wiiw

SEPTEMBER 2024

Russia Monitor 6

# Are Western Trade Sanctions Effective?

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In Cooperation with

The Vienna Institute for International Economic Studies
Wiener Institut für Internationale Wirtschaftsvergleiche

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The present report was prepared on 30 April 2024 as the outcome of research cooperation between the Vienna Institute for International Economic Studies (wiiw, coordinator), the Kiel Institute for the World Economy (IfW), the Leibniz Institute for Economic Research (ifo) and the Austrian Institute of Economic Research (WIFO) on behalf of the German Federal Ministry for Economic Affairs and Climate Action. The views expressed in the report are those of the authors and do not necessarily represent the views of the Federal Ministry for Economic Affairs and Climate Action or the minister.

# Abstract

Recent high-frequency data suggest a further strengthening of growth momentum, driven by the ongoing tightness of the labour market and the muted response of credit expansion to last year's monetary policy tightening. At the same time, the short- and medium-term fiscal outlook has brightened – despite increased military and social spending. On the external front, imports picked up at the end of 2023, but have suffered more recently due to increased payment difficulties – a result of renewed US pressure on banks from third countries dealing with Russia. The effectiveness of trade sanctions crucially hinges on the degree to which missing high-quality Western goods can be replaced with lower-quality products from third countries. Our calculations suggest that in 2023, the share of sanctioned CHP items that Russia was able to obtain ranged from 60% to 170% of the 2021 level, depending on underlying assumptions regarding the extent of the deterioration in quality.

Keywords: economic growth, fiscal situation, foreign trade, sanctions, unit value ratios

JEL classification: F14, F51, H20, H62, O10

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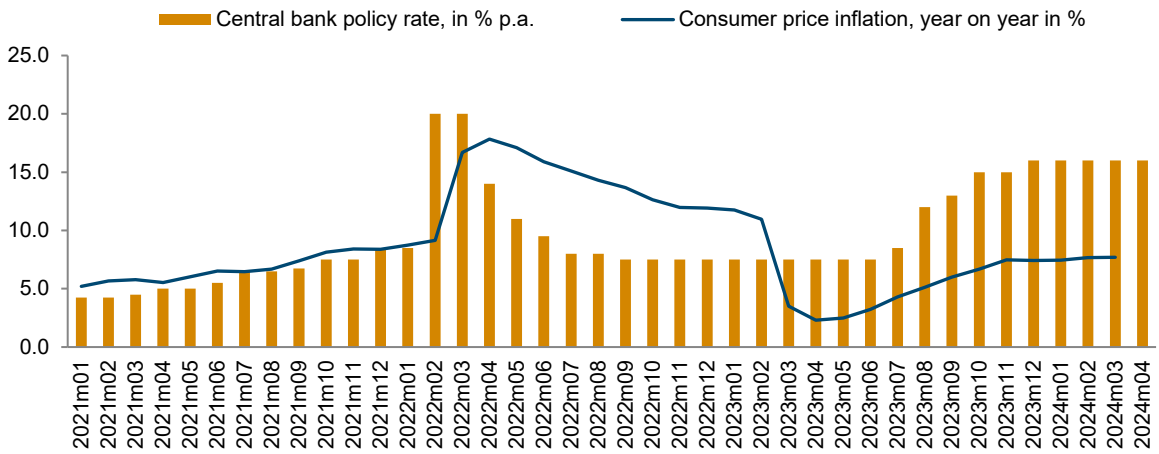
## GENERAL ECONOMIC SITUATION

**Recent high-frequency data suggest a further strengthening of growth momentum.**[1] According to the Ministry of Economy estimates, real GDP picked up by 4.6% year on year in January 2024, and by 7.7% in February. The growth in gross industrial production in Q1 reached 5.6% year on year, mainly on the back of sharply rising manufacturing (+8.8%), while output in mining finally stabilised (+1.1%) after last year's decline.[2] Retail trade turnover expanded by 10.5% year on year in Q1, fuelled in part by a 5.8% rise in real disposable household income. The labour market continued to be very tight, with real wages increasing by 10% year on year in January-February, and the unemployment rate (LFS) declining to another all-time low of 2.7% in March. Besides, private consumption has also been fuelled by a renewed uptick in consumer lending, following a dip at the end of last year in response to sharp monetary policy tightening. So far, the main transmission mechanism of policy tightening has been the strong growth in household deposits, while the response of credit dynamics has been far more muted.[3] On balance, the net saving propensity of households has risen; but this has not been sufficient to offset the positive effect of rapidly rising incomes on private consumption, which has continued to boom. The consumer sentiment index has climbed to another all-time high recently.

**Figure 1 / Inflation and policy rate, in %**




Source: wiiw Monthly database.

1 Central Bank of Russia (2024).

2 In particular, natural gas production soared by 10.6% year on year in Q1.

3 ibid. The levels of indebtedness in the Russian economy are still rather moderate by international standards; therefore, credit expansion may proceed for quite some time without jeopardising the stability of the banking sector.

**After picking up speed throughout most of last year, inflationary pressures have finally stabilised, albeit at a rather high level.** By 22 April 2024, annual consumer price inflation had reached 7.8% – far above the 4% inflation target, making the case for a continuation of tight monetary policy. Since December 2023, the policy interest rate has been maintained at an extremely high level of 16% (Figure 1), which means that in real terms it now exceeds 8%. This is one of the highest levels in Russia's recent history, and yet so far it has had little success in cooling the economy. Nevertheless, given the recent stabilisation of inflation, the central bank reckons that 'peak overheating' will already have been reached in Q2 2024. A gradual cooling of the economy over the remainder of the year will enable progressive disinflation. Inflation is projected to decline to 5-6% by the end of 2024, which may allow a moderate relaxation of monetary policy.

**Despite the recent strong recovery, the level of economic output is still below what it would have been without the war and sanctions...** Last year's GDP growth (3.6%) exceeded the recession witnessed in 2022 (-1.2%); as a result, real GDP in 2023 was 2.4% higher than before the war. How does this compare to the projected growth trajectory of the Russian economy, had it not been for the war and sanctions? In this alternative scenario, the recession in 2022 would clearly have been avoided; but growth in 2023 – assuming more or less the same restrictive economic policies as were pursued in the decade preceding the war – would certainly have been lower. The last wiiw forecast released immediately before the start of the war (in January 2022) forecast growth of 2% in 2022 and 1.5% in 2023.[4] Thus, in the alternative scenario, real GDP in 2023 would have been 3.5% higher than in 2021 and 1.1% higher than it actually was.

**… but the structure of GDP would have been different, too**, with a lower weight of military production and manufacturing in general. Ironically, the diversification of the economy away from excessive reliance on the energy sector, which for decades had been the topic of economic debate in Russia, is now taking place. Besides, growth *drivers* would also have been different: in 2023, growth was mainly driven by domestic demand, fuelled by military-related fiscal expansion (sometimes referred to as 'military Keynesianism') – something that was virtually unthinkable before the war, when the government was seeking to reduce fiscal vulnerabilities ahead of the forthcoming geopolitical conflict with the West. This fiscal expansion would almost certainly not have occurred, had it not been for the war (and hence the need to produce armaments) and sanctions (and the need to offset their impact on the Russian economy).[5]

**Nevertheless, the medium- and long-term prospects are not so bright.** The pace of economic recovery is expected to decline to below 3% this year and then to approach 2% in 2025-2026.[6] In the longer run, the economy is likely to fall behind on the technological front, due to reduced access to advanced Western technologies and inputs (which can only partly be offset by increased cooperation with China). This and the brain drain (the emigration of some of the most productive and best-educated labour force) are likely to weigh on the country's economic prospects. Besides, the economy has now become largely accustomed to the war-related fiscal stimulus and could face a demand-side shock once armaments are no longer needed to the same extent.

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4 wiiw (2022).

5 The latter is in line with the predictions by Galbraith (2023), who argued that sanctions may effectively prove to be a 'gift' to the Russian economy, rather than a tool of punishment.

6 wiiw (2024).

## THE FISCAL OUTLOOK HAS IMPROVED

In Q1 2024, the energy and non-energy tax revenues of the federal government soared by 79.1% and 43.2% year on year (in nominal terms), respectively. However, in the case of energy revenue, the extraordinarily large increase is to be viewed against the very low basis of Q1 2023, when Western energy sanctions weighed heavily on the price of Russian oil. Compared to Q1 2022, energy revenue was still 1.5% lower in nominal terms – despite the high inflation over the intervening period. By contrast, non-energy revenue in Q1 2024 was 38% higher than two years ago – and overall revenue 22% higher. In annual terms, overall revenue picked up by 53.5% year on year, far outstripping the 20.1% rise in expenditure.

Revenue from the oil sector soared by 91% year on year in Q1,[7] helped along by the following factors:

› A pronounced increase in global oil prices, which approached USD 90 per barrel (Brent oil) by the end of Q1.

› A change in the oil taxation mechanism. Back in Q1 2023, it was still based on the actual price of Russian Urals oil, which was highly volatile (reflecting above all the fluctuating price discount for Urals versus the benchmark Brent). Instead, since April 2023 the taxation mechanism has been based on the maximum discount versus the benchmark Brent, the value of which has been gradually reduced: starting from Q1 2024, it has been set at USD 20 per barrel.[8]

› A one-off boost to government revenue from the oil extraction tax (which was imposed to make up for the cancellation of the cuts in the petrol subsidy in autumn 2023).[9]

› Rouble devaluation, which inflated the value of revenue from energy exports in rouble terms: at the beginning of last year, the exchange rate was around 70 RUB/USD, versus 90 RUB/USD or more now.

Overall, in Q1 the federal budget closed with a deficit of a mere 0.3% of GDP.[10] Thus, on current trends the official deficit target of 0.9% of GDP set for this year will probably not be missed by much, and it is highly unlikely that the government will run out of funds for warfare any time soon. Despite high military spending and extra expenditure on five new 'national projects' and other policy measures announced by President Putin ahead of the March 2024 presidential elections[11] (which may cost between 0.5% and 1.1% of GDP per year during 2025-2030, according to some estimates),[12] the budget deficit is expected to remain at below 2% of GDP in the medium term, thanks to decent economic growth and relatively high inflation, both of which boost tax revenue.

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7 https://t.me/kirillrodionov/654

8 https://www.interfax.ru/russia/951910

9 Initially, the price subsidy for petrol sold domestically was cut markedly. However, the measure led to a (widely unpopular) sharp rise in retail petrol prices, prompting the government to reinstate the subsidy, see e.g. https://www.interfax.ru/business/930995.

10 https://minfin.gov.ru/ru/press-center/?id_4=38945-predvaritelnaya_otsenka_ispolneniya_federalnogo_byudzheta_v_1_kvartale_2024_goda

11 The measures announced include, among other things, the modernisation of housing, utilities and airports; the prolongation of the subsidised mortgages programmes; the building of new schools and the renovation of kindergartens; an increase in teachers' salaries; and the launch of satellites.

12 https://t.me/dmitrypolevoy/619

Government revenue should also be helped by the planned fiscal reforms: the more progressive taxation of personal income and a hike in corporate income tax. The government draft proposal reportedly envisages the introduction of personal income tax rates ranging from 13% to 20% (instead of 13-15% currently), as well as a hike in the corporate tax rate from 20% to 25%.[13] Besides, revenue should be boosted by the ambitious privatisation plans (not least involving the sale of the nationalised assets of foreign companies). While last year the privatisation revenues of the federal budget reportedly reached RUB 29bn (EUR 315m),[14] the target for 2024 has been set as high as RUB 100bn (EUR 1bn), although it remains to be seen whether that target will really be met.

The liquid part of the National Welfare Fund, which is now held entirely in Chinese renminbi and gold and can be used to cover budget deficits, now stands at around 3% of GDP and thus may be depleted by the end of 2026. Still, the government will have the option to borrow from domestic banks: at 15% of GDP, Russia's public debt is still very low and the scope for public borrowing correspondingly large. However, the yields on government bonds have risen recently, briefly exceeding 14% p.a. on ten-year maturity bonds at the beginning of April. With the policy rate of the central bank likely to be kept at elevated levels in the foreseeable future, the borrowing costs for the government will remain correspondingly high.

## IMPORTS TO RUSSIA SOARED AT THE END OF 2023…

In this section, we describe the most recent developments in terms of Russia's monthly imports (in real USD terms) across origin countries since September 2023. We combine data from various sources: aggregated import flows are from the Russian Central Bank, while disaggregated trade statistics come from national sources (mirror statistics) and UN Comtrade data. The trade statistics provide information at the HS6 product level for 79 countries (EU27 plus 52 other countries),[15] which accounted for 80% of all Russian imports in 2019. To determine the sanction status of all products, we leverage the ifo Institute's sanctions database.[16] The international product classification switched from HS2017 in 2021 to HS2022 in January 2022. To be able to compare trade flows over time, we follow the literature and harmonise all product codes with the earliest available classification (HS2017), ensuring that all our products are in HS2017 over the entire time period.

[13] The planned hike in the corporate tax rate should not present a major problem for the private sector, especially if in return the government refrains in future from introducing ad-hoc taxes on businesses (such as the recently imposed 5-10% windfall profit tax or the export duties on a wide range of items, motivated by the weak rouble and the correspondingly high profits of exporters). Also, the profit share of GDP – despite the recent decline – is still quite high in Russia, creating a welcome buffer for a higher taxation burden.

[14] https://www.forbes.ru/biznes/503254-pravitel-stvo-rossii-v-16-raz-perevypolnilo-plan-po-dohodam-ot-privatizacii

[15] National statistics: China (for 2024), Kazakhstan; Eurostat's Comext: EU countries; Comtrade: Andorra, Argentina, Australia, Azerbaijan, Bahrain, Barbados, Belize, Benin, Bosnia and Herzegovina, Brazil, Burkina Faso, Canada, Chile, China (for 2021-2023), Georgia, Guatemala, Guyana, Hong Kong (until 2023m11), Iceland, India (until 2023m11), Israel, Kyrgyzstan (2023m7 missing), Macao, Madagascar, Malaysia, Mauritius, Mexico, Moldova, Mozambique, Namibia, New Zealand, Nicaragua, Norway, Panama, Paraguay, Philippines, Serbia, South Africa, Spain, Switzerland, Tanzania, Togo, Türkiye, United Kingdom, United States, Uruguay, Uzbekistan (until 2023m11), Zambia, Zimbabwe.

[16] The export sanctions introduced on 18 December 2023 in sanction package 2023/2878 are disregarded in this report for two reasons: (i) due to their phase-in period, these sanctions do not have an entry-into-force date that falls within our period of interest, and (ii) due to their adoption after 15 December, these sanctions would not be considered as falling within the month of December in our analysis, even without a phase-in period.

In Q4 2023, total Russian imports remained constant and close to the levels of previous quarters, albeit with higher values in November and December: they increased by almost USD 2bn compared to September and October and exceeded usual end-of-year trends. In the aggregate, this surge is mostly explained by imports of non-sanctioned and partly sanctioned products. While trade with EU27 remained stable, China – still Russia's primary supplier – accounted for half of the increase.[17] Importantly, imports of sanctioned products also started to rise: from USD 2.5bn on average in March 2023, they totalled USD 2.8bn by the end of 2023. We next describe these developments in detail.

Chinese exports to Russia of sanctioned products soared unprecedentedly at the end of 2023, confirming Russia's heavy reliance on its key trading partner. In absolute terms, they increased from USD 1.8bn in October 2023 to USD 2.3bn in December, for the first time reaching almost double their pre-war levels. The sanctioned products that saw the largest increase in imports were automatic data processing machines (HS2017 product: 847130) and communication apparatus (HS2017 product: 851762): together they increased by USD 145m in November and USD 79m in December.[18] Alongside China, India increased its exports of sanctioned goods to Russia by 22% between September and November, with aircraft and spacecraft (HS product: 880330) driving the increase (USD 9.3m).[19]

Previous Russia Monitor reports highlighted the importance of Türkiye and CIS countries in providing sanctioned goods to Russia. However, within this group of countries recent trends have diverged: whereas Azerbaijan and Uzbekistan increased their exports in early 2024, exports from Türkiye, Kazakhstan and Armenia have recently decreased. Following two spikes in August and September 2023, imports from Uzbekistan grew again by USD 7m between October and November. A sudden large increase in import volumes from Azerbaijan in the first two months of 2024 is solely attributable to polymers, which are used, for example, in the automotive and electrical industry (propylene copolymers, HS2017 product: 390230).[20] On the other hand, Kazakhstan's exports to Russia started to fall in December 2023 (by USD 39m between 2023m11 and 2024m1). After a surge in exports of large aeroplanes in August 2023, Armenian exports of sanctioned products dropped steadily to reach USD 8m in January 2024. Finally, in the case of Türkiye, exports of sanctioned products to Russia dropped from December to reach USD 136m in January 2024 or 40% of the 2023 monthly average. For Russia's second-largest import partner, this is the first significant decline since 2022.[21]

The decrease in exports of sanctioned products from Türkiye and Armenia seems to have coincided for certain goods with an increase in China's exports to Russia. For Armenia, some of the largest export falls since August 2023 have been observed for automatic data processing machines (HS2017 product: 847130) and communication apparatus (HS2017 product: 851762). Interestingly, we see that Russia's imports of those products from China have recently increased by more than this drop: they accounted for

[17] Interestingly, we observe a surge in Russian imports from China for a specific type of electrical transformer (liquid dielectric transformers; HS6 product: 850423) during that period. The trade value for these transformers had been close to zero since the start of our time series (2023m1), but it soared to USD 231m in December 2023 – thus explaining a large share of the increase in non-sanctioned product imports from China at the end of 2023.

[18] These products have been largely imported throughout the war by Russia, suggesting that this surge is not seasonal.

[19] Data for India are only available until November 2023, which does not allow us to say anything about the evolution of Indian exports to Russia after that.

[20] This product has been imported from Azerbaijan before, with a comparable spike in August 2023 (USD 9.0m, against USD 9.9m in February 2024).

[21] This pattern is not restricted to just a few products; however, exports of petroleum oils (HS6 products: 271019) account for a large share of the decline.

the largest import increases from China since September 2023 across all sanctioned goods. We observe a similar pattern for some of Türkiye's declining exports to Russia: for example, exports of iron or steel parts (HS2017 product: 730890) dropped by USD 2.5m (between 2023m11 and 2023m12), while Chinese exports of this product increased a few months later (by USD 128m between 2024m2 and 2024m3). This overlap may signify a possible alteration in trade routes, but the full scope of the transition remains uncertain at this time.

Throughout 2023, the EU's direct exports of sanctioned goods to Russia were close to zero, indicating the significant impact of the sanctions implemented. Meanwhile, complete substitution of these goods from alternative sourcing countries proved unattainable for Russia, with approximately 40% of the pre-war value of sanctioned goods imports missing in 2023. Also, in 2023 China remained the pivotal player in Russia's import landscape, stepping in to fill the void left by the EU sanctions since the outbreak of the war with a remarkable surge of around 60% in sanctioned goods exports to Russia that year, compared to the pre-war period. Moreover, over the course of 2023, Türkiye and the CIS countries – predominantly Kazakhstan, Armenia, Uzbekistan and Azerbaijan – continued to play a crucial role in providing access to sanctioned products for Russia, thus underscoring the complex dynamics at play in international trade amid geopolitical tensions.

## … BUT HAVE SUFFERED MORE RECENTLY DUE TO INCREASED US PRESSURE ON BANKS FROM THIRD COUNTRIES

According to preliminary central bank data,[22] Q1 2024 closed with a current account surplus of USD 22bn – higher than in either Q1 2023 (USD 15bn) or any other quarter of 2023. In relation to GDP, the surplus reached 4.6%,[23] compared to 2.5% in 2023 as a whole. The annual increase was almost entirely due to improvements in the services balance[24] and the income balance (in both cases, the deficits declined), whereas the trade surplus in goods increased only marginally, by USD 700m. However, the nearly unchanged trade balance masks the fact that both exports and imports recorded a strong decline, with the decrease in imports (-10.6% year on year, in US dollar terms) outstripping that of exports (-6.9%).[25] In March, the gap between the dynamics of exports and imports was particularly pronounced: whereas exports rebounded after the low of January-February (thanks largely to higher oil prices), imports continued on their downward trajectory, contracting by 7% in monthly seasonally adjusted terms. In Q1 as a whole, merchandise imports stood at a mere USD 67bn, marking the lowest level over the last seven quarters (Figure 2). In seasonally adjusted terms, they have been declining now for three quarters in a row, which stands in stark contrast to the ongoing strong domestic demand and the real effective appreciation of the rouble since Q4 2023 (both these factors should have supported imports under normal circumstances).[26]

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22 http://www.cbr.ru/statistics/macro_itm/svs/bop-eval/

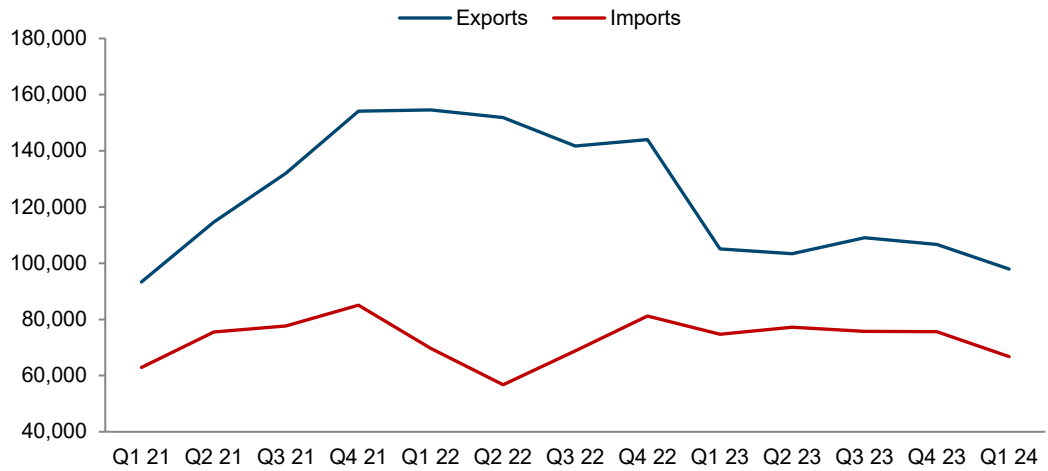
23 Development Centre (2024).

24 The structure of Russia's foreign trade in services is dominated by transportation services and trips abroad. In 2023, these two categories accounted for 36% and 16%, respectively, of total services exports, and 21% and 44%, respectively, of total services imports.

25 The main factors behind export decline were reportedly: (i) lower export prices of natural gas, coal and some metals, (ii) new import restrictions on Russian goods by the EU and G7 (such as on diamonds), (iii) higher import tariffs, such as the introduction of a 200% tariff on Russian aluminium by the US, and (iv) lower output of Russian refineries, https://www.kommersant.ru/doc/6651610?from=glavnoe_3

26 Development Centre (2024).

**Figure 2 / Merchandise exports and imports, in USD million, quarterly in 2021-2024**




Source: Central Bank of Russia.

Anecdotal evidence suggests that the main factor suppressing imports recently has been the increased payment difficulties in trade with third countries, such as China, Türkiye and the United Arab Emirates. In the wake of US President Biden's Executive Order No. 14114 signed on 22 December 2023, which greatly facilitated the enforcement of secondary sanctions on banks from third countries 'facilitating Russia's war machine',[27] many of them started delaying or refusing to process payments to and from Russia. Payment difficulties have reportedly been particularly significant on the import side (although export payments have also been affected), particularly for imports of electronic parts and components that are used inter alia in military production. As a result, for example Russian imports from Türkiye plunged by around a third (year on year) in the first two months of 2024.

More recently, problems with payments have also been mounting with the Chinese banks. Many of them have started demanding written confirmation that transactions are not linked to the Russian armed forces, military industry or the newly annexed Ukrainian regions; and some banks have stopped processing payments to and from Russia altogether.[28] Even payments in Chinese renminbi for purely civil goods have reportedly been affected.[29] As a result, in March 2024 Russian imports from China declined by 14.2% year on year, according to China's customs statistics (while in February, the figure was still positive: +9.6%), with imports of machinery and equipment being hit particularly hard.[30] Recent visits to China by US Secretary of the Treasury Janet Yellen (on 3-9 April)[31] and by Secretary of State

27 Executive Order No. 14114 was, inter alia, an amendment to Executive Order No. 14024. It stated that 'a financial institution sanctioned … will face either full blocking sanctions or the loss of, or strict conditions on, their US correspondent accounts'. https://www.whitehouse.gov/briefing-room/statements-releases/2023/12/22/fact-sheet-biden-administration-expands-u-s-sanctions-authorities-to-target-financial-facilitators-of-russias-war-machine/

28 https://iz.ru/1680898/mariia-kolobova/peremennaia-obstanovki-banki-v-knr-vvodiat-novye-usloviia-dlia-platezhei-iz-rf

29 https://thebellmirror12.site/sborka-elektroniki-na-pauze-iz-za-kitayskikh-bankov-kurortnyy-sbor-prevratyat-v-nalog-skhema-s-rezervami-dlya-ukrainy

30 https://www.rbc.ru/economics/23/04/2024/662664779a7947ad752fb84e. In monthly terms, imports from China in March 2024 increased by 0.6% compared to February, but registered a marked decline of 17.3% compared to January (own calculations based on China's General Customs Administration data).

31 https://home.treasury.gov/news/press-releases/jy2218

Antony Blinken (on 24-26 April)[32] have reportedly put further pressure on Chinese banks in their dealings with Russia. Should these problems persist, the Russian economy may be essentially cut off from imports of critical parts and components, resulting in GDP growth being lower than forecast in the baseline scenario.

There are not that many possible options for Russia to circumvent the payment problems with third countries. Aside from increased transactions through those banks in third countries that have no exposure in the US and to the US dollar (and are therefore largely immune to US pressure), one possible solution would be the increased use of cryptocurrencies (such as the digital rouble) for payments; a law to this effect was adopted in March.[33] Also, Russian banks could set up subsidiaries in third countries; however, this would take time (e.g. VTB is reportedly the only Russian bank with a subsidiary in China at present). Finally, the processing of payments could be re-routed via other third countries that are not (yet) on the radar of the US authorities. However, this would most probably provide only a temporary solution and would inevitably involve additional costs, which would ultimately have to be paid by Russian consumers and businesses.

The remainder of this report analyses the effects of Western sanctions on the prices and quality of sanctioned common high-priority (CHP) items imported by Russia.

## PRICES AND PRODUCT QUALITY MATTER FOR THE EFFECTIVENESS OF SANCTIONS

The sanctions implemented by the European Union (EU) and other Western allies have effectively halted direct exports to Russia. Our previous analyses have relied on comparisons of trade values across countries of origin. This approach, which is standard in the literature, offers valuable insights into broad shifts in Russian import patterns since the outbreak of the Ukraine conflict. It may, however, not be suited to accurately assessing Russia's ability to replace the missing Western imports, as it fails to take account of any potential changes in prices (i.e. due to inflation), as well as the variation in product quality (i.e. imperfect substitution).

In this section, we will discuss the role of changes in price and product quality and will analyse their relevance for the CHP items, which include 48 goods critical to Russia's weapons systems and its military development.[34] We use the same data as described in more detail in the next section; the data contain export values (in USD) and quantities (in kg) to all destinations, allowing us to construct unit values for every CHP item, which we use as a proxy for product-level prices.[35] From our previous analyses we know that the time series for Russian imports are plagued by notorious outliers. Since our goal is to provide information about general price trends, we would like to smooth these out. To this end, we aggregate the raw monthly data to annual data, in order to then calculate unit values.

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32 https://www.wsj.com/politics/national-security/u-s-takes-aim-at-chinese-banks-aiding-russia-war-effort-fcf76dcc

33 https://www.rbc.ru/crypto/news/6613b56a9a79473ff78a977f

34 The CHP items were taken from the list published by the EU on 22 February 2024: List of common high priority items - European Commission (europa.eu). The list includes the following new HS2017 codes: 845710, 845811, 845891, 845961, 846693. To observe trade flows over time, we need to translate the HS2022 codes into the HS2017 nomenclature.

35 Unit values are a standard measure in the international trade literature to proxy product-level prices.

To understand the interplay between import prices, values and the ability to find a substitute for imports that are missing due to sanctions, it is helpful to formalise a measure to quantify Russia's ability to access CHP items since the beginning of the war. Ideally, we would like to compare the change in total Russian imports of CHP items since the start of the war to pre-war levels, i.e. the share of pre-war levels of imports that can be replaced with imports from third countries. Hence, the resulting share tells us how easy it is for Russia to substitute for missing Western imports: the lower the share, the harder it is for Russia to access CHP items and the greater the effectiveness of the sanctions. The equation below describes this relationship, where import values *M* are the product of prices *p* and import quantities *q* and the index *t-1* indicates pre-war values. Hence, a change in the measure of effectiveness of sanctions can be due to either different quantities or different prices. Therefore, focusing solely on observed import values might not give us a clear-cut answer to the question of how easy it is for Russia to substitute for the lack of CHP items from the West, as we cannot disentangle price effects from changes in import quantities.

$$\frac{M}{M_{t-1}} = \frac{M^{EU} + M^{3rd}}{M_{t-1}} = \frac{\overbrace{(p^{EU} \times q^{EU})}^{\text{values EU}} + \overbrace{(p^{3rd} \times q^{3rd})}^{\text{values 3rd countries}}}{\underbrace{M_{t-1}}_{\text{total values pre-war}}}$$

If prices increase, we may wrongly assume that sanctions are less effective if we only look at import values, as we ignore any inflationary effects; conversely, lower prices will overstate the effect of sanctions, if the product quality stays the same. One might think that focusing on import quantity fixes this problem. While this is true of single products, as soon as the goal is to aggregate over different products – to make statements for all CHP items, for example – it becomes impossible to distinguish between increases in the actual quantity of imports and shifts in the import composition from light to heavy products.

Why would we assume that prices will increase in the first place? First, worldwide inflation is at a high level. Second, in the case of sanctions evasion through entrepôt countries, we expect the prices of Russian imports to increase even more. Buying EU goods through entrepôt countries entails higher trade costs, due to longer trade routes. Moreover, the involvement of multiple intermediaries in logistics may introduce mark-ups along the supply chain, as they seek compensation for their services. Lastly, we expect higher prices for imports from suppliers from non-sanctioning countries that are offering the same quality as exporters from the EU. New suppliers from neutral third countries could not compete with Western exporters before the war (e.g. due to higher production costs), otherwise they would already have been serving the Russian market in the pre-war period; they therefore charge higher prices. Note that in our analysis we will not be able to disentangle the different channels of the overall price effects.

At the same time, prices do not necessarily have to increase. An alternative way of substituting for missing Western imports is through lower-quality products from third countries, such as China. For example, the press has reported that Chinese firms are selling US headphones without American licences and in bulk, which reportedly brings the price down from USD 150 originally to USD 19.[36] Alternatively, Russian firms could substitute for missing Western inputs by recycling used goods or by

[36] Sanctions hole - Layout (verstka-media.translate.goog)

replacing parts with non-original and cheaper parts, as has reportedly occurred in the aerospace industry.[37] Again, prices are indicative, as we seek to understand this channel, since we would expect firms that offer lower quality to charge lower prices for the same CHP item as firms that offer higher quality. Following the literature, we will interpret lower prices as a proxy for lower quality.[38]

## THE EFFECTIVENESS OF SANCTIONS HINGES ON THE SUBSTITUTABILITY OF LOW- FOR HIGH-QUALITY CHP ITEMS

To determine how easy it has been for Russia to substitute for missing Western CHP items, we adjust the import values for the years 2022 and 2023 to account for price effects. Thereby we quantify two scenarios.

***Scenario 1: Imports from third countries are a perfect substitute for missing CHP items from the EU***

To eliminate price effects stemming from general inflationary pressure, as well as potentially higher prices due to costly sanctions evasion, for every CHP item we multiply the quantities imported in 2022 and 2023 by the EU price in 2021 for exports to Russia. Note that in this scenario we assume that the quality remains the same, i.e. imports from third countries such as China or Türkiye are of the same quality and are hence a perfect substitute for the European counterpart. Our calculations show that, on the assumption of perfect substitutability between CHP items from the EU and third countries, Russia was able to import 154% of the pre-war levels in 2022, and 170% in 2023 (see row (1) of Table 1).

**Table 1 / The degree of substitution of missing CHP items**

| adjustments | | 2022 | 2023 |
|---|---|---|---|
| (1) | price adjustment, no quality adjustment | 154% | 170% |
| (2) | price and quality adjusted | 71% | 60% |
| (3) | no adjustment | 60% | 67% |

Note: This table shows total Russian imports of CHP items in 2022 and 2023 as a percentage of 2021, with and without price and quality adjustments. Details about the adjustments can be found in the text.

These high numbers illustrate very impressively that the quantity of CHP items imported rose substantially compared to the pre-war period. However, this does not necessarily mean that the CHP items imported from third countries are a perfect substitute for the missing European ones. If third countries can only provide lower-quality products, the presumably high share of substitutability is inflated, as third-country varieties are not perfect substitutes for European ones.

To address potential underlying differences in quality across the various countries of origin, the literature suggests comparing the unit values of different varieties, i.e. the same product from different origins. In our context, for the sake of comparison we would like to use unit values in the pre-war period, in order to see whether third-country varieties are perfect substitutes for European ones, or if they are of lower quality, as measured by lower unit values. In principle, we could perform this comparison for each of the 48 CHP items separately. However, since interpreting the results would be very cumbersome and

[37] https://istories.media/en/stories/2023/09/12/russian-airplanes-spare-parts/

[38] See for example seminal papers by Flach and Unger (2022), Lugovskyy and Skiba (2015) and Dingel (2017).

uninformative, we aggregate and compare the simple average of the unit values of all 48 CHP items in 2021 across origin countries.

Table 2 shows the simple average for all CHP items for the years 2021 to 2023, by country of origin. The simple average unit value over all 48 CHP items in 2021 was USD 599/kg for imports from the EU. For the same set of products, the simple average of the Chinese varieties was more than 60% lower than the EU figure in the pre-war period. As we are comparing the *same* set of products being exported to Russia in the *same* year, these differences can be interpreted as indicating underlying differences in quality – i.e. the CHP items that Russia sourced from China in 2021 were of lower quality than their European counterparts. For the remaining third countries, this comparison is not as straightforward, because they did not export all 48 CHP items. Hence, comparison with the EU is less meaningful, since differences could arise due to different baskets of CHP items. For example, in 2021 Türkiye exported only 36 CHP items to Russia; and Kazakhstan only 37.

**Table 2 / Simple average of unit values of Russian imports of CHP items from different origin countries**

| | | | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| (1) | **EU to RUS** | avg. USD/kg | 599 | . | . |
| | | % (22/23 vs. 21) | | | |
| | | No. of items | 48 | . | . |
| (2) | **CHN to RUS** | avg. USD/kg | 227 | 418 | 445 |
| | | % (22/23 vs. 21) | | 84% | 96% |
| | | No. of items | 48 | 48 | 48 |
| (3) | **ARM to RUS** | avg. USD/kg | 283 | 1244 | 553 |
| | | % (22/23 vs. 21) | | 340% | 95% |
| | | No. of items | 22 | 42 | 44 |
| (4) | **KAZ to RUS** | avg. USD/kg | 112 | 453 | 584 |
| | | % (22/23 vs. 21) | | 305% | 422% |
| | | No. of items | 37 | 42 | 45 |
| (5) | **TUR to RUS** | avg. USD/kg | 169 | 201 | 716 |
| | | % (22/23 vs. 21) | | 19% | 324% |
| | | No. of items | 36 | 45 | 47 |
| (6) | **SRB to RUS** | avg. USD/kg | 2679 | 886 | 901 |
| | | % (22/23 vs. 21) | | -67% | -66% |
| | | No. of items | 21 | 39 | 27 |
| (7) | **SRB to RUS** | avg. USD/kg | 388 | 824 | 877 |
| | *(w/o HS6 852580, 847150, and 903082)*[39] | % (22/23 vs. 21) | | 113% | 126% |
| | | No. of items | 18 | 37 | 25 |

Note: The table shows the simple average unit values for imports from the EU, entrepôt countries and China to Russia. The percentage change in the second row is the change with respect to 2021, the third row gives the number of CHP items (their total number is 48) that are exported at least once in the respective year. Data for Kyrgyzstan are unfortunately not available due to incomplete time series.
Source: UN Comtrade, Comext, national statistics for Kazakhstan.

[39] HS6 852580: Television cameras, digital cameras and video camera recorders; HS6 847150: Units of automatic data processing machines; processing units other than those of item no. 8471.41 or 8471.49, whether or not containing in the same housing one or two of the following types of unit: storage units, input units or output units; HS6 903082: Instruments and apparatus; for measuring or checking semiconductor wafers or devices.

Also note that if the European varieties of CHP items are transshipped through entrepôt countries to avoid sanctions, but are otherwise identical to the pre-war varieties (i.e. are of the same quality), we would expect prices to rise and to exceed the European average unit values before the war, since higher transport costs and high levels of inflation since the outbreak of the war have driven prices up. However, when we compare the simple average for all exported CHP items across the origin countries, we do not observe this uniformly. Instead, for China – the most important supplier of CHP items to Russia – the average unit value in 2023 was still roughly 25% lower than the pre-war EU unit value. Interestingly, over time there has been a significant increase in the average unit value of Chinese varieties. In addition, we find that there is a distinctly Russia-specific mark-up apparent in China's pricing strategy: in 2022, China charged on average 1.8 times more for exports of CHP items to Russia than to other BRICS countries (which constitute a suitable control group to account for global trends, such as differences in demand for CHP items).[40] In 2023, the figure was 2 times more.

Overall, analysis of average unit values suggests differences in quality across Russian suppliers, as particularly Chinese CHP items seem to be of lower quality than their European counterparts. Lower quality could result in heavy wear and tear, and therefore more rapid replacement than in the pre-war period, thus making imports from third countries imperfect substitutes for the missing CHP items from the EU. Therefore, in the next scenario we adjust for quality.

***Scenario 2: Low-quality imports are an imperfect substitute for missing high-quality CHP items***

The assumption of the perfect substitutability of low-quality CHP items from third countries for high-quality European products most likely does not hold: if they were perfect substitutes, we should have seen zero (or very few) imports of more expensive EU products in the pre-war period. However, this was not the case: the EU used to be a major supplier of CHP items to Russia. Furthermore, the reported smuggling of, for example, microchips by private individuals would not be necessary (or profitable) if perfect substitution were possible. Hence, using EU prices for the calculations will only give a useful upper bound of Russia's ability to substitute for the missing imports of CHP items.

To correct for the differences in quality, we next adjust the prices for the three countries from which Russia seems to be sourcing low-quality CHP items, i.e. China, Türkiye and Kazakhstan. To achieve this, we replicate the previous procedure; however, for imports from those three low-quality suppliers, instead of using the EU's 2021 export prices to Russia, we use their own export prices. Adjusting for quality reduces the degree of substitution of pre-war imports of CHP items to 71% in 2022 and 60% in 2023. These numbers can be regarded as a lower bound of Russia's ability to substitute for the missing imports of CHP items. In particular in the short run, we would expect the substitutability of low-quality products for high-quality ones to be elevated, since lower quality (for example, no need for costly licences if non-original spare parts are used) could lead to a shorter lifespan for the products, but most likely will not make a huge difference in the short run. Put differently, if we could perfectly observe quality and adjust for it, we would expect the share of substituted imports to be somewhere between the values reported in rows (1) and (2) of Table 1.

[40] i.e. Brazil, India and South Africa.

## LITTLE EVIDENCE OF HIGHER COSTS DUE TO SANCTIONS EVASION

Unfortunately, it is not possible to determine with certainty whether sanctions evasion is costly – and, if it is, how much more Russian importers have to pay to maintain their access to EU products. For that, we would need much richer data, such as transaction-level product descriptions, to determine the quality of the exported CHP item in detail, as well as more information about additional trade costs (e.g. higher freight costs). However, the evidence presented in this report runs counter to the claim that sanctions lead to significantly higher prices for Russian imports, which would make it harder for Russia to substitute for missing imports of CHP items. Why is that? If higher prices were inflating import values, and thereby leading us to understate the effectiveness of sanctions, the unadjusted shares of pre-war import levels should be higher than the adjusted ones. However, that is not the case.

This does not mean that the sanctions are having no effect whatsoever. Our analysis shows that Russia is importing CHP items that are of lower quality – and that could have potentially severe repercussions in the medium to long term. Furthermore, we have some evidence suggesting that the prices of these lower-quality CHP items have increased quite substantially as well, which is a consequence of the sanctions.

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IMPRESSUM

Herausgeber, Verleger, Eigentümer und Hersteller:
Verein „Wiener Institut für Internationale Wirtschaftsvergleiche“ (wiiw),
Wien 6, Rahlgasse 3

ZVR-Zahl: 329995655

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Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein "Wiener Institut für Internationale Wirtschaftsvergleiche", A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

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