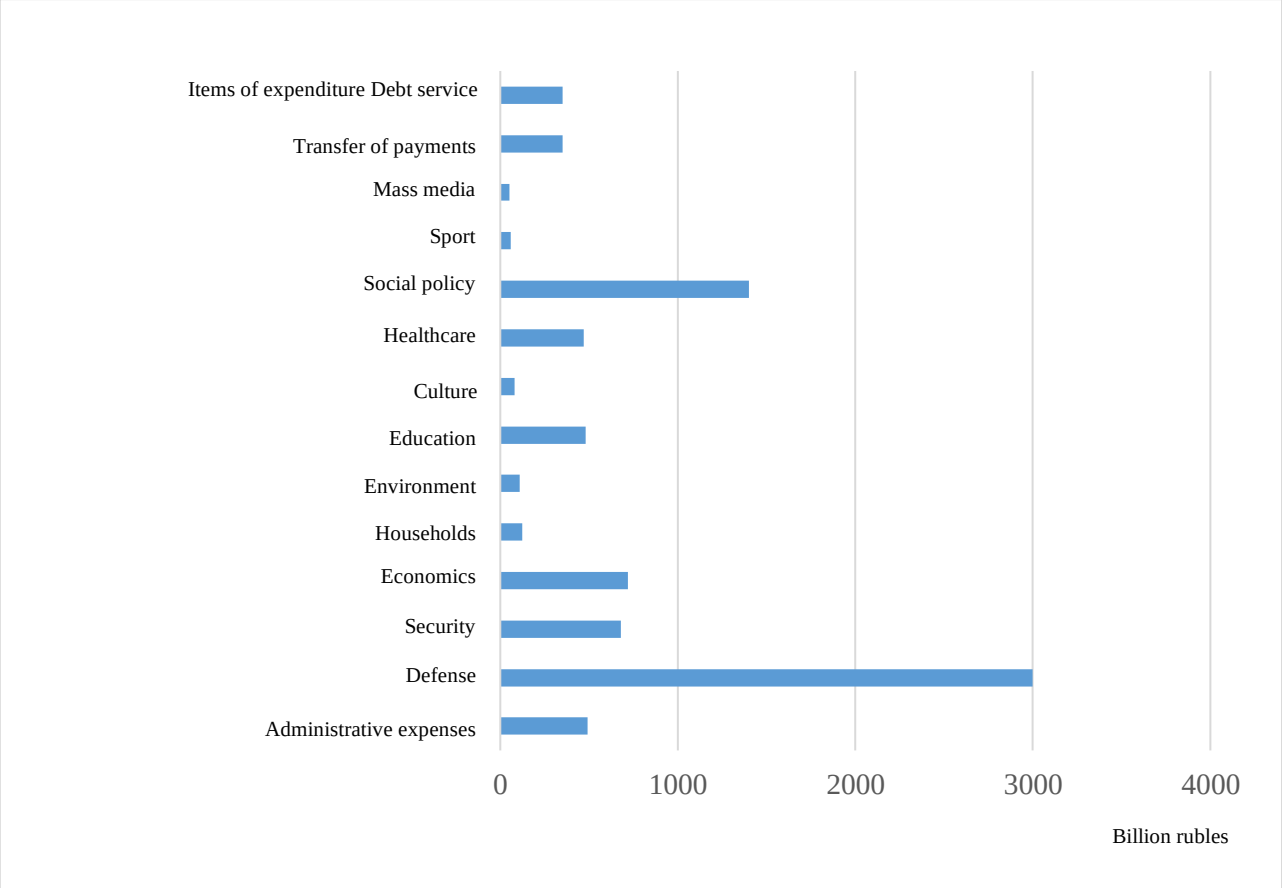


Figure 2. Expenditures of the federal budget of the Russian Federation as of 28.03.2023, billion rubles for 2022

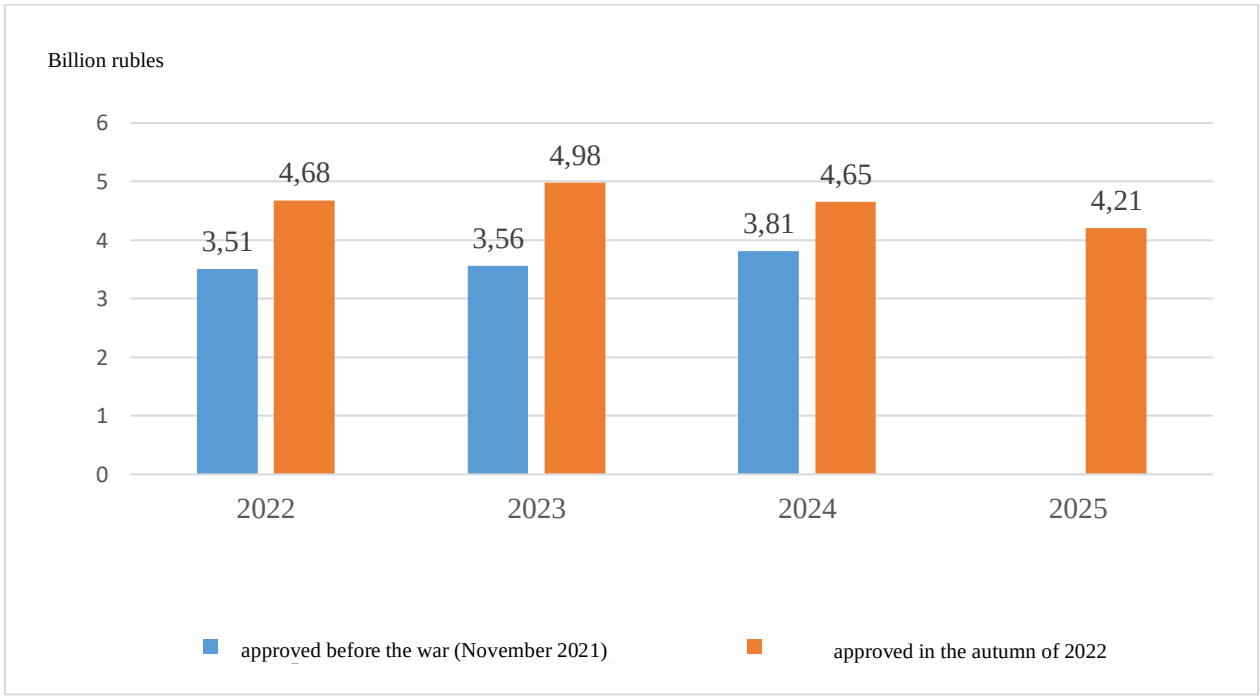


Figure 3. Military expenditures in the budget of the Russian Federation for 2022–2025 (trillion rubles)

Recently, there has been a tendency for the Russians to conceal real defense spending. Thus, at the end of 2021, part of classified expenses amounted to 15.2%. In the first half of 2022, the non-public part increased to 18.6%. Since the beginning of 2023, 32% of the Russian budget has been classified (except for open data on defense and security) (Bloomberg 2023). As of 24.03.2023, this makes $31 billion. According to analysts, this indicates that all these costs go to the war in Ukraine. According to experts, at least 10-15 trillion rubles are required ($1 = $84.32) per year to sustain combat operations in the current conditions. The most expensive for the federal budget was the provision of the army – about $36 billion per year of the war. And the amount of compensation that the Russian government has to pay to the killed and wounded even exceeds the amount of salaries – $29.1 billion. The families of each killed Russian soldier (175160 as of 03.04.2023) should be paid compensation of 7.4 million rubles (approximately $110,000). That is, the total amount of compensation for the killed Russians in the first year of the war exceeds 1 trillion rubles. The wounded will receive 3 million rubles compensation from the Russian Federation. However, there are usually twice as many seriously wounded as killed, that is, the expenditure for this item is not much less. At the same time, despite the increase in defense spending, the Russian Federation is significantly inferior to the United States and European NATO countries in this regard.

The values of GDP, military expenditures of the Russian Federation, the United States and European NATO countries are shown in Table 1.

Table 1. GDP of the Russian Federation, the United States and European NATO countries

Countries	*GDP, $ trillion*	*Military expenditures, $ trillion*	*% of GDP*
RF	1.7	0.0356	2.09
USA	23	0.7777	3.38
European NATO countries	23	0.345	1.5

Although Russia avoided economic collapse after the start of a full-scale war against Ukraine, it is slowly plunging into crisis. According to Bloomberg Economics, the Russian economy could lose $190 billion in GDP (8%) by 2026. This is equivalent to the annual GDP of such countries such as Hungary or Kuwait. During a year of the war, the Russian Federation spent a third of all revenues of the Russian budget for 2021 (Table 2, Fig. 4) (Datsenko V., 2023).

Russia's expenditures for a year of the war in Ukraine

As shown in the graph (Fig. 4), Russia's spending on compensation to the families of the killed and compensation for the wounded will increase in 2023.

Russia spent $114.4 billion on the war in just one year (almost $10 billion per month). This amount includes only direct costs of the war and does not take into account economic and indirect losses suffered by the Russian Federation from sanctions and economic isolation.

The dynamics of Russia's expenditures during a year of the war on financial support and compensation to military personnel is shown in Table. 3 and in Fig. 5.

Table 2. Russia's estimated expenditures for a year of the war in Ukraine

Total military salaries and compensation costs	$53.8 bn
Expenses for the provision of the army	$36.1 bn
Cost of lost equipment	$24.5 bn
Total	$114.4 bn

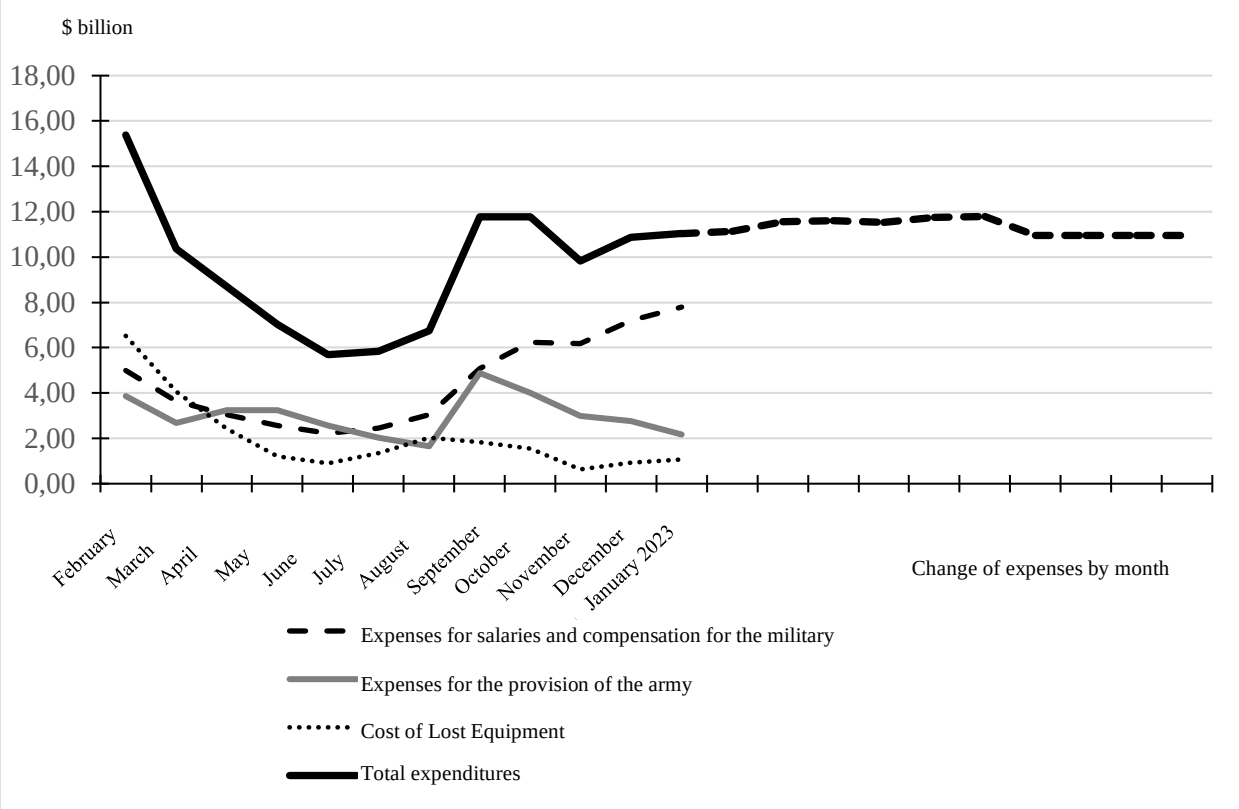


Figure 4. Dynamics of changes in Russia's estimated expenditures in the first year of the war in Ukraine by items

Table 3. Total expenditures of the Russian Federation during a year of war on financial support and compensation to military personnel

Items	Amount, $bn
Total expenditures of the Russian Federation for a year of the war on financial support for military personnel	24.7
Total expenditures of the Russian Federation for a year of the war to compensate the families of the killed	16
Total expenditures of the Russian Federation for the year of the war to compensate the wounded	13.1
The total amount of expenditures of the Russian Federation	53.8

Whilst they are trying to increase the cost of providing the army and maintaining military personnel, there is a big problem with equipment. The estimated cost of weapons and military equipment that the Russian Federation is losing during the war is $10-11 billion per month. It is quite clear that Russia is unable to compensate for these costs in the medium term. The above graph (Fig. 4) presents the total costs, a forecast for 2023 is based on them. Forecasting is carried out using neural networks based on the Group Method of Data Handling applying GMDH Shell. At the same time, the coefficient of determination of the obtained forecasts ranges from 0.85 to 0.97, and the forecast corridors did not exceed 15%, which indicates their high accuracy on the selected horizon.

The cost of equipment lost by Russia during a year of the war.

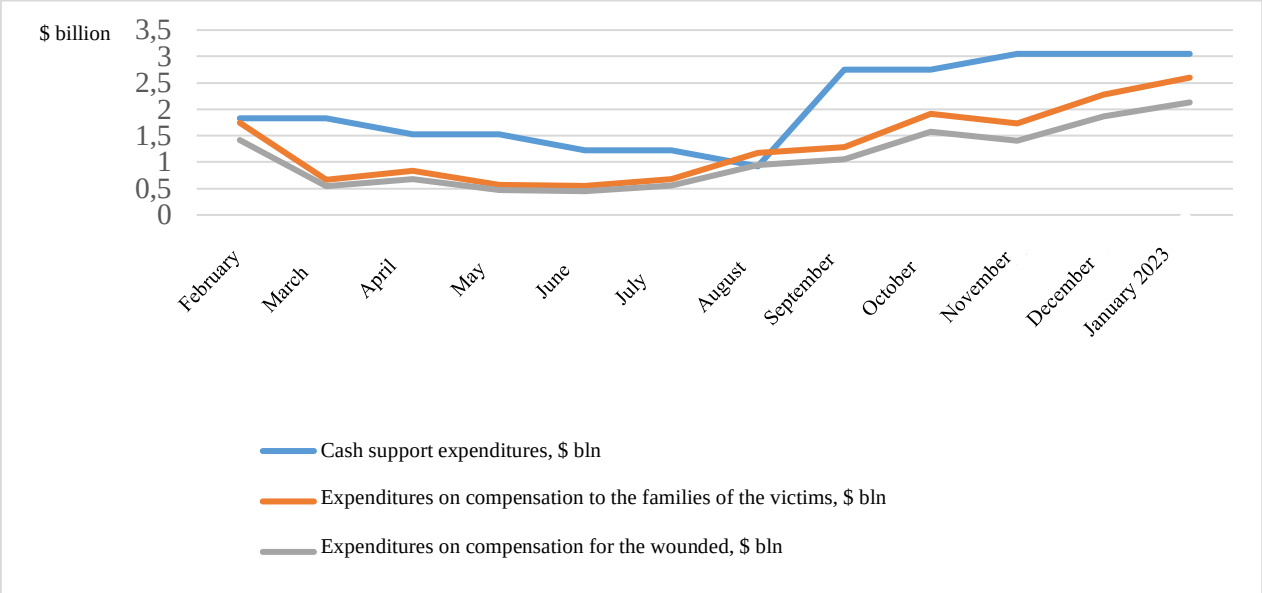


Figure 5. Dynamics of Russia's expenditures on financial support and compensation to military personnel in the first year of the war

It is estimated that the value of the equipment alone lost by Russia reaches $25 billion. The cost of equipment by type, which the Russian Federation lost during one year of the war in Ukraine, is shown in Fig. 6.

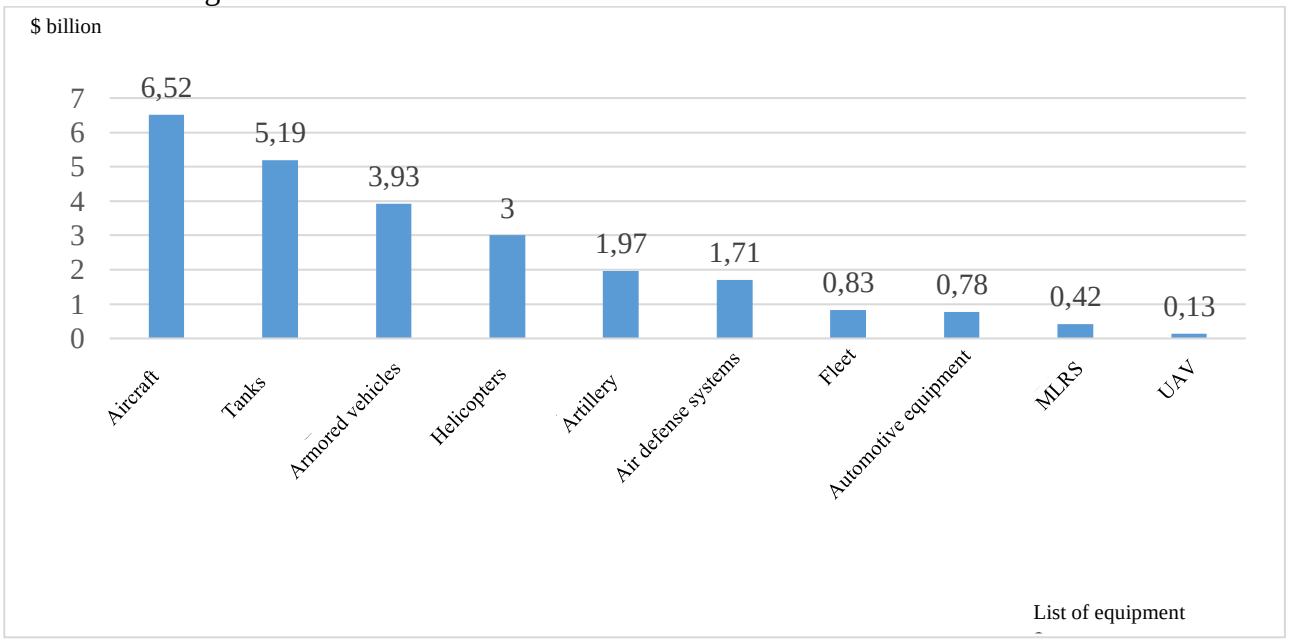


Figure 6. The cost of equipment that the Russian Federation lost during one year of war in Ukraine

Apparently, the most costly for the Russians are the losses of aviation (about $6.52 billion), despite the fact that aviation does not play such an important role in the war in Ukraine. At the same time, the restoration of the fleet is the most complex and costly process. The destroyed helicopters cost Russia about $3 billion. The total cost of equipment that the Russian Federation lost during one year of the war in Ukraine will increase in 2023. For the Russian Federation, the restoration of

weapons and military equipment will be problematic, especially when it comes to high-tech one, due to the relatively large number of foreign-made components to which there is currently no access, the indivisible production potential and the acute shortage of technical personnel. For example, the promising T-14 Armata main tank, the development of which began in 1971, was supposed to be put into service in 2015, but it has not yet passed state tests, the start of serial production is constantly being postponed, the volume of orders is decreasing (from 2300 samples in 2018 to 132 in 2021), and according to the latest information, the production of the T-14 has been stopped due to Western sanctions (Russia refuses, 2022).

A similar situation has developed with the fifth-generation Su-57 (T-50) aircraft, which is based on Soviet developments, and has been actively developed since the early 2000s. So far, only 3 serial models and 7 test models have been produced, but, according to experts, it is already obsolete and inferior in basic characteristics even to the F-15 and F-16, which were created in the mid-70s of the last century (more than 6000 samples were produced in total) (Against the backdrop of outright stagnation, 2022).

Expenditures of the Russian Federation on the provision of the army in 2022-2023 are shown in Fig. 7.

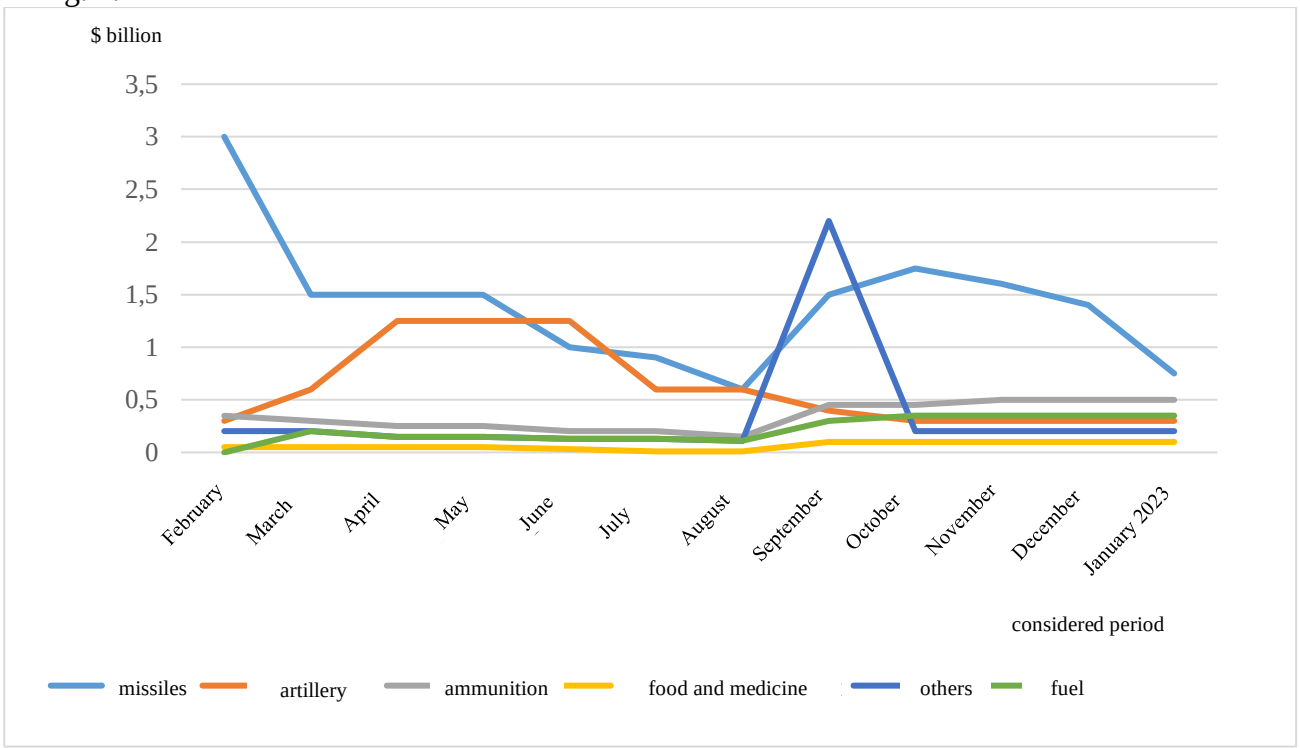


Figure 7. Dynamics of Russia's expenditures on the provision of the army

According to estimates, the cost of provision of the Russian army per month ranges from $1.2 to $2 billion, which creates an additional burden on the budget.

Inflation

The war against Ukraine, together with sanctions, has had a significant impact on the economy of the Russian Federation. Thus, over the past six years, the Russian economy has been experiencing inflation, and in the current conditions, inflationary processes have accelerated significantly (Fig. 8).

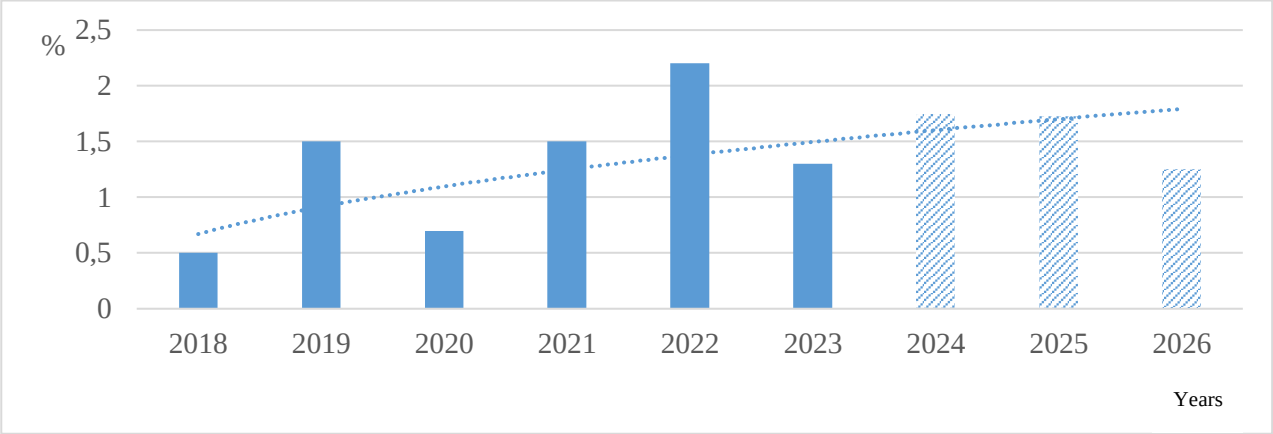


Figure 8. Inflation in 2018–2023, January–December, % compared to December of the previous year

That is, inflation has a steady upward trend.

National currency exchange rate

An important indicator that reflects both the real economic situation and the state's efforts to stabilize it is the exchange rate of the national currency (Fig. 9, 10). Thus, inflation targeting is an important element of monetary policy, the ultimate goal of which is price stability (Inflation Targeting, 2023). At the same time, the Central Bank of the Russian Federation noted that annual inflation, after falling below the target of 4% in March-April 2023, would gradually begin to grow in May-June. The inflation forecast of 5–7% for the end of 2023 remains unchanged (Zabotkin A., 2023).

Tough economic sanctions against the banking system and fear of new restrictions are eroding Russian stability. In order to somehow even out the situation, the Central Bank adopted a package of currency restrictions: on the sale of cash in $ and Euro; withdrawal of money from accounts opened in foreign currency; for international money transfers, etc. However, exchange rates continue to rise.

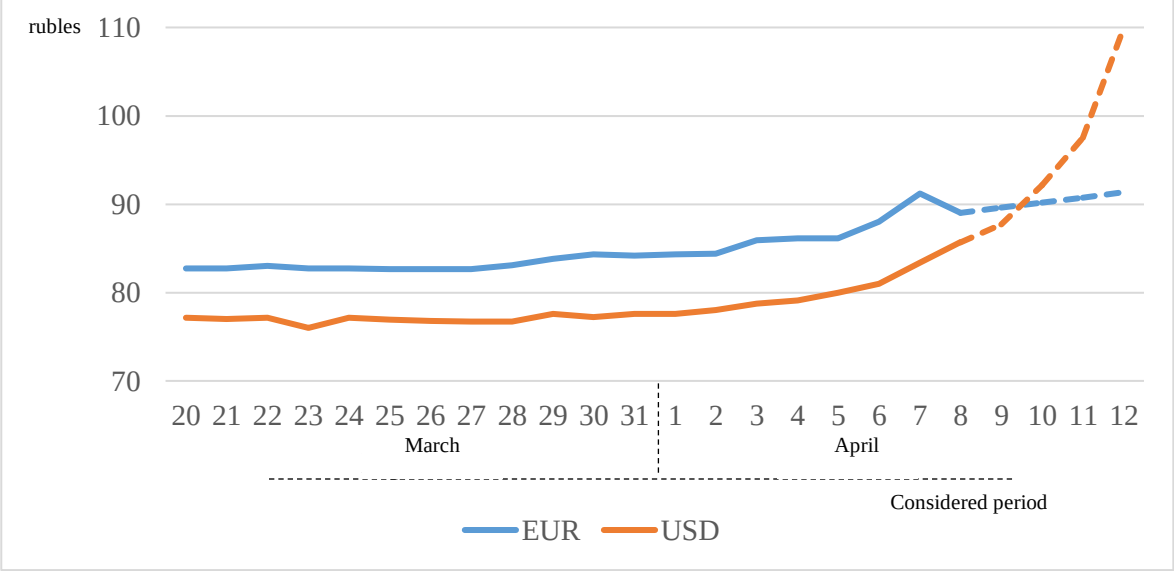


Figure 9. Dynamics of changes in the exchange rate of the dollar and Euro against the ruble, March–April 2023

Retrospective analysis shows that the outbreak of armed conflicts has a negative impact on the ruble exchange rate (Fig. 10).

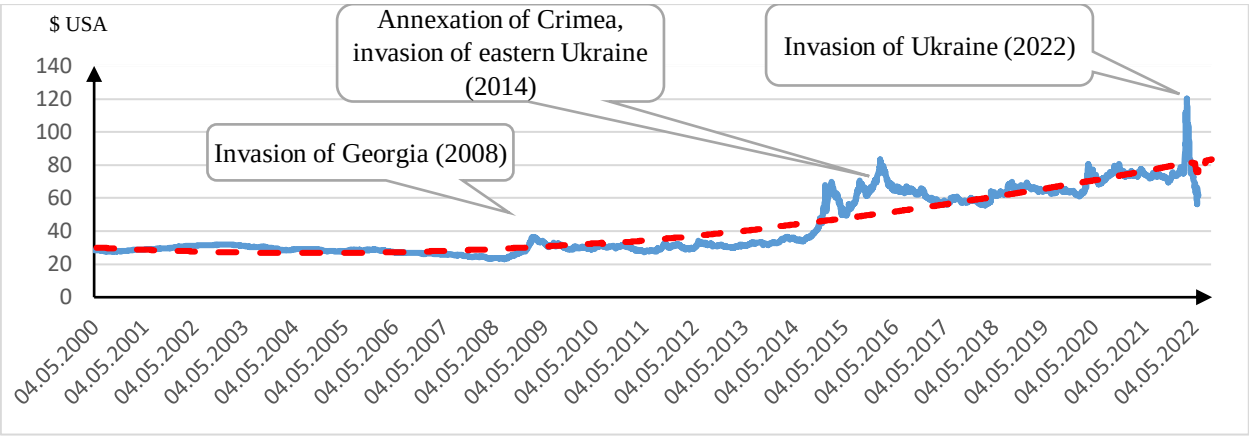


Figure 10. Changes in the ruble exchange rate against $ in 2000–2022

Key rate

Another important indicator is the key rate. This is the minimum interest rate at which the Central Bank issues loans to commercial banks. The key rate is one of the instruments of monetary policy to support the economy in a downturn. Since the end of 2020, the key rate had been 4.5 % and remained at this level until March 2021 (Fig. 11). In the second half of 2023, the Board of Directors of the Central Bank of Russia raised the key rate five times, the last one – on 15.12.2023 to 16 % (Ilchenko L., 2023). Currently, the Central Bank has stopped the reduction of the rate, freezing it for an indefinite period. The government of the Russian Federation assures the market that under such circumstances, high rates will remain for a long time. Fig. 11 presents a forecast for changes in the key rate by the end of 2023 and at the beginning of 2024. If the current trends continue, it is expected to grow to 17 %.

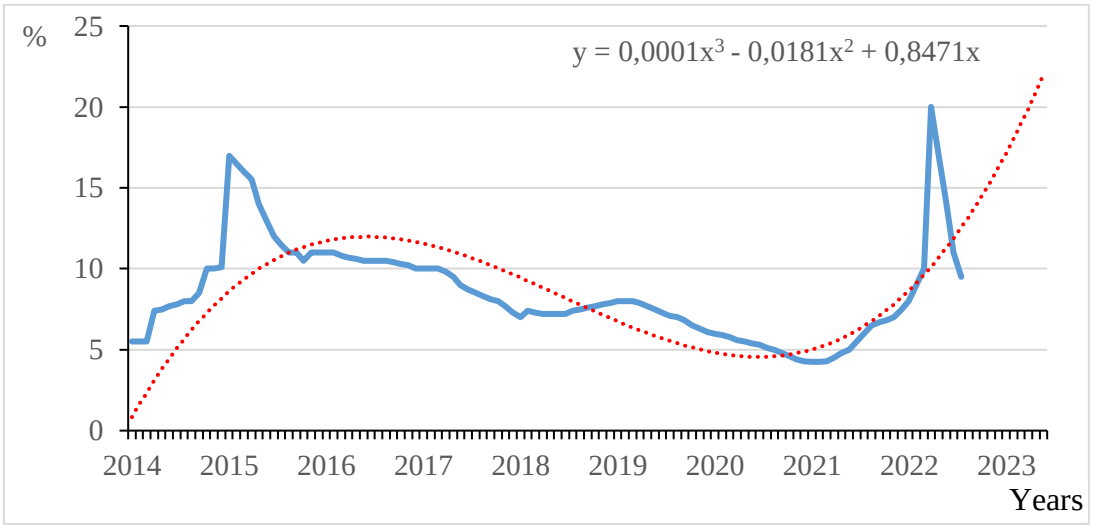


Figure 11. Change in the key rate of the Russian Federation, % (where x is the value of the key rate in the previous step)

Approximation is rather accurate, without taking into account " unloadings". The unloading is the real nature (reaction) of the process, and the decrease that occurs after is the reaction of the Central Bank, which is due to its purposeful activity. Preliminary accounting of "emissions unloadings" was

not carried out due to the overall smoothness (harmony) of the process and the specifics of the software used. Therefore, there was no decrease in the key rate in 2023 and it is not expected in the first half of 2024.

At the same time, there is every reason to believe that the situation is worse than that presented by the official data of Rosstat. Thus, the Central Bank of the Russian Federation admitted that the blow to the economy is very strong, and it is unknown how long it will last. In addition, the Central Bank classified bank statements.

Oil and gas revenues

The main source of filling the budget of the Russian Federation is oil and gas revenues. On 05.12.2022, almost a year after Russia's invasion of Ukraine, the West imposed an almost complete embargo on Russian oil exports According to IEA (International Energy Agency), due to the embargo, the Kremlin will lose about one trillion dollars in export revenues by 2030, and Russia's share in the global energy market will decrease to 13% from 20%. At the same time, the situation is worsening due to the rapid reduction in the price of Russian oil. The markets lost to the Russian Federation will be occupied by the United States and the countries of the Middle East (Kalmykov O., 2023). Russia's revenues will fall by at least 40% in 2023. changes in the price of URALS oil during 2022 are shown in Fig. 12.

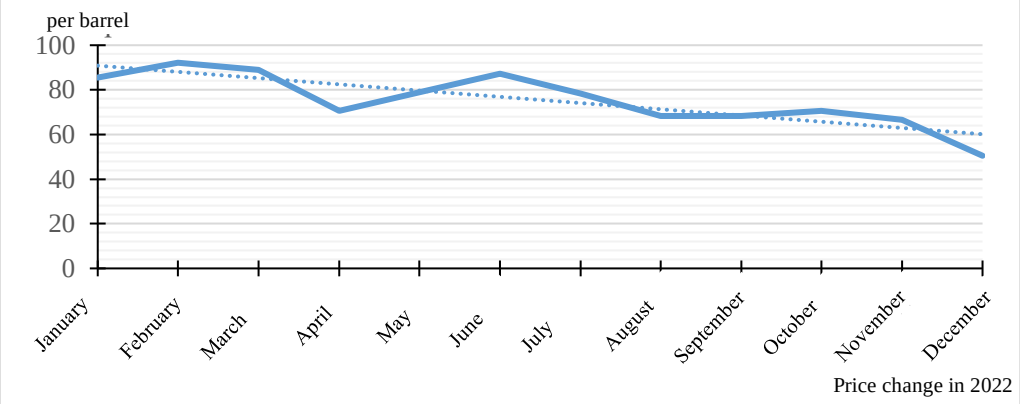


Figure 12. Changes in the price of URALS oil in 2022, $ per barrel

In March 2023, the average price of URALS oil was $47.85 per barrel. There was no increase in the price of oil due to a decrease in its production.

Gas exports from the Russian Federation fell by 46%. That is, one can say that the budget of the Russian Federation will not see large revenues from oil and gas, since the situation with oil is not improving. As a result, we should expect an even larger budget deficit, which depends on the sale of oil and gas, by 40%, and this is the issue of financing the war in Ukraine. As a result, there is a further expenditure of the NWF.

Conclusion

Thus, the article analyzes and forecasts the impact of the Russian-Ukrainian war on economic processes in Russia. In the first year of the war, the NWF shrank by 3.2 trillion rubles ($0.038 trillion), in 2022 their budget deficit was almost 3.3 rubles ($0.039 trillion). Defense spending is the largest part in the expenditures of the federal budget of the Russian Federation for 2023 (3000 billion rubles, or $ 35.577 billion). The key goal of the budget policy of the Russian Federation is to finance the war. For 2024, 11 trillion rubles have been allocated. for military expenditures. Russia spent $114.4 billion on the war in a year (almost $10 billion per month). According to experts, at least 10-15 trillion rubles are needed. ($0.12 trillion – $0.18 trillion) per year to sustain hostilities in the current

conditions. Now the enemy has put its economy on a war footing, but due to Western sanctions, it is not able to quickly produce modern weapons. Since there is not enough money, the Russian Federation will revise its federal budget and increase military spending. This will put additional pressure on the deficit, and falling revenues and high spending have already created it.

Over the past six years, the Russian economy has been experiencing strong inflation, and in the current conditions, inflationary processes have accelerated significantly. The forecast suggests that the key rate may rise to 17% in 2023. Eventually, the Kremlin will face a problem: either to continue hostilities in Ukraine, or to raise the economy, or to move to large-scale monetary emission, which will lead to an even greater increase in prices. The NWF has shrunk by almost a third, and this process continues. That is, without additional investment of foreign capital, the Russian Federation will not be able to raise the economy and conduct hostilities.

The subject of further research may be the study of the impact of mobilization on the economic processes of Russia.

Recommendations

The materials of the article are of practical value for analysts, economists and all those who study the Russian-Ukrainian war from the point of view of the economic component.

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