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**Research Report**

## Latest developments in Russian imports of sanctioned technology products

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Heli Simola

Latest developments in Russian imports of  
sanctioned technology products



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## Contents

Abstract .....	3
1. Introduction .....	4
2. General development of Russian imports .....	4
3. Russian imports of sanctioned technology products .....	5
3.1 Russian imports of most sanctioned goods declined substantially, but with huge variation across goods .....	6
3.2 China as the big supplier of alternative imports .....	8
4. Sharp price increases in some Chinese and Turkish exports to Russia .....	10
4.1 China .....	11
4.2 Türkiye .....	12
5. Sanction evasion via CCA countries .....	13
5.1 High-priority battlefield items .....	13
5.2 Other dual-use goods .....	14
6. Concluding remarks .....	15
References .....	17

Heli Simola

## Latest developments in Russian imports of sanctioned technology products

### Abstract

This brief examines the latest developments in Russian imports on the basis of mirror statistics. We focus particularly on technology products subject to export restrictions imposed by sanctioning coalition countries. While most Russian imports of technology products subject to sanctions fell considerably between the first half of 2021 and the first half of 2023, our analysis reveals that the value of certain imported technology products also increased substantially. Exports of these products grew dramatically particularly from Central Asia and Caucasus, but the share of these countries in Russian imports is still moderate. China was by far the most important provider of technology products to Russia in absolute terms during the observation period.

Keywords: Russia, imports, sanctions

## 1. Introduction

A wide coalition of countries has imposed extensive economic sanctions on Russia since Russia launched a full-scale war in Ukraine in February 2022. A key aim of the sanctions has been to curb Russia's ability to make war by restricting the availability of technology critical to Russia's military industry. The main mechanism is restriction of technology goods exports to Russia, which has long been highly dependent on imports of advanced technology systems and components.

In this note, we examine the latest developments in Russian imports with a focus on sanctioned products. As Russia no longer releases detailed foreign trade statistics, we calculate import estimates by summing up exports from countries for which data is available. This statistical analysis is sufficient to gain a general sense of trends in Russian imports at the aggregate level. Such analysis complements case studies and anecdotal evidence reported by media. However, given that sanction evasion is subject to criminal penalties, its full scope cannot be solely inferred from statistical analysis.

Our results indicate large variation across product groups and individual products, even if Russian imports overall recovered this year to pre-war levels in value terms. The value of imports of many sanctioned products in the first half of 2023 was still much lower than in the first half of 2021. This applies particularly to high-priority battlefield items and other dual-use items. On the other hand, the value of Russian imports for certain sanctioned goods was substantially higher in 1H23 than in 1H21. Exports of these goods from Central Asian and South East European countries have increased dramatically – apparently largely due to increased re-export activity and possible sanction evasion.

In absolute terms, China is by far the most important provider of all goods (including most sanctioned goods) to Russia. The export of Chinese goods to Russia does not necessarily constitute sanction evasion as China has not joined the sanctioning coalition and it is a major producer of many technology goods for the global market. China provides Russia with an alternative source for replacement of certain lost imports from sanctioning countries.

Our analysis suggests that higher prices have significantly contributed to the growth in the value of Russian imports. Examples of exports from China and Türkiye indicate that the prices of products exported to Russia have sharply increased – much more than to other export markets. Thus, even if Russia has managed to find alternative imports from other markets for sanctioned products, it may also have been obliged to pay steep mark-ups on such products.

The brief is constructed in the following way. Section 2 provides a brief look at the latest overall developments in Russian imports. In section 3, we focus on Russia's imports of sanctioned technology products and examine the developments across product groups and countries. Section 4 presents analysis of export price trends, with special focus on China and Türkiye. Potential sanction evasion by exporting goods originating from the EU through Central Asian countries to Russia is discussed in section 5. Section 6 concludes.

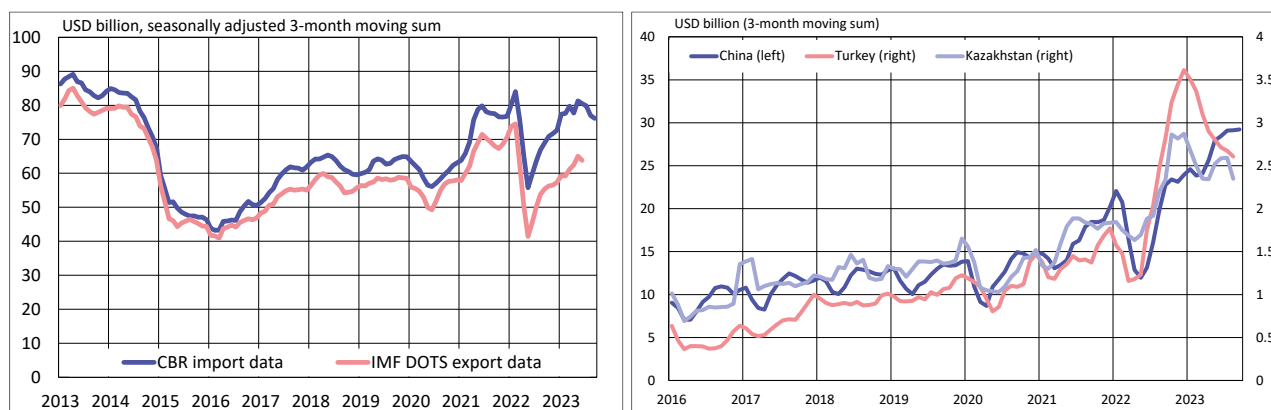
## 2. General development of Russian imports

Following Russia's invasion of Ukraine in spring 2022, Russian imports initially decreased sharply and then recovered gradually (Figure 1A). Central Bank of Russia (CBR) balance-of-payments data show that the value of Russian imports recovered to its pre-war level in spring 2023. This recovering trend reversed in recent months with a slight decline in the value of imports.

Mirror statistics point to similar trends in Russian imports. An aggregate of global exports calculated from IMF data shows a sharp decline and subsequent recovery. The mirror data suggest,

however, that the level of imports last summer was still slightly below the pre-war level. In general, it appears that the correlation between CBR data and mirror data has decreased a bit since Russia's invasion (98 % in 1M12–2M22 vs. 96 % in 3M22–6M23). Moderation of export trends is visible in recent months for several countries that sharply increased their exports to Russia after spring 2022, most notably China, Türkiye and Kazakhstan (Figure 1B).

**Figure 1.** A) Development of the value of Russian goods imports; B) Value of goods exports to Russia by selected countries.



Sources: Central Bank of Russia, IMF DOTS, Macrobond.

### 3. Russian imports of sanctioned technology products

As a consequence of Russia's invasion of Ukraine, a large coalition of countries – led by the EU and the US – imposed a range of restrictions on exports to Russia. The key aim of these restrictions was to curb the capabilities of Russia's military industry. Export restrictions were also imposed on certain consumer goods considered luxury items, like certain expensive electronics and sports equipment.

We now examine recent developments of Russian imports of sanctioned technology products on the basis of mirror statistics using an approach similar to that previously applied in Simola (2023) and Borin et al. (2023). Focusing on technology products,<sup>1</sup> which constitute a large part of the export restrictions imposed on Russia, we calculate the value of Russian imports as the combined value of exports of other countries to Russia.<sup>2</sup> The values of exports in 1H23 and 1H21 (i.e. pre-war level) are then compared.

We use disaggregation at the HS6 product line level, the finest level of disaggregation at which national trade statistics are still comparable. While many EU export restrictions define products at the more disaggregated 8-digit level, they do not cover all products included in the more aggregated product lines.

We group the sanctioned products in four different categories: *high-priority battlefield items*, *other dual-use goods*, *luxury goods* and *other sanctioned technology products*.<sup>3</sup> It should be noted

<sup>1</sup> Technology products refer here to HS chapters 84, 85, 87 and 90.

<sup>2</sup> The combined value of exports is based on export data from 86 countries. All largest economies of the world and most Russia's neighboring countries are covered. Belarus, the United Arab Emirates and several other countries have been omitted due to the lack of data. The data are taken from the Global Trade Tracker database and complemented with national statistics from Kazakhstan.

<sup>3</sup> "High-priority battlefield items" are defined according to the list published by the European Commission in July 2023, classification of other sanctioned goods is based on EU legal texts and sanction guidelines as of 1H23.

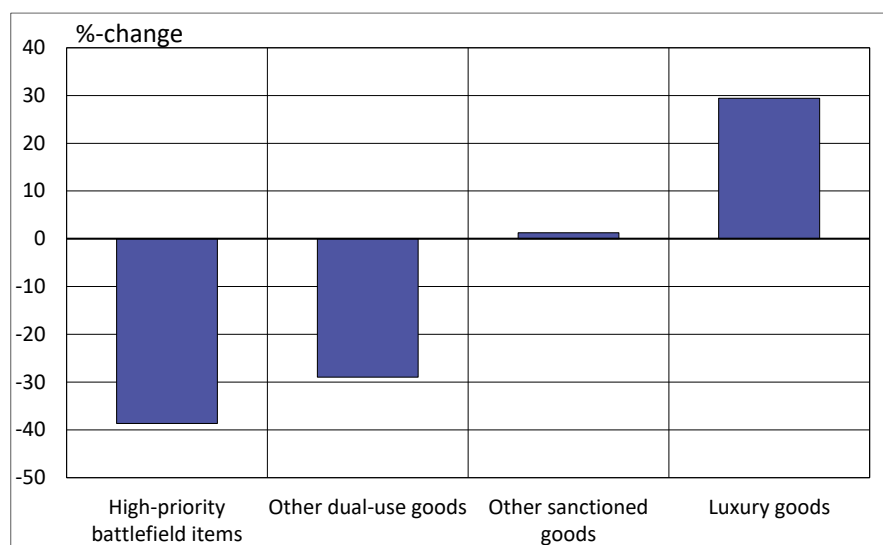
that there are many exemptions, especially in the luxury goods category. Exports of most products in this category are banned only if the value of the product exceeds a certain (often quite high) threshold value.

In addition to lack of data, certain products must be excluded from the analysis due to the substantial changes in the HS classification in recent years that make temporal comparison unfeasible. We have also made modifications for some products (e.g. summing up product lines) to improve comparability across HS classifications applied in 2021 and after 2022.

### 3.1 Russian imports of most sanctioned goods declined substantially, but with huge variation across goods

Our results suggest that the value of global exports to Russia in 1H23 at the aggregate level was about 40 % lower for high-priority battlefield items and 30 % lower for other dual-use goods than in 1H21 (Figure 2). In contrast, the value of exports of other sanctioned technology goods was practically unchanged in 1H23 and 1H21. The value of exports of goods subject to luxury good restrictions was 30 % higher in 1H23 than in 1H21. Again, it should be noted that restrictions in this category apply to a very limited subgroup of products poorly captured with the data available.

**Figure 2.** Change in value of global exports of sanctioned technology products to Russia from 1H21 to 1H23.



Source: Author's calculations on data from Global Trade Tracker and Statistics Kazakhstan.

There is considerable variation across product lines. For certain goods, exports to Russia have essentially dried up. In such cases, Russia has apparently failed to find alternatives in substantial amounts from other import markets to cover for the lost imports from sanctioning countries. These include instruments for aeronautical or space navigation, navigational instruments, instruments for measuring or checking voltage and base stations of apparatus for the transmission or reception of data. All sanction categories include products for which the “substitution ratio” is less than 0.5 (the ratio of import value in 1H23 to 1H21), meaning that Russia has been able to find substitute products for less than half of the lost imports from sanctioning countries (Figure 3A).

On the other hand, the combined value of exports for some goods was two to four times higher in 1H23 than in 1H21. In these cases, the substitution ratio exceeds 2, implying that Russia has not just succeeded in finding suitable alternative imports from other markets but managed to more than



compensate for lost imports from sanctioning countries. Such products are found in all types of sanction groups. Examples include machines for the manufacture of semiconductor devices, electrical signal generators and lathes for removing metal (Figure 3B).

**Figure 3.** Change in ratio of global exports to Russia from 1H21 to 1H23 for selected goods. Goods with low substitution ratios are shown in panel A and goods with high substitution ratios appear in panel B.



Note: Pink bars refer to high-priority battlefield items, blue bars to other dual-use items, green bars to luxury goods and grey bars to other sanctioned technology goods.

Source: Author’s calculations on data from Global Trade Tracker and Statistics Kazakhstan.

Our results overall comport with the findings of Borin et al. (2023), who conclude that the value of Russian imports of goods sanctioned by the EU was substantially lower in 4Q22 than in 4Q21.<sup>4</sup> Prior to end-2022, Russia was unable to replace lost imports from sanctioning countries in substantial amounts. Over time, however, the substitution ratio has gradually increased, with the level of 1H23 exceeding that of 4Q22.

Bilousova et al. (2023), who analyze Russian customs statistics at a more granular level, find that the value of Russian imports of *critical components* approached pre-war levels already at end-2022. However, less than half of the goods under their definition of critical components were subject to EU sanctions, so their results are not directly comparable to our findings. While the mirror data and data from Russian Customs provide similar trends for trade in most goods, there are some notable exceptions. For example, the Russian Customs data appears to provide much higher figures for imports of semiconductors than estimates calculated from mirror data (Borin et al., 2023).

### 3.2 China as the big supplier of alternative imports

Unsurprisingly, the exports of sanctioning countries of sanctioned products to Russia had nearly ceased by 1H23. For many sanctioned goods, exports of non-sanctioning countries to Russia also declined substantially. However, as noted in the previous section, Russia found suitable alternative imports in some cases that more than compensate for the lost imports from sanctioning countries.

Regional examination of export flows of sanctioned technology goods to Russia suggests that exports of sanctioning countries have substantially declined in all sanction groups, from -65 % for luxury goods to -96 % for high-priority battlefield items (Figure 4). In contrast, exports from the Caucasus and Central Asia (CCA)<sup>5</sup> and South East Europe (SEE)<sup>6</sup> groups of countries have skyrocketed in all sanction groups, posting growth of several hundred percent for SEE countries and more than a thousand percent for CCA countries. Much of this explosive growth (especially in the case of CCA countries) is likely based largely on re-export activity as their domestic supply capabilities for such products are extremely limited.

In the case of China (including Hong Kong), there was a sharp increase in exports of luxury goods and some sanctioned technology goods, while growth in exports of high-priority battlefield items and other dual-use goods was more modest. In some cases, exports from China of some battlefield items and other dual-use goods declined substantially, which is reflected in the low substitution ratio of these products. The dramatic growth in exports of China in other sanctioned technology products reflects mainly huge increases in exports of road tractors for semi-trailers (export value up 250 times) and mechanical shovels and excavators (export value up nearly 10 times).

With our data, we cannot say whether the growth of Chinese exports originates from exporting domestic products or re-exporting goods manufactured in other countries. Chinese exports of its own products does not constitute sanction evasion as China has not joined the sanctioning coalition. If China re-exports goods under sanctions and manufactured in sanctioning countries such as EU countries, it would be regarded as a violation of the sanctions regime. The results of Bilousova et al. (2023) suggest that about 10 % of Russian imports of critical components from China actually originated from other countries, and that the share for semiconductors was 55 %.

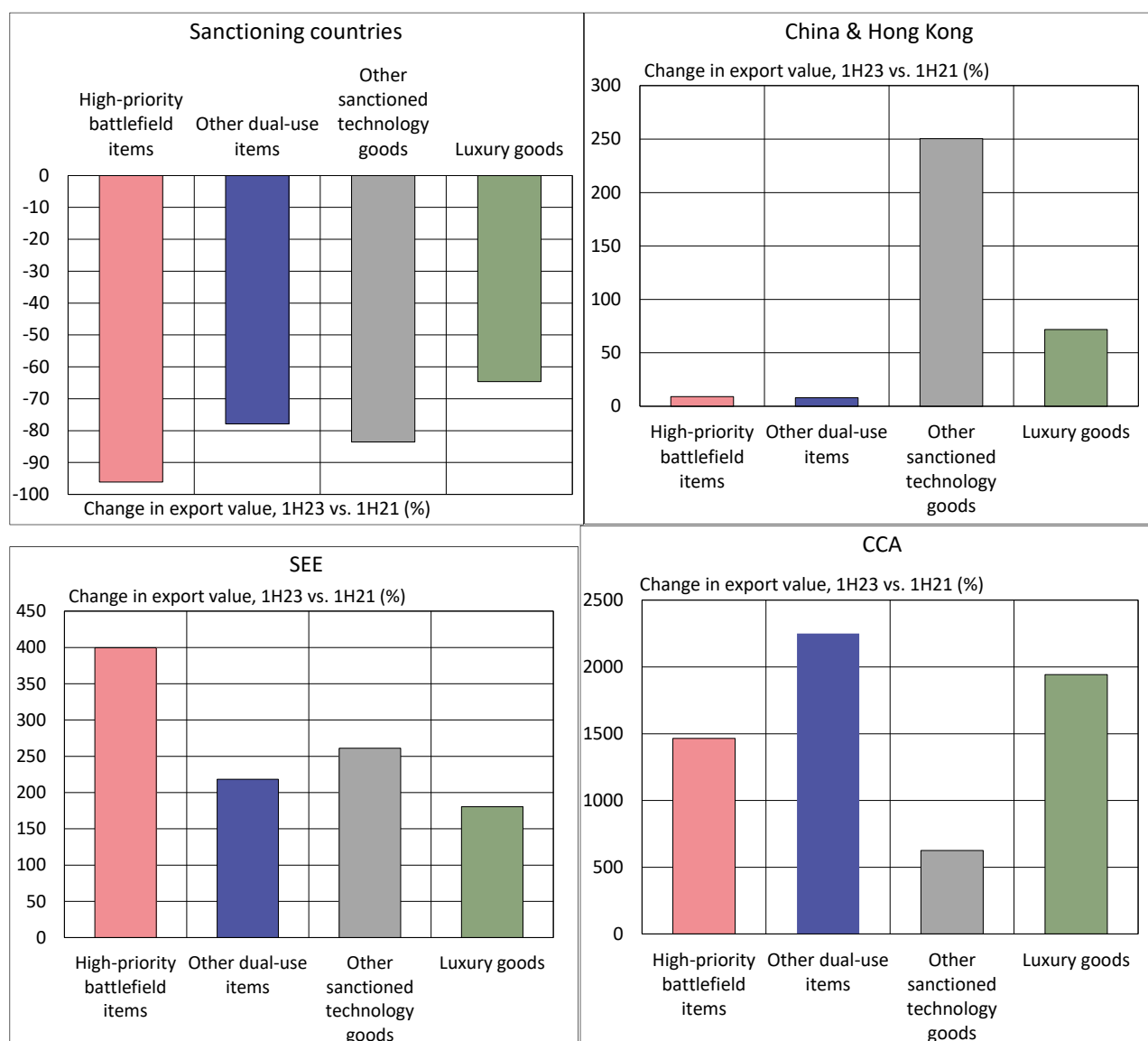
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<sup>4</sup> Their analysis covers all sanctioned goods, while we focus on a more limited subset of technology products.

<sup>5</sup> CCA countries include Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Moldova and Uzbekistan.

<sup>6</sup> SEE countries here refers to Bosnia-Herzegovina, Serbia and Türkiye.

**Figure 4.** Change from 1H21 to 1H23 in value of exports of sanctioned technology goods to Russia from A) sanctioning countries, B) China & Hong Kong, C) SEE countries, and D) CCA countries.

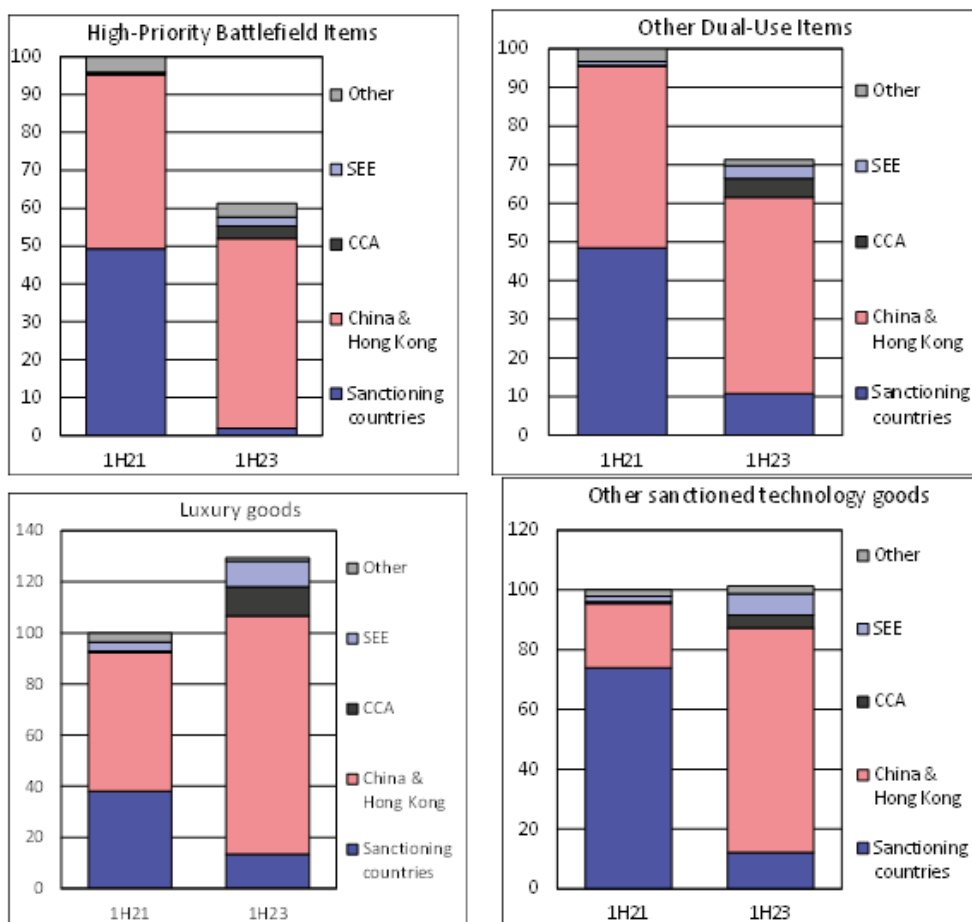


Source: Author’s calculations on data from Global Trade Tracker and Statistics Kazakhstan.

Despite spectacular growth figures of SEE and CCA countries, their share at the aggregate level for Russian imports of sanctioned technology products is small. China dominates Russian imports in all product groups of sanctioned products accounting for 70–80 % of Russian imports in these product categories (Figure 5). The SEE and CCA countries each account for 4–8 % of Russian imports in sanctioned product groups.

The situation is similar for individual goods. For most sanctioned technology goods, China is by far the largest import market for Russia. For certain products, however, other countries also provide a substantial share of Russian imports. For example, among high-priority battlefield items, Malaysia in 1H23 accounted for nearly half of Russian imports of ball bearings and nearly a third of spherical roller bearings. Kyrgyzstan provided 34 % of imports of electronic integrated circuits as amplifiers. Türkiye provided 20 % of imports of electrical apparatus for switching electrical circuits, while Israel supplied 18 % of imports of certain apparatus for data transmission and recording.

**Figure 5.** Geographic distribution of global exports of sanctioned technology products to Russia in 1H21 and 1H23 by sanctioned product group.



Source: Author’s calculations on data from Global Trade Tracker and Statistics Kazakhstan.

#### 4. Sharp price increases in some Chinese and Turkish exports to Russia

For certain sanctioned technology goods, Russia has been able to fully compensate for the lost imports from sanctioning countries in value terms. The increase in import value, however, may also reflect higher prices. This issue is difficult to examine from mirror statistics due to the limited availability of data on export volumes for certain countries. Here, we illustrate this issue using the examples of China and Türkiye. We have excluded CCA countries and others due to the lack of data.

Volume data is typically available in kilograms, which, perhaps, is not the optimal unit for comparison in such categories as machinery and equipment. Moreover, certain product lines can cover quite heterogeneous goods even at the HS6 disaggregation level, making it difficult to compare prices. Due to data limitations, we focus on a small sample of goods and countries to get some indication of the trends in Russia’s import volumes and prices.

## 4.1 China

As noted, China is currently the main supplier of sanctioned technology products for Russia. We focus on high-priority battlefield items and other dual-use goods and examine the trends in Chinese export prices to Russia and other countries between 1H21 and 1H23. Due to limited data availability, we have volume data only for 34 product lines.

For most products, both the value and volume of Chinese exports to Russia increased over the observation period. However, the growth was typically much lower in terms of volume than in value. There is huge variation across individual growth rates, with more than 1,000 % growth for certain goods. The median growth rate across product lines in 1H23 compared to 1H21 was 186 % by value and 70 % in terms of quantity.

Export prices generally increased for all countries over the observation period, so our question is whether the price hikes were higher for Russia than other countries. The median price increase in export prices to Russia was 78 %, while for other countries it was 12 %. For most individual products, growth in export prices to Russia was also much higher than in export prices for other countries (with a few exceptions).

The average export price levels in 1H21 vary substantially between Russia and other countries for many products, probably reflecting the heterogeneity of certain product lines even at this level of disaggregation.<sup>7</sup> Yet even if we exclude from the analysis product lines with disparate initial prices, the median price increase for exports to Russia was still 78 % and for other countries 12 %.

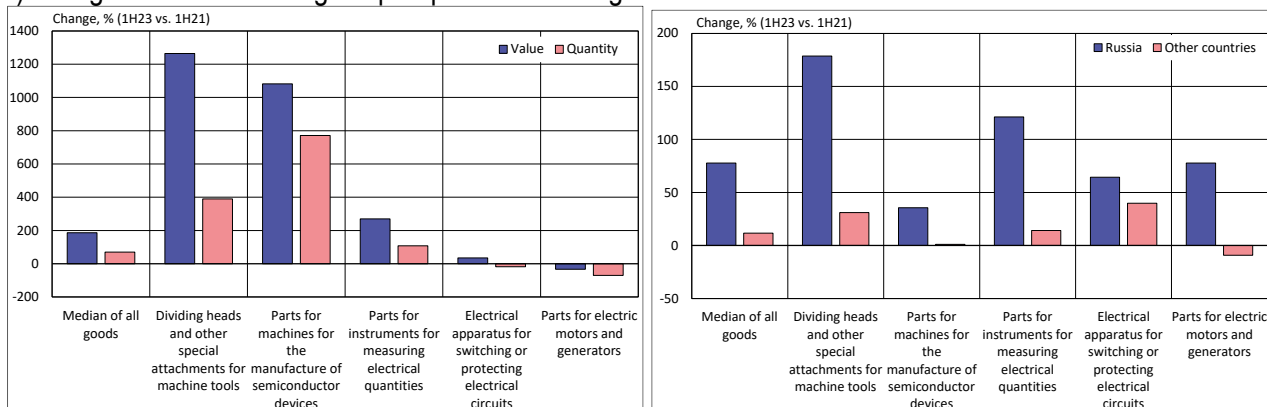
This suggests that Russia has been obliged to pay steep premia to acquire sanctioned products from China. Based on this analysis, we cannot conclude whether this simply reflects the improved price-setting power of Chinese suppliers selling their own non-sanctioned products or the cut Chinese suppliers take for selling sanctioned goods of European origin.

Product line-level examples of products with sharp price hikes include dividing heads and other special attachments for machine tools, as well as certain parts for machines for the manufacture of semiconductor devices. Both the value and quantity of Chinese exports of these goods to Russia increased sharply, but much more in value terms (Figure 6A). The average prices of exports to Russia grew much more than average export prices to other markets between 1H21 and 1H23 (Figure 6B).

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<sup>7</sup> Export prices should not reflect differences in transportation cost as they are expressed in FOB (free-on-board) terms.

**Figure 6.** A) Change in the value and volume of Chinese exports to Russia in selected sanctioned goods and B) change in China's average export prices of these goods to Russia and other markets.



Note: All products refers to 34 HS6-level product lines comprising selected high-priority battlefield items and other dual-use goods.

Source: Author's calculations on data from Global Trade Tracker.

## 4.2 Türkiye

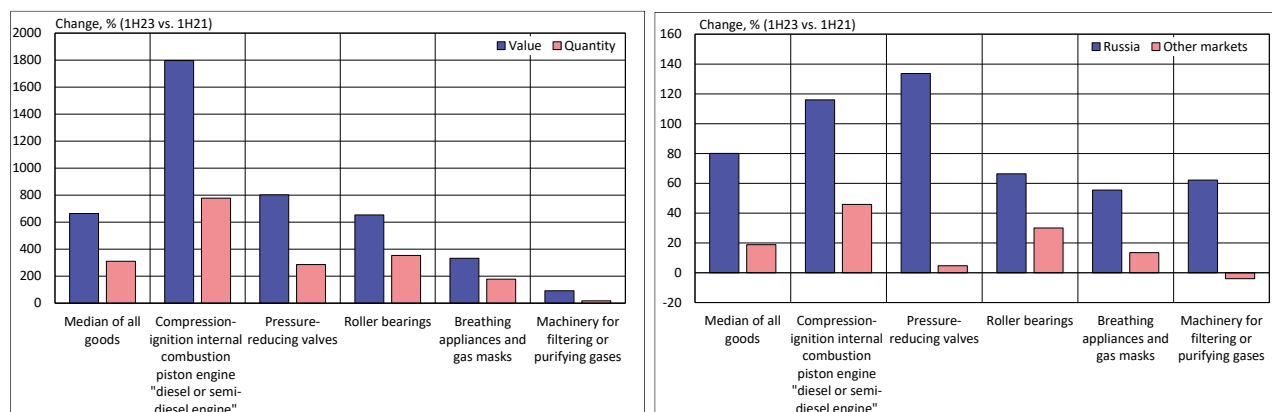
A corresponding analysis for Türkiye yields quite similar results. For Türkiye, our analysis covers 82 goods that are high-priority battlefield items or other dual-use goods. For most of these goods, we see increases in both the value and volume of exports to Russia. As in the case of China, the increases are typically larger in value terms. The median increase between 1H23 and 1H21 was 665 % in value terms and 311 % in volume terms.

We also get findings similar to those for China when comparing the development of Turkish export prices to Russia against other markets. The median price increase was 80 % for exports of these goods to Russia between 1H21 and 1H23, while the rise was just 19 % for other countries. The price hikes are much higher for Russia than other markets across most individual goods.

The initial price levels of Turkish exports to Russia and other markets are quite different in many cases. Limiting the analysis only on goods with comparable initial price levels, the price increase between 1H21 and 1H23 for the median product exported to Russia was 79 %, but just 26 % to other markets.

Product-level examples of Turkish exports to Russia include compression-ignition internal combustion engines (diesel or semi-diesel engines) and pressure-reducing valves. The value and quantity of Turkish exports of these goods to Russia was substantially higher in 1H23 than in 1H21, but growth in value terms was much more dramatic (Figure 7A). Export prices to Russia also increased much faster than export prices to other markets (Figure 7B).

**Figure 7.** A) Change from 1H21 to 1H23 in value and volume of Turkish exports to Russia for selected sanctioned goods; B) change in Turkish average export prices of these goods to Russia and other markets.



Note: All products refers to 82 HS6-level product lines comprising selected high-priority battlefield items and other dual-use goods.

Source: Author's calculations on data from Global Trade Tracker.

## 5. Sanction evasion via CCA countries

Some studies and media reports note the problem of sanction evasion. One example is the export of sanctioned goods of EU origin via CCA countries to Russia. Earlier studies estimate that re-exporting products manufactured in the EU via third countries to Russia could account for about 10 % of previous direct exports from the EU to Russia (Borin et al., 2023; Chupilkin et al., 2023).

Statistical analysis can only offer limited possibilities for identifying sanction circumvention as it constitutes criminal activity. Nevertheless, statistics can depict general trends and complement specific case studies.

We examine the development of EU exports to Russia and CCA countries and the trends in exports of the same goods from CCA countries to Russia. Here, our focus is on high-priority battlefield items and other dual-use goods, and again we compare trade flows in 1H23 to those of 1H21. Our assumption is that a substantial increase in EU exports of sanctioned goods to CCA, coupled with an increase in CCA exports to Russia, suggests potential sanction evasion through these countries. The capacity of CCA countries in production of sanctioned technology products is quite limited.

### 5.1 High-priority battlefield items

The value of EU exports of high-priority battlefield items to Russia in 1H23 was down by 97 % from 1H21 (Figure 8A). This also applies to the level of individual goods, for which the decline in exports is more than 90 % for nearly all of these products. The main exception is instruments for measuring semiconductor devices. The value of these exports more than doubled from 1H21 to 1H23, including a dramatic increase in exports from Slovenia. Despite sharp declines in the value of EU exports to Russia in most goods in this group, some categories such as instruments using optical radiation and static converters were still worth millions of euros in 1H23.

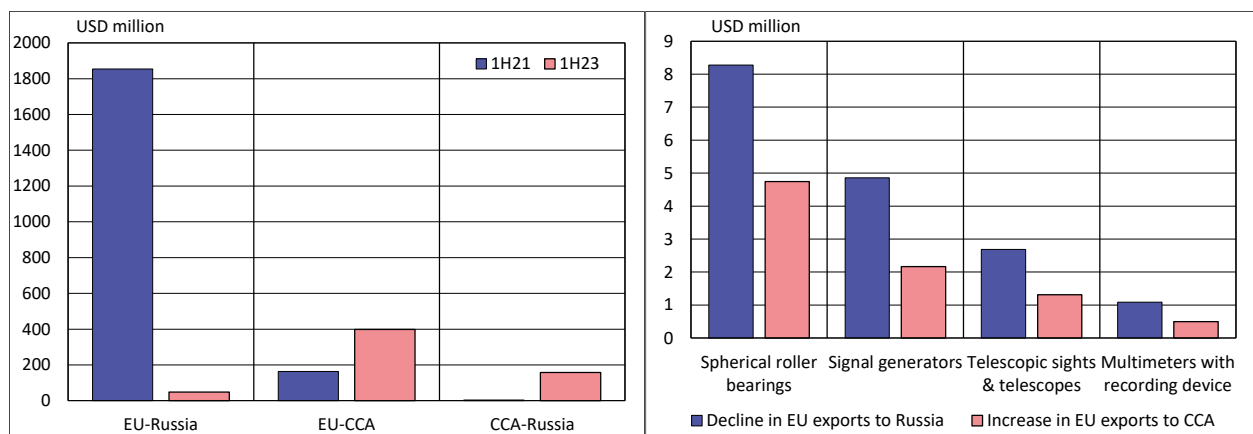
On the other hand, the total value of EU exports of these items to CCA countries was up by 145 % in 1H23 from 1H21. Growth rates are high for nearly all individual items. The increase is more

modest in absolute terms. The increase in exports to CCA equals about 13 % of the decline in exports to Russia. If we assume that all exports from EU to CCA countries were re-exported to Russia, the value of EU exports of high-priority battlefield items to Russia was still 76 % lower in 1H23 compared to 1H21.

There is, however, again substantial variation across individual items. For certain items, the increase in the value of EU exports to CCA accounts for 40–65 % of the decline in EU exports to Russia. These products include spherical roller bearings, signal generators, telescopic sights and telescopes, and multimeters with recording device (Figure 8B). If we assume that all exports from EU to CCA countries were re-exported to Russia, the value of EU exports of these goods to Russia was about 40 % lower in 1H23 than in 1H21.

While it is highly unlikely that all EU exports to CCA countries are re-exported to Russia, the actual share is difficult to quantify. The value of exports of high-priority battlefield items from CCA to Russia certainly skyrocketed – it was 17 times higher in 1H23 than in 1H21. The value of CCA exports to Russia also accounted for 40 % of the EU export value to CCA at the aggregate level. For certain individual products, the share was much higher (e.g. 74 % for signal generators and well over 100 % for some electronic integrated circuits). This evidence at least points to a potentially high rate of re-exporting of goods originating in the EU or other countries.

**Figure 8.** A) The value of exports of high-priority battlefield items from EU to Russia and CCA countries and from CCA countries to Russia in 1H21 and 1H23; B) Declines in EU exports to Russia and increase in EU exports to CCA countries between 1H23 and 1H21 for selected goods.



Source: Author's calculations on data from Global Trade Tracker and Statistics Kazakhstan.

## 5.2 Other dual-use goods

The value of EU exports of other dual-use goods to Russia fell by 82 % from 1H21 to 1H23 (Figure 9A). Most individual products saw dramatic declines, but there were exceptions. The value of EU exports of dual-use goods such as certain diesel engines, x-ray tubes and computer tomography apparatus increased. This increase does not necessarily implicate a violation of sanctions as restrictions related to dual-use goods are often determined at a more disaggregated level and do not necessarily cover all products at the HS6 level.

The value of EU exports of dual-use goods to CCA countries was 68 % higher in 1H23 than in 1H21. The increase in EU exports to CCA accounted for about 16 % of the decline in exports to Russia. Assuming that all exports from EU to CCA countries were re-exported to Russia, the value of EU exports of other dual-use goods to Russia was still about 50 % lower in 1H23 than in 1H21.

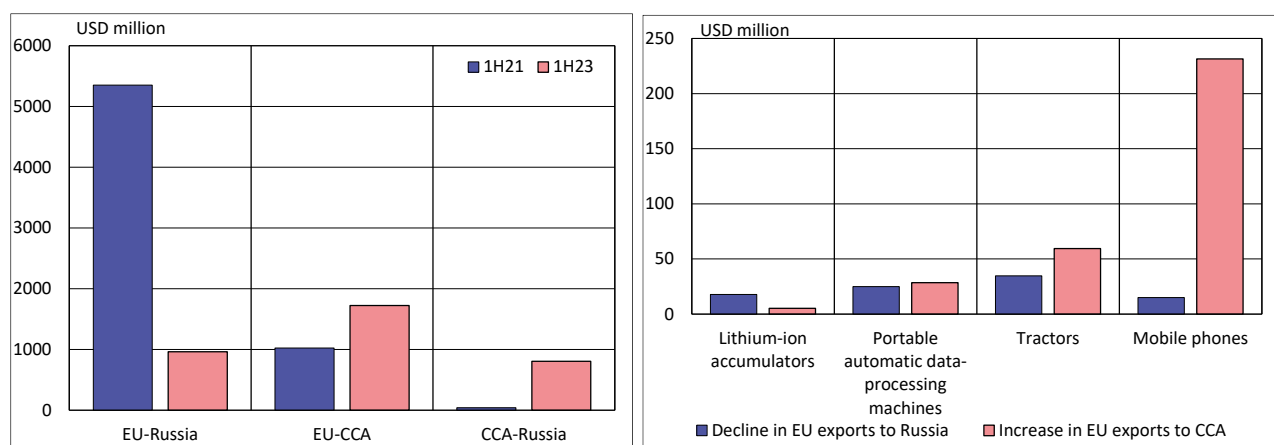


For certain goods, the increase in the value of EU exports to CCA countries was even higher than the decline in exports to Russia between 1H23 and 1H21. These goods include mobile phones, portable data-processing machines, dividing heads and other special attachments for machine tools.

Even at the aggregate level, the increase in CCA exports of dual-use goods to Russia was slightly higher than the increase in EU exports to CCA between 1H23 and 1H21. This again points to re-export of some of the goods imported from the EU and other countries.

There is again considerable variation across individual goods. For several goods, the increase in CCA exports to Russia was substantially higher than the increase in EU exports to CCA countries. These include central heating boilers, portable data-processing machines, inductors, lithium-ion accumulators and instruments for measuring electrical quantities.

**Figure 9.** A) The value of exports of other dual-use items from EU to Russia and CCA countries and from CCA countries to Russia in 1H21 and 1H23; B) Comparison of declines in EU exports to Russia and increases in EU exports to CCA countries between 1H23 and 1H21 for selected goods.



Source: Author's calculations on data from Global Trade Tracker and Statistics Kazakhstan.

## 6. Concluding remarks

This brief examined trends in Russian goods imports with a special focus on technology goods subject to EU export restrictions. Combined global exports to Russia in 1H23 and 1H21 were compared to evaluate the effect of sanctions on Russian imports. While Russia's total imports recovered to pre-war levels by 1H23, our analysis suggests that the picture is more nuanced – particularly for sanctioned products.

Our analysis suggests that export restrictions imposed by the sanctioning coalition have substantially cut Russian imports of high-priority battlefield items and other dual-use goods at the aggregate level. This finding also applies to most individual products. In some cases, the substitution ratio in value terms was more than double the pre-war level. For such goods, Russia clearly succeeded in finding alternative suppliers to replace lost imports from sanctioning countries. Particularly worrisome are those products that support Russia's own production capacity such as devices for manufacturing of semiconductors.

For luxury goods and other technology goods subject to export restrictions, Russia has been able at the aggregate level to fill the gap left by sanctioning countries by boosting imports from other markets. There is, however, much variation across individual goods particularly among the

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technology goods subject to other sanctions. For luxury goods, the imports from other market can be cheaper substitutes.

In geographical terms, our analysis finds three main trends related to exports of sanctioned technology products. Exports of sanctioning countries have substantially contracted in all sanction groups. The most rapid growth in exports of sanctioned goods has been recorded for CCA and SEE countries. Nevertheless, their share of Russian imports is still relatively small. In absolute terms, China towers as the key market for Russia for substituting lost imports from sanctioning countries in product categories where Russia has managed to substitute its lost imports. China dominates Russian imports in all sanction product groups at the aggregate level, as well as for most individual products.

Evaluating developments in import quantities is more difficult on the basis of mirror data due to limited data availability. We provide an indicative analysis based on a sample of high-priority battlefield goods and other dual-use goods exported from China and Türkiye to Russia. While export values and quantities have typically increased for these goods, our analysis suggests that growth has been much higher in value terms. Export prices to Russia have increased many times faster on average and across most products in comparison to other export markets.

Finally, our analysis points to some sanction evasion through CCA countries. At the aggregate level, the amount of evasion appears limited for the most important products. Even with the extreme assumption that all EU exports to CCA would be exported further to Russia, the value of exports of high-priority battlefield items and other dual-use goods was substantially below pre-war levels in 1H23. Even so, there is considerable variation across individual products. Further investigation would require more than our simple statistical analysis to assess the criminal aspects of this activity.

In any case, the findings here highlight the importance of sanctions enforcement. Sanctions can restrict the availability of technology for Russia, when properly executed. For certain sanctioned items, Russia has managed to find alternative imports and even more than compensate for lost imports. Extending export restrictions would make sanction evasion more difficult and restrict Russia's industrial capabilities for warfare more effectively.

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