

# DGAP POLICY BRIEF

## Russia's War Economy

### How Sanctions Reduce Military Capacity



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Sanctions are a strong signal of Western resolve to oppose Russia's war against Ukraine and have significantly weakened its ability to wage war. But Russia is adapting, turning its economy into a war economy, ramping up military production, and adjusting to sanctions. This Policy Brief looks at Russia's economic adjustment with a focus on the shifting of resources to war purposes and the effect of sanctions on military production.

– Russia remains able to fund its military activities by heavily increasing its budget for these. Other spending items have been cut and the deficit has widened. Falling oil revenues make a substantially higher budget deficit likely.

– Russia's defense industry has stopped, reduced, or downgraded the manufacturing of several high-tech weapon systems as sanctions have limited its access to necessary technology.

– Russia has adapted military production to sanctions by relying on older systems or inferior domestic substitutes. It has also found ways of circumventing sanctions and its high-tech goods imports are increasing.

– Ukraine's allies need to maintain, tighten, and adjust sanctions to further weaken Russia's military and economic power as it adapts to them. Enforcement of export controls is key as is a lower oil price cap to reduce Russia's revenues.

Russia has been at war with Ukraine since 2014. Since the full invasion in February 2022, the intensity of the conflict has dramatically increased. Beyond the loss of human lives on both sides, the terror and war crimes against Ukraine, and the destruction of infrastructure in the country, the war and the resulting sanctions regime have had substantial consequences for Russia's economy and its defense sector. Russia has lost substantial amounts of weapons, ammunitions, and equipment in the fighting. In mid-December 2022, UK Defense Secretary Ben Wallace stated that Russia had lost 4,500 armored vehicles, 63 fixed-wing aircraft, 70 helicopters, 150 unmanned aerial vehicles, 12 naval vessels, and over 600 artillery systems.<sup>1</sup> Russia has at times fired as much as 20,000 artillery rounds per day, according to US officials.<sup>2</sup> Accordingly, it has had to devote a growing share of its economy to the defense industry. What is more, Russia is in great need of boosting its military production also to compensate the losses inflicted by Ukraine.<sup>3</sup>

Sanctions affect Russia's military capacities in multiple ways. First, they affect the economic base of the war by reducing Russian GDP. Second, sanctions target the defense sector more specifically. Finally, they also signal the unity of the sanctioning parties with effects on third countries. In the debate on the usefulness and effectiveness of sanctions, the possibility of an unending war is often used as a blanket argument for the ineffectiveness of the existing sanctions. However, the effect of sanctions on political behavior by autocrats is only one possible target for them and it is not the one that the West has stated as a sanctions goal. Instead, it has communicated that its sanctions aim to weaken Russia's economic, financial, and military capacities in the medium to long term. We have discussed elsewhere the effects of sanctions on Russia more broadly and highlighted that they are effective, even though the assess-

ment is difficult given the large number of sanctions and the simultaneous effects of the war itself.<sup>4</sup> Here we focus on how Russia has shifted to a war economy, how sanctions affect its military production, and how its defense industry has adapted to the sanctions.

## THE RUSSIAN ECONOMY

The International Monetary Fund estimates the Russian economy to have contracted by 2.2 percent in 2022; it also forecasts a growth rate of 0.3 percent for 2023 and of 2.1 percent for 2024.<sup>5</sup> This is substantially higher than its previous forecasts and those of other independent forecasters.

Since the beginning of the war, access to reliable data on Russia's economy has been severely limited, and the country's authorities have published embellished and highly selective economic data. It is therefore difficult to precisely assess the effects of the sanctions. One study published in July 2022 painted a negative picture of Russia's economic situation, finding that over 1,000 Western companies had announced they were leaving the country since the beginning of the invasion.<sup>6</sup> In the long term, such a large withdrawal would mean innovative capacity loss and brain drain. However, a more recent study showed that only about 8 percent of companies headquartered in EU and G7 countries had divested from Russia as of November 2022.<sup>7</sup> This indicates that Western companies are not fully aligned with the policy of Western governments in response to Russia's war.

According to official data, unemployment in Russia has declined since 2020. However, according to one study, hidden unemployment – including downtime, unpaid leave, and partial employment – hit a record

- 1 Jake Epstein, "The UK Defense Chief Read Out the Numbers on Russia's War Losses, and They're Bleak," *Business Insider* (December 2022): <https://www.businessinsider.com/uk-defense-chief-releases-numbers-putin-russia-war-losses-ukraine-2022-12> (accessed February 6, 2023). According to the General Staff of the Armed Forces of Ukraine, Russian losses are significantly higher. On February 3, 2023, it reported the destruction of more than 3,215 tanks, 6,388 armored vehicles, 2,215 artillery systems, 460 multiple launch rocket systems, 222 anti-aircraft warfare systems, 294 aircraft, 284 helicopters, 5,068 military auto vehicles and fuel tanks, 18 military boats, 1,952 tactical unmanned aerial vehicles, 202 pieces of special military equipment, and 796 cruise missiles: <https://war.ukraine.ua/news/41269/> (accessed February 6, 2023).
- 2 Natasha Bertrand, Oren Liebermann, and Alex Marquardt, "Russian Artillery Fire Down nearly 75%, US Officials Say, in Latest Sign of Struggles for Moscow," *CNN* (January 2023): <https://edition.cnn.com/2023/01/10/politics/russian-artillery-fire-down-75-percent-ukraine/index.html> (accessed February 6, 2023).
- 3 According to a recent report, Russia has by now lost around 1,500 or half of its tanks. Sinéad Baker, "Russia has Lost at Least 1,500 Tanks Since the Start of the Ukraine War, More Than Half of Its Invasion Force: Report", *Business Insider* (February 2023): <https://www.businessinsider.com/russia-lost-1500-tanks-likely-half-invasion-fleet-ukraine-report-2023-2> (accessed February 12, 2023).
- 4 András Rácz, Ole Spillner, and Guntram B. Wolff, "Why Sanctions Against Russia Work," *Intereconomics*, 58, no. 1 (2023), pp. 52-55.
- 5 International Monetary Fund (IMF), "World Economic Outlook Update: Inflation Peaking amid Low Growth," (January 2023), p. 6
- 6 Jeffrey Sonnenfeld, Steven Tian, Franek Sokolowski, Michal Wyrebkowski, and Mateusz Kasprowicz, "Business Retreats and Sanctions are Crippling the Russian Economy," *YALE Chief Executive Leadership Institute* (2022): <https://dx.doi.org/10.2139/ssrn.4167193> (accessed February 6, 2023).
- 7 Simon Evenett and Niccolò Pisani, "Less than Nine Percent of Western Firms Have Divested from Russia," *SSRN*, (2023): <http://dx.doi.org/10.2139/ssrn.4322502> (accessed February 6, 2023).

4.66 million in the third quarter of 2022.<sup>8</sup> The hidden unemployment rate would thus be well above 12 percent. More than 500,000 Russians are also estimated to have left the country in the first six months after the start of the full invasion, about 50 percent of whom have a high level of education or worked as skilled workers in the tech industry and other ones.<sup>9</sup>

The sanctions regime on Russia, led by the EU and the United States, covers financial assets payment systems, trade, technological products, and individuals, in particular oligarchs. Given the large number of sanctions and the fact that they came in parallel with the war, it is quite difficult to precisely assess their impact.

## The Russian economy contracted much less in 2022 than independent forecasts suggested.

Overall, the Russian economy contracted much less in 2022 than independent forecasts in the first half of the year suggested. This can be attributed to a number of important factors that dampened the impact of the war and of sanctions, and it should not be taken as evidence of the ineffectiveness of the sanctions.

**First**, the most important revenue source for Russian firms and the Russian state, the export of fossil fuels, has remained largely untouched by sanctions. In fact, despite a decline in production, Russia's oil and gas revenues substantially increased in 2022, with the country's official data showing that from January to October they amounted to 9,788 billion rubles (\$132 billion)<sup>10</sup> or 44 percent of total revenues, a 34 percent increase compared to the same period in 2021. Oil exports in 2022 surpassed those in 2021 and Russia redirected them to China, India, and other countries in anticipation of the sanctions announced in July 2022 for implementation in January 2023.<sup>11</sup> The West thus did not sanction the most important Russian revenue source in 2022. Since December 2022, however, a price cap is in place, and Russia's Urals oil currently trades at a \$31 or 35 percent discount compared to Brent, substantially reducing its revenues from redirected oil sales.

**Second**, the Russian government reacted to the recession by supporting companies and sectors that were hit particularly hard.

**Third**, Russia has managed to find ways of circumventing, mitigating, and avoiding sanctions and other restrictions. For example, it has relied on "grey imports" of sanctioned high technology via countries in Central Asia or Turkey, although these imports are more costly, with slower and less reliable delivery.<sup>12</sup> There is also evidence of circumvention of sanctions with illegal or deliberate actions within the EU.<sup>13</sup> On the whole, however, international cooperation on sanctions has remained relatively stable.

**Fourth**, Russia accumulated massive reserves of more than \$600 billion before the full-scale escalation in February 2022. More than \$330 billion of Russian state and oligarchic assets were held in the West

8 Anastasia Stognei, Max Seddon, and Daria Mosolova, "Black Box Economics: Russia's Internal Struggle Over Classified Financial Data," *Financial Times* (January 2023): <https://www.ft.com/content/42b53987-8280-469e-8014-9ddb0c98463b>

9 Sonnenfeld et al. (2022), p. 56.

10 Based on exchange rate on February 13, 2023.

11 Lionel Guetta-Jeanrenaud, Ben McWilliams, and Georg Zachmann, "Russian Crude Oil Tracker: Dataset," Bruegel (December 2022): <https://www.bruegel.org/dataset/russian-crude-oil-tracker> (accessed February 6, 2023); Sebastian Bienkowski, Pavel Elizarov, Maria Kausman, Natalya Lunde, Maxim Mironov, Elina Ribakova, Maria Telegina, Elizaveta Volkova, and Kathryn McConaughy with contributions by Samuel Bendett, Kevin DelliColli, Oleg Itskhoki, and Sergey Aleksashenko, "Effectiveness of U.S. Sanctions Targeting Russian Companies and Individuals," Free Russia Foundation (January 2023): <https://www.4freerussia.org/wp-content/uploads/sites/3/2023/01/frf-sanctions-web.pdf> (accessed February 6, 2023).

12 Steve Stecklow, David Gauthier-Villars, and Maurice Tamman, "The Supply Chain that Keeps Tech Flowing to Russia: A Reuters Special Report," *Reuters* (December 2022): <https://www.reuters.com/investigates/special-report/ukraine-crisis-russia-tech-middlemen/> (accessed February 6, 2023); Polina Ivanova and Max Seddon, "Russia's Wartime Economy: Learning to Live Without Imports," *Financial Times* (December 2022): <https://www.ft.com/content/6c01e84b-5333-4024-aaf1-521cf1207eb4> (accessed February 6, 2023); Bienkowski et al., "Effectiveness of U.S. Sanctions Targeting Russian Companies and Individuals".

13 Sharyn Alfonsi, "Cyprus: Searching for the Money of Russian Oligarchs," *CBS NEWS* (January 2023): <https://www.cbsnews.com/news/cyprus-russia-money-60-minutes-2023-01-15/> (accessed February 6, 2023); Bienkowski et al., "Effectiveness of U.S. Sanctions Targeting Russian Companies and Individuals".

and got frozen after the invasion. Nevertheless, the remaining reserves have provided the Russian economy with a substantial financial cushion so far.<sup>14</sup>

## THE WAR ECONOMY

Wars are expensive. While official Russian data on spending on the war is classified, military expenditures in 2022 are estimated to have exceeded 5 percent of GDP, the largest share of GDP since the end of the Soviet Union. Military spending could thus have amounted to around \$90 billion last year.<sup>15</sup>

Russia increasingly organizes its budget to serve its war machinery. Classified spending reportedly has increased by more than 40 percent to \$95 billion compared with a prewar planning goal of \$54 billion.<sup>16</sup> Publicly available official data shows that spending on defense and law enforcement was 2.7 trillion rubles (\$36.6 billion) from January to October 2022. In September 2022, the estimate for the 2022 defense budget was adjusted to 4.7 trillion rubles (\$63.7 billion), a change that might not be the last.<sup>17</sup> Prime Minister Mikhail Mishustin said after the 2023 budget consultation in September: "The head of state ordered us to take measures to meet the needs of our armed forces and military formations."<sup>18</sup> Compared to the 2021 draft, the 2023 defense budget was increased by more than 40 percent to \$84 billion.<sup>19</sup> Compared to the 2022 budget, the share of the military and security services will grow from 24 percent of spending to almost 33 percent, at the cost of other expenditures.

Spending for internal security and law enforcement is also being increased. Expenditure on national defense, internal security, and law enforcement for

2023-2025 will average 5.7 percent of GDP per year, according to the Ministry of Finance.<sup>20</sup> Moreover, the Kremlin has further reduced the powers of local and regional governments and burdened the budgets of regions with purchasing military equipment, a process closely linked with the ongoing mobilization. At the same time, government agencies outside the defense and security sectors have been tasked with reducing their spending by 10 percent to limit debt-servicing costs and inflation pressures.<sup>21</sup>

Russia had a budget deficit of around 2.3 percent (\$48 billion) in 2022 compared to an originally planned surplus of 1 percent. This deficit was financed through various channels. First, the previous budget surplus was completely used up. Second, the National Welfare Fund was used to finance parts of the deficit. Third, oil and gas revenues were no longer placed in the National Welfare Fund but directly spent. The budgets of regions also had deficits.<sup>22</sup>

The 2023 budget law calculates a 20 percent drop in fossil fuel revenues, inflation of 5 percent, and a 1 percent reduction of GDP.<sup>23</sup> This forecast seems overly optimistic because it assumes an unlikely average oil price of \$70 per barrel (Urals oil was trading at below \$50 in January 2023), and a reduced level of military mobilization, and thus a lower reduction the labor market. Therefore, Russia's GDP performance could be worse than what the authorities forecast.<sup>24</sup> Currently, the Ministry of Finance expects a budget deficit of 2 percent of GDP for 2023.<sup>25</sup> The January 2023 deficit of \$23 billion indicates that the yearly deficit could be substantially higher than forecast. Expenditure in January was 58 percent higher than in January 2022 and revenues were substantially lower due to the oil price cap and the Western im-

14 DFA, "Allies Freeze \$330 bn of Russian Assets Since Ukraine Invasion: Task Force," France24 (June 2022): <https://www.france24.com/en/live-news/20220629-allies-freeze-330-bn-of-russian-assets-since-ukraine-invasion-task-force> (accessed February 10, 2023).

15 Pavel Luzin, "Russia's Skyrocketing Defense Spending, 2022-2023," Eurasia Daily Monitor, 19, no. 148 (2022): <https://jamestown.org/program/russias-skyrocketing-defense-spending-2022-2023/> (accessed February 6, 2023).

16 Stognei et al., "Black Box Economics."

17 Inna Sidorkova and Anastasia Boyko, "Расходы на национальную оборону в этом году вырастут на треть" [National defense spending to rise by a third this year], Vedomosti (September 2022): <https://www.vedomosti.ru/economics/articles/2022/09/23/942188-rashodi-na-natsionalnuyu-oboronu> (accessed February 6, 2023).

18 Russian Government, "Заседание Правительства" [Governmental Meeting] (September 2022): <http://government.ru/news/46579/> (accessed February 6, 2022).

19 VOA News, "Russia Reportedly Raises \$13 Billion for 2023 Defense Spending," VOA News (November 2022): <https://www.voanews.com/a/russia-raises-13-billion-for-2023-defense-spending/6841435.html> (accessed February 6, 2023).

20 Inna Sidorkova and Anastasia Boyko, "Расходы на национальную оборону в этом году вырастут на треть" [National Defense Spending to Rise by a Third This Year].

21 Boris Grozovski, "Putin's War Costs: Shifting the Burden to the Population," Wilson Center (January 2023): <https://www.wilsoncenter.org/blog-post/putins-war-costs-shifting-burden-population> (accessed February 6, 2023).

22 Ibid. Furthermore, also individuals were affected; for example, billionaires' assets have decrease by about \$94 billion since the start of the invasion.

23 Iwona Wiśniewska, "Russia's 'War' Budget for 2023-2025," Ośrodek Studiów Wschodnich (OSW) (December 2022): <https://www.osw.waw.pl/en/publikacje/analyses/2022-12-12/russias-war-budget-2023-2025> (accessed February 6, 2023).

24 Boris Grozovski, "Putin's War Costs."

25 Benjamin Harvey, "Russia's Budget Gap Surges to Record as War Hits Finances," Bloomberg (January 2023): <https://www.bloomberg.com/news/articles/2023-01-10/russia-s-budget-gap-surges-to-record-as-war-hits-finances?leadSource=verify%20wall> (accessed February 6, 2023).

port stop.<sup>26</sup> It seems likely that the budget deficit will be financed by domestic borrowing. The liquid part of the National Welfare Fund will be used to finance some of the deficit. However, the fund is expected to run out of money in three to four years.<sup>27</sup> Furthermore, large parts of it remain frozen in Western central bank accounts. In addition, the Central Bank is indirectly printing money, with the government issuing bonds to be bought by state-owned banks that the Central Bank funds.<sup>28</sup>

On the whole Russia remains able to fund its military activities in the short term through refocusing its budget on military activities. However, the current way of financing the war effort comes at a significant cost to other spending items and affects Russia's population.

Russia's military spending is less of a burden on its population than is the case for Ukraine, whose military spending is estimated to be around \$30 billion in 2023 or 43 percent of expenditure.<sup>29</sup> Western military support thus remains central to ensure Ukraine has comparable or stronger military resources to Russia. And budget support to Ukraine is of the essence as its deficit is huge after the collapse of its economy.

## EXPORT RESTRICTIONS

Export restrictions and sanctions cause production losses due to a lack of materials, inputs, and technology.<sup>30</sup> According to the official data of its main trading partners, Russia's imports decreased by up to 50 percent in the first half of 2022. The restrictions and sanctions did not only affect sanctioning countries (-60 percent in exports to Russia) but also non-sanctioning ones (-40 percent).<sup>31</sup> Many countries are reluctant to undermine the restrictions on trade with Russia and to risk suffering the consequences in their far more important Western markets.

The crucial question for Russia is whether it will be able to make up for the lack of imports from sanctioning countries in the medium term. Eight of the ten largest economies in the world have joined the sanctions regime, with China and India the important exceptions. In the first months after the full invasion, except in a few cases, Russia's attempts to make

*The majority of the high-tech components that Russia uses in its advanced military equipment come from US-based leading microelectronics companies.*

up for its import shortfalls mostly failed. Even imports from China fell by an average of almost 15 percent from March to June 2022 compared to the same months of the previous year.<sup>32</sup> Imports from India fell by 22.7 percent in the first half of 2022 compared to the same period in the previous year.<sup>33</sup>

26 DPA, "Moskau verkauft Gold zur Deckung von Haushaltslücken," [Moscow Sells Gold to Cover Budget Gap], SPIEGEL (February 2023): <https://www.spiegel.de/ausland/russland-ukraine-krieg-moskau-verkauft-gold-zur-deckung-von-haushaltsluecke-a-b499514c-2617-48b6-b06d-ca392e80255c?dicho=v2-edena70> (accessed February 6, 2023).

27 Boris Grozovski, "Putin's War Costs."

28 Iwona Wiśniewska, "Russia's 'War' Budget for 2023-2025."

29 Andrzej Wilk and Piotr Zochowski, "43% of Ukraine's defence budget. 253rd day of the war", Ośrodek Studiów Wschodnich (OSW) (November 2022): <https://www.oswwaw.pl/en/publikacje/analyses/2022-11-04/43-ukraines-defence-budget-253rd-day-war#:~:text=It%20provides%20for%2043%25%20of,%2C%20for%20security%20and%20defence> (accessed February 6, 2023)

30 Rácz et al. (2023).

31 Martin Chorzempa, "Export Controls Against Russia are Working – with the Help of China," PIIE Realtime Economics Blog (June 2022): <https://www.piie.com/blogs/realtime-economic-issues-watch/export-controls-against-russia-are-working-help-china> (accessed February 6, 2023).

32 General Administration of Customs People's Republic of China, "China's Total Export & Import Values by Country/Region (in USD)," (2022): <http://english.customs.gov.cn/statics/report/preliminary.html> (accessed February 6, 2023).

33 Indian Ministry of Commerce and Industry, "System on India's Monthly Trade (Harmonized Classification of Commodities)" (2022): <https://tradestat.commerce.gov.in/meidb/entq.asp?ie=e> (accessed February 6, 2023).

However, this did not last. Since July 2022, Russia's imports from China have been rising sharply again; for example, they increased by 26.48 percent in August 2022 compared to the previous August. Eventually, imports from China in 2022 exceeded those in the previous year by 12.8 percent.<sup>34</sup> Overall, China became Russia's most important trading partner in 2022.<sup>35</sup> Imports from India remain smaller than in the previous year – -5.28 percent in November 2022 compared to November 2021 – but the size of the fall is decreasing.<sup>36</sup>

The EU's sanctions regime foresees export restrictions particularly in the technology realm as these are expected to hurt the Russian economy the most. Cutting-edge technology (quantum computers, advanced semiconductors, high-end electronics and software); technology needed for oil refining; aviation and space industry technology; radio communication technology; and any kind of dual-use technology cannot be exported from the EU to Russia.<sup>37</sup> The United States, the United Kingdom, and countries allied to the West have imposed similar export restrictions. The majority of the high-tech components that Russia uses in its advanced military equipment come from US-based leading microelectronics companies. The United States has introduced an export-control mechanism against Russia, the Foreign Direct Product Rule, that bans exports of a range of US tech products designed or manufactured anywhere in the world using US software and equipment.

Some Asian countries are important suppliers of technology goods for Russia in various product categories. China is an important source of consumer electronics, Japan of passenger cars and car parts, South Korea of shipping industry products, Taiwan of products using semiconductors, and ASEAN countries of electrical equipment. However, Japan, South Korea, Taiwan, and Singapore participate to some extent in the sanctions regime and have substantially reduced the availability of certain technology products in Russia. Non-sanctioning East Asian countries

have not yet stepped up to provide Russia with technology affected by sanctions.<sup>38</sup>

Over time, supply chains have been adapted to keep tech flowing to Russia.<sup>39</sup> Numerous ways have been used to create new companies and new intermediaries to export high technology sanctioned by the EU and the United States to Russia via third countries such as Turkey. At least \$457 million's worth of Intel products reportedly arrived in Russia between April and October 2022, showing that the adaptation is ongoing and growing, and suggesting that export restrictions are becoming less binding.<sup>40</sup>

A recent analysis of Russia's customs data indicated that the country has managed to procure important and sanctioned high-tech goods from China.<sup>41</sup> It also shows that the import volumes increased substantially in the course of 2022, confirming the reports of Russia increasingly adjusting to the sanctions.

Overall, export restrictions, especially those affecting high-tech products with dual-use capacities, have weakened Russia's economic base. By preventing or reducing access to critical technologies, sanctions have had an impact on its war economy. Their consequences for Russia's industrial base and war-fighting capability can be observed particularly well in the vehicle and weapons industries. Nevertheless, over time Russia will find more ways of adapting to and avoiding sanctions. The following sections show where the sanctions regime has undermined Russia's military sector and how adaptation is gradually allowing the country to increase its weapon production.

## EFFECTS OF EXPORT RESTRICTIONS AND SANCTIONS ON RUSSIA'S MILITARY CAPABILITIES

The mix of sanctions in the technology sector and of the withdrawal of Western high-tech companies

34 General Administration of Customs People's Republic of China (2022).

35 Bienkowski et al, "Effectiveness of U.S. Sanctions Targeting Russian Companies and Individuals."

36 Indian Ministry of Commerce and Industry (2022).

37 Council of the European Union, "EU Sanctions Against Russia Explained," (2023): <https://www.consilium.europa.eu/en/policies/sanctions/restrictive-measures-against-russia-over-ukraine/sanctions-against-russia-explained/> (accessed February 6, 2023).

38 Aino Röyskö and Heli Simola, "Russia's Technology Imports from East Asia," Bank of Finland Institute for Emerging Economies, BOFT Policy Brief No. 6/2022 (November 2022): <http://hdl.handle.net/10419/266194> (accessed February 6, 2022).

39 Stecklow et al., "The Supply Chain that Keeps Tech Flowing to Russia."

40 A recent report states that Gulf countries also play a role in sanctions evasion. See The Soufan Center, "IntelBrief: Russia Using the United Arab Emirates as a Sanctions Evasion Hub," The Soufan Center (January 2023): <https://thesoufancenter.org/intelbrief-2023-january-12/> (accessed February 6, 2023).

41 Ian Talley and Anthony DeBarros, "China Aids Russia's War in Ukraine, Trade Data Shows," Wall Street Journal (February 2023): <https://www.wsj.com/articles/china-aids-russias-war-in-ukraine-trade-data-shows-11675466360> (accessed February 6, 2023).

has had an impact on the Russian armed forces. Russia is currently hardly able to replace losses of weapons systems with newly produced ones. On a more structural level, the sanctions implemented in 2014 have weakened the Russian armed forces.<sup>42</sup>

Without the sanctions imposed in 2014, the course of Russia's war against Ukraine would have been different. This can be illustrated by three examples. First, a 2011 contract for Russia to purchase four French Mistral-class helicopter-carrying attack ships was cancelled in 2014. Defending the port of Odesa would have been much more difficult for the Ukrainian armed forces in 2022 had Russia received these ships. Second, Western export restrictions on technology have significantly slowed the development and production of the 4+ generation Sukhoi Su-57 stealth fighters, which are far superior to any Ukrainian aircraft. According to pre-2014 plans, the Russian Air Force aimed to have more than 60 of these jets by 2022.<sup>43</sup> However, sanctions have delayed production so much that in February 2022, it had only five serial-produced SU-57s, which could not even be deployed for combat missions. Third, the long-planned, fifth-generation PAK DA bomber has not yet been completed, despite pre-2014 plans to have it up flying by the late 2010s.<sup>44</sup>

Since February 2022, sanctions related to military and dual-use products have been significantly tightened. Despite repeated claims of self-sufficiency, the Russian defense industry remains heavily dependent on parts and components imported from the West. The T-72 tanks use French-made Thales thermal cameras and Japanese optics, which are no longer available.<sup>45</sup> The production of several modern air defense weapons (such as the 9K37 Buk and the 9K22 Tunguzka) had to be stopped due to the lack of German-made electronics.<sup>46</sup> The production of Kh-101 cruise missiles also suffers as Dutch, Swiss, Taiwanese, and US components are no longer avail-

able.<sup>47</sup> Russia's most advanced satellite-guided 300-mm Tornado missiles use US-made gyroscopes. And there are other examples. Although its inventories were vast, Russia has few modern cruise missiles left. Its capabilities to conduct precision strikes are thus severely weakened as a result of the sanctions.

The production of military vehicles has also suffered greatly. The truck manufacturer KAMAZ had to stop the production of all its modern military-use platforms because the necessary Bosch fuel injectors produced in Germany are no longer available.<sup>48</sup> This affects the wheeled platforms of several Russian weapons, such as the Pantsir air defense system, as well as heavy military trailers, supply trucks, and many special vehicles.

The withdrawal of many Western high-tech companies has thus delivered a major, so far largely irreparable, blow to the Russian defense industry. Since February 2022, Russia has had to rely only on those Western-made parts and components that it had stockpiled, but these stocks are limited and depleting. And import substitutes cannot fully replace pre-2022 shipments.

## ADAPTATION MEASURES BY THE DEFENSE INDUSTRY

The Russian defense industry has so far demonstrated a remarkable adaptability to the post-February 2022 sanctions regime by employing various means of damage control.

**First**, Russia has developed several ways to circumvent the high-tech sanctions by receiving imports via countries that did not join the sanctions regime, such as China, Kazakhstan, and Turkey. This enables it to acquire microchips, semiconductors, and other high-tech components, albeit not in the prewar

42 Rácz et al. (2023).

43 Sputnik News, "Russian Air Force to Buy over 60 Fifth-Generation Fighters," Sputnik News (July 2010): <https://sputniknews.com/20100713/159797767.html> (accessed February 6, 2023).

44 Anton Lavrov, Roman Kretcul, and Alexey Ramm, "ПАКетное соглашение: новейшему бомбардировщику назначили сроки выхода в серию" [PACKAGE Agreement: The Latest Bomber was Given a Release Date for the Series], IZ (January 2020): <https://iz.ru/963694/anton-lavrov-roman-kretcul-aleksei-ramm/paketnoe-soglasenie-noveishemu-bombardirovshchiku-naznachili-sroki-vykhoda-v-seriiu> (accessed February 6, 2023).

45 Disclose, "War in Ukraine: How France Delivered Weapons to Russia until 2020," Disclose (March 2022): <https://disclose.ngo/en/article/war-in-ukraine-how-france-delivered-weapons-to-russia-until-2020> (accessed February 6, 2023).

46 Elise Vincent, "Russian Military Aviation Weakened by Sanctions," Le Monde (July 2022): [https://www.lemonde.fr/en/international/article/2022/07/26/russian-military-aviation-weakened-by-sanctions\\_5991437\\_4.html](https://www.lemonde.fr/en/international/article/2022/07/26/russian-military-aviation-weakened-by-sanctions_5991437_4.html) (accessed February 6, 2023).

47 James Byrne, Gary Somerville, Joe Byrne, Jack Watling, Nick Reynolds, and James Baker, "Silicon Lifeline: Western Electronics at the Heart of Russia's War Machine," Royal United Services Institute (RUSI) (August 2022): <https://rusi.org/explore-our-research/publications/special-resources/silicon-lifeline-western-electronics-heart-russias-war-machine> (accessed February 6, 2023).

48 TopWar, "Санкции за Украину и наше производство грузовиков," [Sanctions for Ukraine and Our Truck Production], TopWar (March 2022): <https://topwar.ru/193696-sankcii-za-ukrainu-i-nashe-proizvodstvo-gruzovikov.html#> (accessed February 6, 2023).

amounts and variety, and with substantial additional costs and delays.

**Second**, prewar stockpiles have probably not yet run out, though this is hard to exactly fathom from open sources. However, it is clear that, despite the sanctions, Russia is still able to produce some of its high-tech precision weapons. One investigation revealed that in November Russia fired at Kyiv Kh-101 cruise missiles that had been manufactured in September-October 2022, months after the sanctions came into force.<sup>49</sup> Whether these missiles were built with freshly imported parts or prewar stockpiles could not be established. However, this example demonstrates that the sanctions have not ended Russia's ability to manufacture high-tech precision weapons.

Meanwhile, the number of modern and cruise missiles Russia uses against Ukraine is decreasing with every attack. Hence, despite its partially sustained manufacturing, Russia is apparently gradually running out of modern missiles. Its use of air defense missiles and even anti-ship missiles against ground targets points to the same conclusion. As these older weapons are not designed for precision strikes, the results are sometimes particularly catastrophic. For example, on January 14, 2023 Russia fired a Soviet-era Kh-22 anti-ship missile – a notoriously inaccurate weapon – against the city of Dnipro, where it hit a residential building and killed dozens of civilians.<sup>50</sup>

**Third**, Russia has imported weapons and components from countries that have not joined the sanctions regime. It imports attack drones from Iran, tanks and armored vehicles from Belarus, and huge amounts of artillery ammunition from North Korea. Somewhat ironically, Iranian drones use many Western components, such as engines, gyroscopes, and sensors.<sup>51</sup> Hence, Russia's reliance on these weapons is also an indirect way of circumventing the sanctions and get access to the Western technology built into them.

**Fourth**, Russia redesigns its weapon systems to decrease their dependence on Western technology, using domestically manufactured parts instead. The defense industrial sector has been using such import substitution at least since 2012, when Sergei Shoigu became minister of defense and ordered decreasing reliance on Western technologies. Hence, the sector has more than a decade of experience in import substitution. Experience, however, does not mean that Russia will be fully successful in replacing Western components with domestic ones. As of 2019, it aimed to substitute Western technology in 826 weapon systems – but only by 2025.<sup>52</sup> What is more, substituting with domestic products decreases the military capability of the weapons.

**Fifth**, Russia has “de-conserved” and modernized Soviet-era weapon systems that did not rely on Western technologies at all. The best example is the decision in the summer of 2022 to modernize 800 old T-62 tanks within three years. This involves adding reactive armor, protective fencing, and somewhat improved sensors to them.<sup>53</sup> A similar modernization project concerns BRDM-2 amphibious armored reconnaissance cars.<sup>54</sup> Their thin armor and outdated design make them extremely vulnerable on the modern battlefield; nevertheless, Russia's 103rd Armor Repair Plant in Chita is equipping them with a new engine, thermal sight, and additional armor ahead of deploying them to Ukraine. The modernization of such outdated weapons is another indicator of the hardship Russia's defense industry is suffering in manufacturing modern ones. Had it been able to produce modern tanks in sufficient numbers, it is highly unlikely that it would rely on modernizing six-decades-old T-62 tanks.

**Sixth**, the move towards a war economy has allowed Russia to significantly increase the speed of production as a result of increased demand and more resources for the sector. As of January 2023, several Russian arms plants were working in three shifts, six or seven days a week, and offering competitive sal-

49 Conflict Armament Research, “Dating Newly Produced Russian Missiles Used in Kyiv Attacks,” Conflict Armament Research (December 2022): <https://storymaps.arcgis.com/stories/81bc6b71fdc64361a05a21020c3d6d5e> (accessed February 6, 2023).

50 Tim Lister, Fred Pleitgen, and Svitlana Vlasova, “The Closer I Got, the More it Looked Like Hell: Dnipro Reels from Deadly Russian Missile Strike,” CNN (January 2023): <https://edition.cnn.com/2023/01/15/europe/dnipro-ukraine-war-russian-missile-strike-intl/index.html> (accessed February 6, 2023).

51 Conflict Armament Research, “Dissecting Iranian Drones Employed by Russia in Ukraine,” Conflict Armament Research (December 2022): <https://storymaps.arcgis.com/stories/7a394153c87947d8a602c3927609f572> (accessed February 6, 2023).

52 TopWar, “Импортозамещение в российском ВПК. Результаты,” [Import Substitution in the Russian Military-Industrial Complex: Results], TopWar (October 2019): <https://topwar.ru/163525-imperto-zameshenie-v-rossijskom-vpk.html> (accessed February 6, 2023).

53 TopWar, “Russia to Receive 800 Modernized T-62s – an Act of Desperation or a Serious Combat Unit,” TopWar [October 2022]: <https://en.topwar.ru/203438-t-62.html> (accessed February 6, 2023).

54 VPK, “There Was a Restructuring of the Enterprise: Modernization of T-62M and BRDM-2 Vehicles in Chita Switched to Military Rails,” VPK (January 2023): [https://vpk.name/en/678359\\_there-was-a-restructuring-of-the-enterprise-modernization-of-t-62m-and-brdm-2-vehicles-in-chita-switched-to-military-rails.html](https://vpk.name/en/678359_there-was-a-restructuring-of-the-enterprise-modernization-of-t-62m-and-brdm-2-vehicles-in-chita-switched-to-military-rails.html) (accessed February 6, 2023).



aries. Hence, they can increase production of those weapon systems that Russia is still able to manufacture despite the sanctions. This does not help the problem of technological degradation but it helps addressing battlefield losses.

**Finally**, one needs to add that the sanctions do not affect the entirety of Russia's defense industry. The country has long achieved full autarchy in the manufacturing of nuclear weapons, intercontinental ballistic missiles, and submarines, including nuclear-powered ones. Hence, while several branches of the conventional arms industry are suffering from the sanctions, the bulk of Russia's nuclear arsenal remains unaffected.

## RECOMMENDATIONS

Sanctions against Russia are not a substitute to continued weapons deliveries to Ukraine, which needs them to withstand Russian attacks. Sanctions are complementary to such deliveries and export controls can have a meaningful effect on Russia's war economy; therefore, the sanctions also support Ukraine.

Russia's economy has been able to withstand sanctions and the decline in its GDP has been less severe than forecast, in part due to strong revenues from the non-sanctioned fossil-fuel exports, especially oil, during 2022. In 2023, the EU import stop and in particular the price cap have ensured a significant constraint on Russian oil revenues. A gradual lowering of the price cap could help further reduce Russian government revenues.

As detailed above, sanctions limiting exports, in particular of high-tech goods, to Russia have had impacted its capacity to produce military goods.

The longer the war lasts, the more Russia will find ways of adjusting its economy. It has changed its economic and budget priorities towards funding the war effort while other spending has been cut. Emerging evidence confirms that Russia is increasingly able to get around constraints from the sanctioning regime.

In a cat-and-mouse game, the sanctioning coalition needs to focus on adjusting and tightening the

sanctions regime. Loopholes must be closed and enforcement must be strengthened. The key players – the EU, the United Kingdom, and the United States – need to work together and use their influence on countries through which Russia can currently circumvent or avoid sanctions. The United States has, for example, already increased its pressure on Turkey to address the problem.

Russia procures weapons from a variety of countries such as Iran and North Korea. The enforcement of existing sanctions on these countries – for example, sanctions that should prevent the presence of Western technology in Iranian drones – could play a growing role in constraining Russia.

*The longer the war lasts, the more Russia will find ways of adjusting its economy.*

EU sanctions are decided by unanimous vote of the member states. But their implementation and enforcement are solely the responsibility of the member states individually, with very little room for the EU institutions to control or influence enforcement. It will be hard to achieve treaty change to give the EU institutions more competences in this regard.<sup>55</sup> Thus, a name-and-shame strategy seems the most promising way to encourage strict sanction enforcement within the current framework.

The EU member states have different institutions and agencies responsible for the enforcement of sanctions. They also categorize breaches differently: partly as criminal offenses, partly as administrative offenses. Differing understandings of breaches of the sanctions regime makes cooperation against circumvention difficult. The European Commission's proposal to harmonize criminal offenses and penal-

55 Kim B. Olsen and Simon F. Kjeldsen, "Strict and Uniform: Improving EU Sanctions Enforcement," Deutsche Gesellschaft für Auswärtige Politik, DGAP Policy Briefs No. 29 (September 2022).

ties for the violation of EU restrictive measures is an important measure to streamline enforcement. This would make it easier to investigate, prosecute, and punish violations of restrictive measures alike in all member states. It must be a priority to conclude the ordinary legislative procedure process as fast as possible to put this proposal into effect.

Encouraging more countries to align themselves with the sanctions regime and to enforce it is even more difficult but important. Armenia and Kazakhstan in particular are reportedly hubs for grey imports into Russia.<sup>56</sup> It is argued that third countries follow EU sanctions regimes only as long as their foreign policy interests are not affected.<sup>57</sup> A carrot-and-stick approach could be useful in convincing these two countries to step up their efforts to stop high technology flowing to Russia.

A further important avenue is enforcement via US tech companies. Such companies stopped exports to Armenia and Kazakhstan after they noticed an unusual increase in orders for microchips from both countries.<sup>58</sup>

To further weaken Russia's economy and thereby the base of its war effort, the West should consider further sanctions, in particular against the country's access to the international financial system. As long as its oil revenues are substantial and the financial system enables it to spend them, Russia can find ways of using its petrodollars to buy those goods that are most needed to keep up its economic activities.

Finally, the lack of willingness by Western companies to divest from Russia means that it can still count on their know-how and expertise. While new Russian owners would take over the assets of departing Western firms in the country and continue to operate them, the breakdown in supply chains and the departure of managers should in principle limit the productivity of these assets. More pressure on Western firms as well as clear rules should limit Russia's economic capacities.

## CONCLUSIONS

The EU is achieving a large part of its goals with its sanctions. Russia's economy has suffered damage and the sanctions have had an impact on the capabilities of its armed forces. However, Russia remains able to fund its military activities, having refocused its budget on them, even if this comes at significant cost to other spending items.

Russia's defense industry has had to either stop or downgrade the manufacturing of several high-tech weapon systems. Not all production lines have come to a halt, as demonstrated by the example of the Kh-101 cruise missile. However, production has decreased even in the modern systems that Russia is still able to manufacture, as indicated by the several measures taken to address apparent shortages.

Meanwhile, Russia still has large stockpiles of Soviet-era weapon systems. Reactivating these and, following some modernization, deploying them to Ukraine enables the Russian army to strengthen its defenses in Ukraine, which allows it concentrate its remaining modern weaponry for offensive operations.

All in all, sanctions are causing a technological degradation of Russia's conventional armed forces. However, there is not any collapse visible in any sectors of the defense industry. By accepting losses in technological level and production numbers, Russia will be able to keep its defense industry operational and provide its armed forces with the minimum necessary supplies for a considerable while more. Hence, sanctions are weakening Russia's military machine but they are not going to stop it.

Considering Russia's various adaptation measures, it is important not only to keep the sanctions but also to strengthen them where possible. Overall, sanctions are still an effective tool in reducing the military capabilities of Russia.

56 Polina Ivanova and Max Seddon, "Russia's Wartime Economy: Learning to Live Without Imports," *Financial Times* (December 2022): <https://www.ft.com/content/6c01e84b-5333-4024-aaf1-521cf1207eb4> (accessed February 6, 2023).

57 Elin Hellquist, "Either With Us or Against Us? Third-Country Alignment with EU Sanctions Against Russia/Ukraine," *Cambridge Review of International Affairs*, 29, no. 3 (2016), pp. 997-1021.

58 Polina Ivanova and Max Seddon, "Russia's Wartime Economy: Learning to Live Without Imports," *Financial Times* (December 2022): <https://www.ft.com/content/6c01e84b-5333-4024-aaf1-521cf1207eb4> (accessed February 6, 2023).



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