

# **Export Controls: A Key G-7 Tool to Halt Russia's War**

## **Working Group Paper #20**

**June 12, 2024**

<https://fsi.stanford.edu/working-group-sanctions>

The International Working Group on Russian Sanctions aims to provide expertise and experience to governments and companies around the world by assisting with the formulation of sanctions proposals that will increase the cost to Russia of invading Ukraine and that will support democratic Ukraine in the defense of its territorial integrity and national sovereignty. Our working group is comprised of independent experts from many countries. We coordinate and consult with the Government of Ukraine and those governments imposing sanctions. This consultation process helps to inform our views, but our members express independently held opinions and do not take direction from or act at the behest of the Government of Ukraine or any other government, person, or entity. All members of this working group participate in their individual capacity.

*Export controls, which deny Russia access to critical inputs for weapon production, are crucial in halting the war. Extensive export controls have been implemented and are impacting Russia's military-industrial complex, yet they face the challenge of inadequate enforcement capacity. Ukrainian authorities are providing unparalleled insights into Russia's military by publicizing numerous weapon units' components. Additionally, researchers have demonstrated how Russia circumvents sanctions through evasion networks. Recent measures by the U.S. to involve financial institutions in disrupting these networks are an important step to curb these activities. We propose further measures such as enhancing the resources of government institutions, strengthening corporate enforcement, addressing the involvement of third countries, and implementing new strategies to identify chokepoints in the Russian military-industrial complex.*

The 2022 Russian full-scale invasion of Ukraine is the most significant global economic and security crisis since World War II, with Europe facing its worst hostilities since 1945 and raising concerns worldwide. Over 800 days into Russia's unprovoked full-scale war, the war of attrition has become essential aspect of the conflict.<sup>1</sup> Significant sanctions have already been imposed on Russia and have had an impact on Russia's ability to produce weapons to make up for those lost on the battlefield, yet Russia has found workarounds. In our recent paper, we proposed additional measures to curb Russia's ability to wage war on Ukraine.<sup>2</sup> Export controls—depriving Russia of access to critical inputs for its military production—are among the most important measures to stop the war.<sup>3</sup>

In an unprecedented multilateral action, over 50 countries have imposed sanctions<sup>4</sup> on Russia, including export controls<sup>5</sup>, shortly after the February 2022 invasion. Over the past two

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<sup>1</sup> [Policy Insight 131: Russian economy on war footing: A new reality financed by commodity exports](#), Center for Economic Policy Research, May 2024.

<sup>2</sup> [Action Plan 3.0: Strengthening Sanctions Against the Russian Federation](#), Working Group Paper #19, May 2024.

<sup>3</sup> [Challenges of Export Controls Enforcement How Russia Continues to Import Components for Its Military Production](#), Working Group Paper #16, January 2023.

<sup>4</sup> We use the term sanctions to include the whole range of measures of economic statecraft, including export controls and financial sanctions.

<sup>5</sup> The following jurisdictions have imposed export controls on Russia: Australia, Canada, European Union, Japan, New Zealand, Norway, South Korea, Switzerland, Singapore, Taiwan, United Kingdom and the United States.

years, coalition nations have harmonized their export control regimes and bolstered enforcement efforts. Sanctions coordinators from the US, EU, UK, and other nations have undertaken numerous joint trips to third countries, including China, Kazakhstan, Turkey, and the UAE, to curb circumvention. Despite these efforts, Russia persists in acquiring access to critical Western components and expanding its military production capabilities.

### ***Western components in Russia's weaponry***

Russia's military-industrial complex critically depends on components from the West. In 2023, Ukrainian authorities established and provided policymakers and researchers with a unique resource, offering unparalleled insights into Russia's military: [Components in the Aggressor's Weapon](#) (Figure 1), soon to be followed by [Instruments of War](#) (foreign equipment used by the aggressor in the production of weapons). The authorities have identified 3,175 components in 100 distinct weapon units (as of June 2024). For example, a [Shahed-238 UAV](#) contains electronic components from countries such as the US, Switzerland, Canada, Netherlands, Germany, China, and Taiwan. These findings confirm Russia's own research that its military is 70-90 percent dependent on Western-made components.

In its recent attacks on the Ukrainian energy system, Russia has deployed new types of weapons, specifically the Kh-69 and Zircon missiles. This indicates that Russia not only continues to produce weapons in its existing arsenal, but is also capable of developing new weaponry. While detailed information about the microelectronics of the Kh-69 is scarce, public sources<sup>6</sup> reveal that it features an updated navigation system (DSMAC type, using GPS/Glonass), which is likely produced with Western components.

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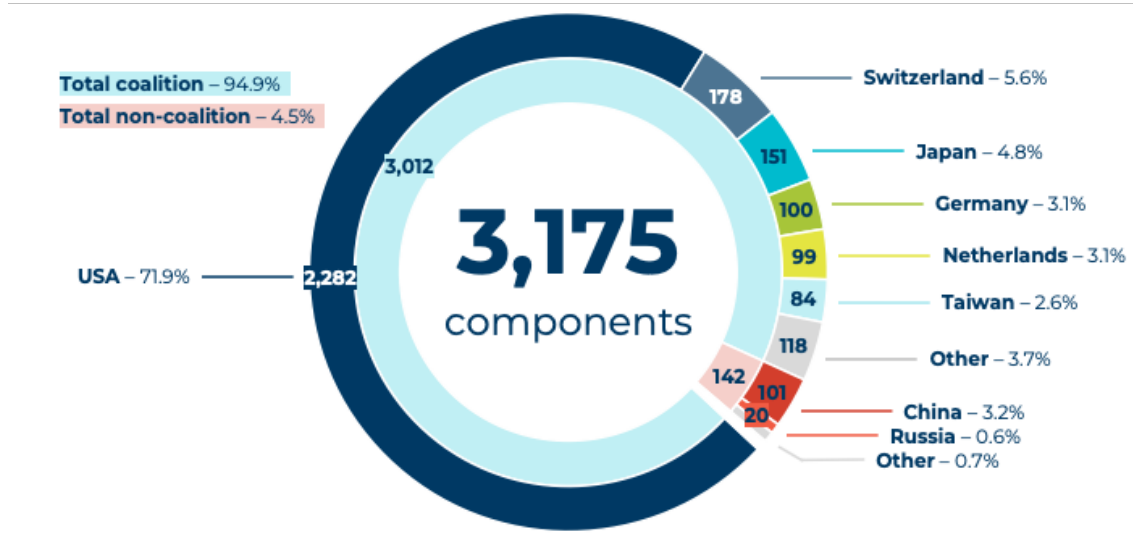
<sup>6</sup> [Experts from the KSRIFE started examining the wreckage of the Kh-69 missile](#), Militarnyi, February 2024.

A Ukrainian weapons disassembly team also identified that the Zircon missile contains the Altera Cyclone II field-programmable gate array (FPGA). The Zircon missile is also equipped with a flight computing module similar to that found in the Kinzhal missile, incorporating numerous Western components manufactured by companies such as Texas Instruments, Vishay, and Analog Devices from the US, ROHM from Japan, SICSSA from Spain, and Macronix from Taiwan.

Additionally, at the beginning of 2024, Russia used North Korean KN-23/KN-24 ballistic missiles, which, despite sanctions on North Korea, also contain Western components produced by Texas Instruments, Analog Devices from the US, NXP Semiconductors from the Netherlands, and AXICOM from Switzerland.

Furthermore, some of the Western components in the navigation systems of these missiles have been replaced by more advanced versions, demonstrating Russia's ongoing efforts to modernize its weaponry. Satellite imagery further corroborates this, showing new construction near aviation plants, drone production facilities, and artillery shell production sites, indicating a significant expansion of Russia's military production capabilities.

**Figure 1. Foreign components in Russian weapons by country of producer**



Source: [War & Sanctions](#)

### *Shifts in global trade in response to sanctions*

The global implementation of Russian sanctions remains incomplete. While coalition countries, accounting for approximately 58 percent of world GDP,<sup>7</sup> have enforced sanctions, significant economies like China and India have not aligned with these measures and have stepped up their trade with Russia (Figures 2 and 3). Consequently, while the EU, US, and UK no longer buy Russian oil and gas, with minor exemptions, other countries have stepped in. At the same time, while export controls have blocked direct sales of goods for the Russian military directly from the coalition countries to Russia, other countries are now serving as on-shipment and on-production hubs. For instance, India has become the second-largest purchaser of Russian crude oil,<sup>8</sup> while China facilitates the trade of advanced electronics crucial for Russia's military industry.<sup>9</sup>

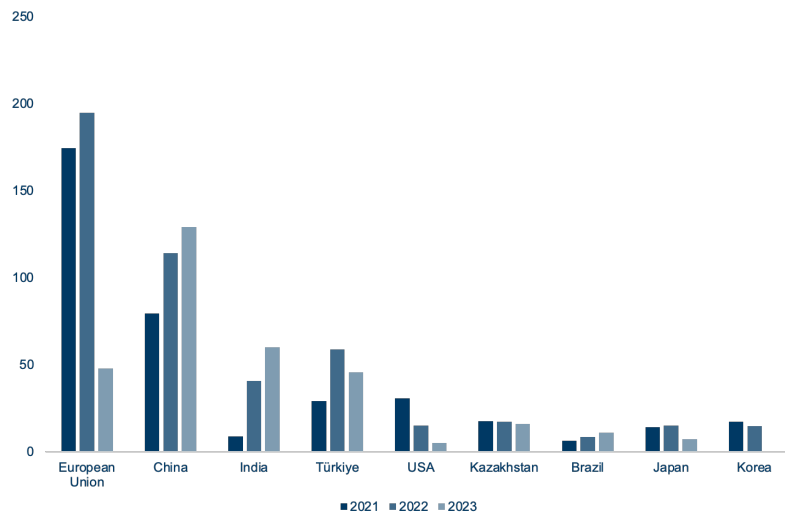
<sup>7</sup> [World Economic Outlook: Navigating Global Divergences](#), International Monetary Fund, 2023.

<sup>8</sup> Assessing Russia's Shadow Fleet: Initial Build-Up, Links to the Global Shadow Fleet, and Future Prospects, Kyiv School of Economics Institute, forthcoming.

<sup>9</sup> [Policy Insight 131: Russian economy on war footing: A new reality financed by commodity exports](#), Center for Economic Policy Research, May 2024.

Moreover, not only state actors but also companies opting to remain in the Russian market contribute to its economy.<sup>10</sup> Despite some companies withdrawing investments, others persist in business activities in Russia, resulting in tax revenues for a regime engaged in aggression in Europe. This ongoing presence allows the regime to minimize the impact of war spending on the Russian population.

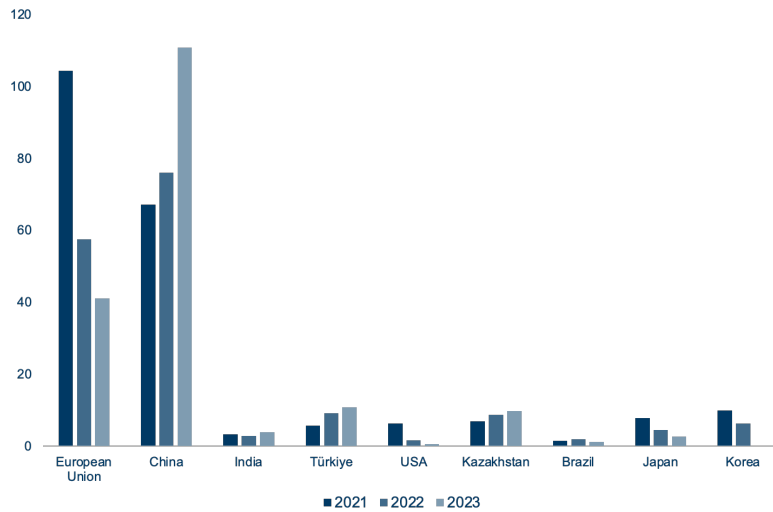
**Figure 2. Russia's exports, \$ billion**



Source: United Nations Comtrade

<sup>10</sup> [Leave Russia](#), Kyiv School of Economics Institute.

**Figure 3. Russia’s imports, \$ billion**



Source: United Nations Comtrade

Russia continues to gain access to so-called battlefield goods (Figure 4).<sup>11</sup> Russia acquired \$12.5 billion of such goods in 2023. Imports to Russia have nearly rebounded in value terms since the drop following the imposition of export controls in spring 2022. By 2023, imports were only 2 percent lower than in the pre-invasion period. Items of most significant concern (Tier 1), critical for producing advanced precision-guided weapons and with a limited number of global manufacturers, accounted for \$2.3 billion or 18 percent of the total. Tier 2 products, additional electronic items that Russia prefers to source from the US and its allies despite Russia having some domestic production capability, made up another \$2.4 billion or 19 percent.

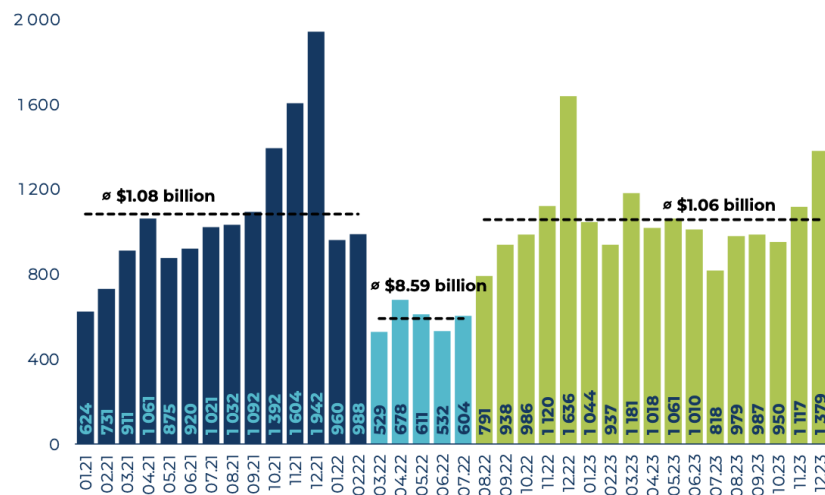
<sup>11</sup> List of Common High Priority Items issued by the [US](#), [EU](#), [UK](#), and [Japan](#); these are determined to be ‘common high priority items’ (aka ‘battlefield goods’). This list comprises 50 six-digit Harmonised System (HS) product groups deemed to be critical for Russia’s military industry and largely consists of microelectronics and communications and navigational equipment. The list has been expanded twice to reflect new insights into critical inputs for the Russian military industry, among them non-electronic components (e.g. bearings) and machinery for local production of certain items (e.g. CNC tools).



Although there is evidence that Russia pays significant markups for export-controlled goods acquired through third countries, indicating a more pronounced decline in volume terms than trade values suggest, the enforcement of these restrictions faces significant challenges.

Imports primarily flow through China, Turkey, and the United Arab Emirates, with other nations such as Armenia, Georgia, Kazakhstan, and the Kyrgyz Republic also witnessing significant increases in imports from EU and coalition countries, likely destined for Russia.<sup>12</sup>

**Figure 4. Russian imports of “battlefield goods”, \$ million**



Source: KSE Institute, “battlefield goods”=common high-priority items

To understand the trade dynamics of Russian imports, we also analyzed a wider subset of goods, termed ‘critical components’ (Figure 5). This subset also reflects the goods used for military production but not necessarily sanctioned. For critical components, we selected goods according

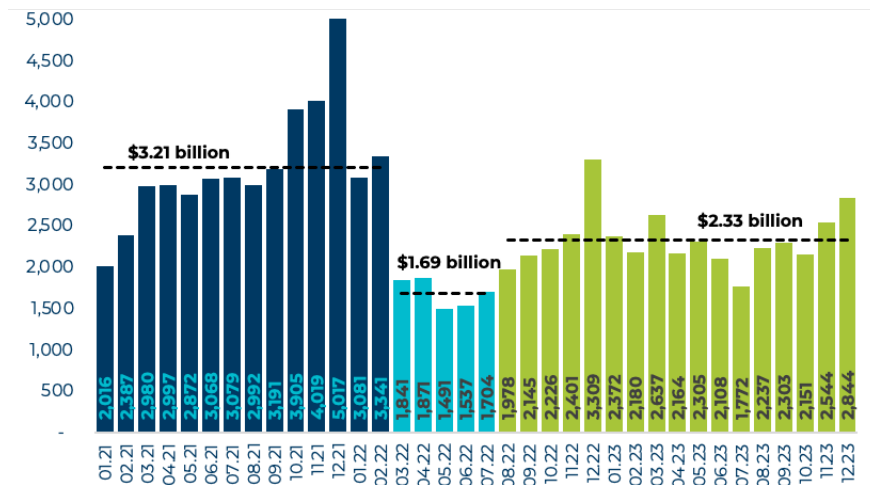
<sup>12</sup> [Research](#) by CORISK, Country Risk is Corporate Risk.

to our knowledge of components previously found in Russian weapons. In 2023, Russia acquired \$27.6 billion of such goods.

While trade volumes for battlefield goods have recovered completely, and the average monthly amount is now equal to the pre-invasion level, the dynamics for critical components are more encouraging. We see that the average monthly amount of imports is now 27 percent lower than during the pre-invasion period. This also may be explained by the fact that the battlefield goods list was enforced in 2023, and codes were added gradually during the 2023-2024 years.

While the wider list may still include some civil goods due to the limitations in classification data, we want to emphasize that it is twice as large as battlefield goods, which shows the need to revise and expand the list of goods under regulation.

**Figure 5. Russian imports of critical components, \$ million**

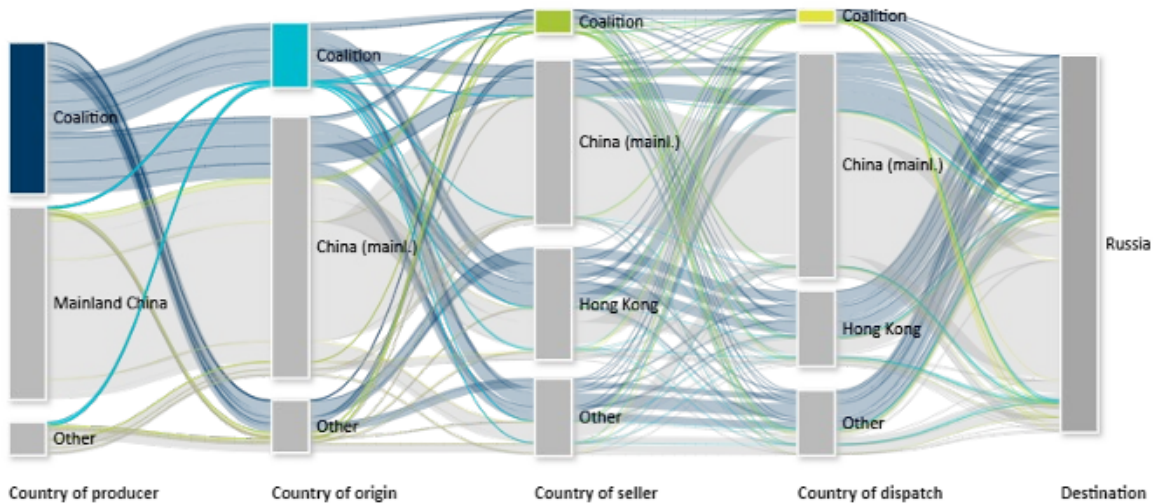


Source: KSE Institute

***Role of China in facilitating Russia’s sanctions evasion***

China is an essential conduit for producing and shipping dual-use goods to Russia (Figure 6). The US has recently stepped up its efforts to curb China’s support of Russia’s sanctions evasion.<sup>13</sup>

**Figure 6. Flows of battlefield goods to Russia in 2023<sup>14</sup>**



Source: KSE Institute. Notes: Country of producer = location of company ultimately responsible for the good; country of origin = location of manufacturing; Country of seller = location of final seller to Russia; country of dispatch = location from which final shipment to Russia was made.

***Corporate responsibility is key to implementing export controls***

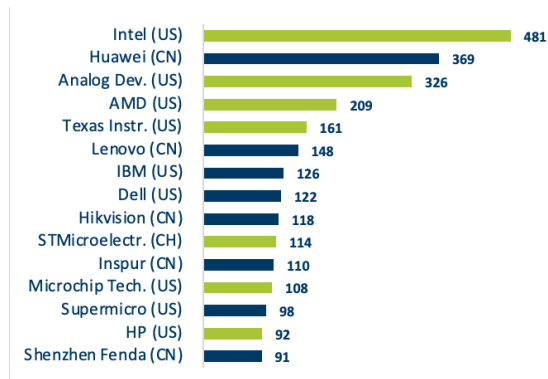
Corporate responsibility has increasingly come into focus. Analytical reports by the [Yermak-McFaul International Working Group on Russian Sanctions](#), investigative journalists, think tanks, and advocacy institutions have attracted the attention of policymakers and legislators. In the US,

<sup>13</sup> [Remarks by Deputy Secretary of the Treasury Wally Adeyemo at Atlantik Brücke and the Transatlantic Business Initiative Event](#), May 2024 and [US seeks to choke off supplies via China for Russia’s war machine](#), Financial Times, May 2024.

<sup>14</sup> Figure only includes transactions for which the full chain of custody could be determined (80 percent of the total value).

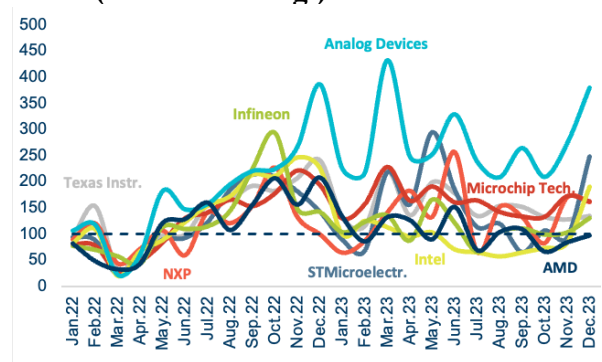
recent Congressional hearings focused on US corporate responsibility in fueling Russia’s war in Ukraine (Figures 7 and 8).<sup>15</sup> In addition, think tanks have contacted corporations whose products are found in Russia’s weapons to solicit their responses.<sup>16</sup> The US Department of Commerce and the Department of Justice increasingly focus on corporate responsibility and corporate enforcement.<sup>17</sup>

**Figure 7: Imports in 2023 by company**



Source: KSE Institute

**Figure 8: By producer, index (100 = 2021 avg.)**



Source: KSE Institute

***Using the financial system to enforce export controls***

Implementing and enforcing export controls faces significant challenges stemming from complex supply chains, opaque financial structures, and transparency issues in documentation. These challenges parallel those seen in anti-money laundering and countering the financing of terrorism

<sup>15</sup> [Hearing on U.S. Technology in the Russia-Ukraine War](#), The Senate Homeland Security and Governmental Affairs Permanent Subcommittee on Investigations, February 2024, memorandum available [here](#).

<sup>16</sup> [Products of over 250 Western companies repeatedly found in Russian weapons on Ukraine’s battlefield expose issues in export controls enforcement, according to a new report; incl. cos. responses & non-responses](#), May 2024.

<sup>17</sup> [Enforcement of US Trade Sanctions and Export Controls in 2023 and What to Expect in 2024](#), Foley Hoag, April 2024.

frameworks, where progress has been made over the past two decades. Leveraging a similar approach could enhance the effectiveness of export controls.<sup>18</sup>

Proposed measures include tasking financial institutions with monitoring trade in controlled goods and blocking illicit transactions, drawing on those institutions' experience with financial due diligence. The December 2023 Executive Order<sup>19</sup> strengthening US sanctions against financial institutions facilitating Russia's sanctions evasion, including export controls, is already having an impact. China's banks have begun to apply more scrutiny to transactions with Russia or refuse to process them.<sup>20</sup> Trade with Russia from the key on-shipment hubs is beginning to fall.<sup>21</sup>

Additionally, non-financial companies could adopt due diligence procedures akin to those used in anti-money laundering efforts to ensure compliance with export controls. Public-sector investigations and appropriate fines are essential to incentivize compliance. Technology sanctions are poised to remain part of the economic statecraft toolbox in the foreseeable future, with the effectiveness and credibility of such measures likely to be tested by the Russia case.

### ***Fault lines in Russia's military production***

Russia's shift towards militarization,<sup>22</sup> driven by revenues from commodity sales, is evident as domestic manufacturing increasingly caters to war-related industries (Figure 9). However, vulnerabilities in Russia's defense industrial base are emerging beneath the surface of apparent stability and increased resources,<sup>23</sup> presenting opportunities for additional pressure through export

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<sup>18</sup> [Using the Financial System to Enforce Export Controls](#), Bruegel, May 2024.

<sup>19</sup> [Fact Sheet: Biden Administration Expands U.S. Sanctions Authorities to Target Financial Facilitators of Russia's War Machine](#), the White House, December 2023 and [Wally Adeyemo: The US is ready to impose sanctions on foreign financial institutions when others don't](#), Financial Times, December 2023.

<sup>20</sup> [China's banks pore over Russia transactions, causing delays and unsettling exporters](#), South China Morning Post, May 2024.

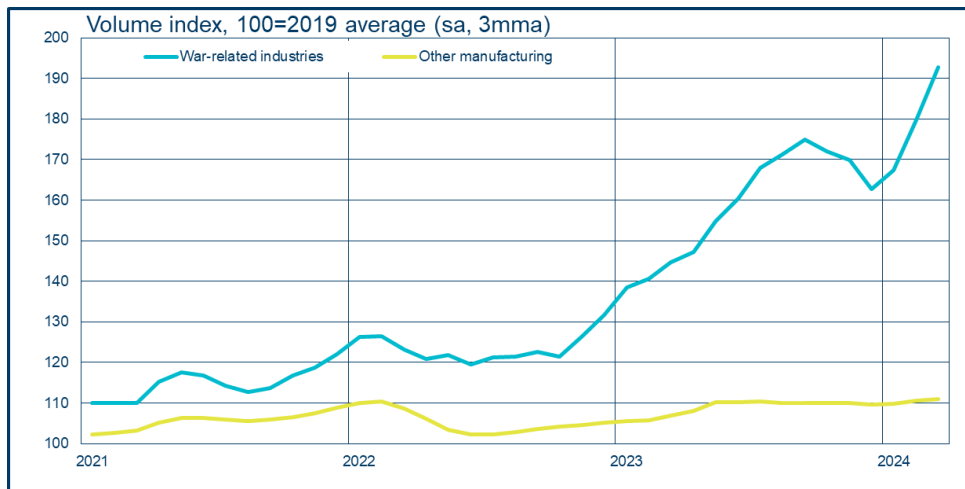
<sup>21</sup> Changes in exports to Russia since the start of 2024, [The Bell](#).

<sup>22</sup> [Russia's new economy may end up prolonging its war](#), Financial Times, May 2024.

<sup>23</sup> [Russia's War in Ukraine: Myths and Lessons](#), Republic of Estonia Ministry of Defence, January 2023.

controls. The recent government reshuffle seems to stem from a position of weakness, primarily involving the reassignment of longstanding loyalists.<sup>24</sup> In recent interviews, key Russian military producers have expressed concerns about low returns, inadequate investments, and high borrowing rates.<sup>25</sup>

**Figure 9. Output of Russia's war-related industries and other manufacturing**



Source: Rosstat, BOFIT, KSE Institute.

***What is next? Recommendations for the G-7 summit this week***

Coalition countries must identify choke points in Russia's military-industrial production and redouble their efforts to bolster the impact of sanctions. We urge policymakers to take action to ensure that export controls stay ahead of Russian efforts to circumvent them. Western measures need to address the distinct challenges at various stages of the supply chain with tailored solutions.

<sup>24</sup> [Belousov's appointment exposes a structural crisis in Putin's Ministry of Defence](#), FRF Think Tank, June 2024 and [In a war of attrition, you want an economist as defense minister](#), The Bell, May 2024.

<sup>25</sup> [Чемезов — РБК: «Экономика для военных — дело десятое»](#), RBC, May 2024.

They should aim to (i) close policy gaps in the existing export controls regime; (ii) strengthen government institutions tasked with its implementation and enforcement; (iii) incentivize and empower the private sector to step up compliance; (iv) target circumvention schemes that allow Russia to import goods via third countries; and (v) improve multilateral cooperation in the field of export controls. Furthermore, coalition countries need to identify specific choke points in Russia's military production, including software<sup>26</sup> for the military-industrial complex, to stay ahead of Russia's war machine.

At the G-7 summit meeting this week, leaders of the free world should agree on the principle of sanctioning companies involved in providing Russia's military-industrial complex. Just making such a statement will put these companies on notice that they will be held responsible for these transfers even when they occur through third-party enterprises located in third countries. Second, the G-7 should agree to publish a comprehensive study of these technology transfers as an exercise to shame Western companies participating in aiding the Russian defense industrial complex. Our paper here and additional research already done by the Kyiv School of Economics and other academic institutions could help provide data for such a project, but G-7 countries, including first and foremost the United States, must also declassify data on this subject that they have collected to make the study even more comprehensive. Third, the G-7 this week must sanction a handful of companies making the most direct contributions to the Russian military-industrial complex. That probably means sanctions on some Chinese companies, since they are the biggest players here. After doing so, the G-7 should signal clearly that they will ratchet up such sanctions on third-party countries and enterprises until those countries and enterprises stop helping Russia's military-industrial complex. Financial institutions facilitating these transactions could also be

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<sup>26</sup> [Exposing and Exploiting the Kremlin's Software Networks and Dependencies](#), Working Group Paper #17, January 2024.

sanctioned. Finally, the G-7 must articulate a clear pathway for entities to get off the sanctions lists if they change their behavior.



*Note: The inclusion of affiliations is for identification purposes only and does not represent an endorsement of shared views with the co-signer.*

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