

THE IMPACT OF THE UKRAINE CRISIS ON INTERNATIONAL TRADE

ZSOLT DARVAS AND CATARINA MARTINS

We study the economic implications of Russia's invasion of Ukraine, by scrutinising global trade volumes and commodity prices, trade balances and bilateral trade flows between major economic powers and Russia. We find that energy prices increased more in 2021 than in 2022, suggesting that the war and the sanctions were not the most important drivers. Nevertheless, International Monetary Fund forecast revisions from October 2021 to October 2022 suggest that the volume of global trade in goods and services declined by 3.4 percent, energy prices increased by about 100 percent, and the prices of non-energy commodities by 8 percent. The war could be an important driver of these forecast revisions, though other factors were also at play. While forecasts for important industrial production input costs were not revised, soaring energy prices deteriorated the trade balance of countries importing energy.

Only half of the increase in Russia's trade surplus was related to soaring energy prices. The other half resulted from the collapse of Russian imports, which will likely undermine the Russian economy's productive capacity over time. Falling Russian exports of goods other than mineral fuels suggest Russia's productive capacity has already weakened. Russia's trade has been reoriented from advanced economies to China, India and Turkey, but this has only partially compensated for the decline in trade with advanced countries.

We find that sanctions had an impact on trade. There is no evidence of European and US companies circumventing sanctions by re-routing sanctioned goods to Russia via China and Turkey. The UK and the US have already stopped importing fossil fuels from Russia, and such imports by the EU have declined. With the EU's Russian seaborne crude petroleum import ban taking effect in December 2022 and the refined petroleum ban coming to effect in February 2023, Russia's revenues from fossil fuel exports to the EU are set to shrink significantly, with limited options for redirecting exports to other countries.

The three main policy-relevant implications from our research are:

- The war and the sanctions are not the most important drivers of energy prices;
- The direct aim of sanctions seems to have been achieved;
- The capacity of the Russian state to finance the war from fossil fuel revenues is bound to shrink.

Paper prepared for the Nomura Foundation's Macro Economy Research Conference 2022 on 'The Impact of the Ukraine Crisis on the Global Economy', Tokyo, 27 October 2022. The authors thank Maria Demertzis, Masahiro Kawai, Atsushi Nakajima and participants in the Nomura Foundation Conference and the 31 October 2022 Bruegel Research Meeting for useful comments and suggestions, and Conor McCaffrey for his help with updating the dataset.

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Recommended citation:

Darvas, Z. and C. Martins (2022) 'The impact of the Ukraine crisis on international trade', *Working Paper 20/2022*, Bruegel

1 Introduction

On 24 February 2022, Russia invaded Ukraine, triggering international condemnation. The 2 March 2022 United Nations resolution demanding that Russia immediately end its military operations in Ukraine was adopted by 141 countries, with 37 abstentions and 5 against, while the 12 October 2022 UN resolution demanding the reversal of Russia's attempted illegal annexation of Ukrainian territories was adopted by 143 countries, with 35 abstentions and 5 against¹.

The international condemnation was followed quickly by the imposition of wide-ranging economic sanctions on Russia, and the provision of military support to Ukraine, by most OECD and European Union countries. Trade-related sanctions have included prohibitions of exports to Russia of strategic goods, including high-tech goods and components for use in electronics, telecommunications, aerospace and oil refining, among other sectors. Sanctions imposed by the United States apply not only to goods exported by US companies, but also to goods produced elsewhere using US technologies. The extra-territorial nature of US sanctions has likely impacted exports to Russia even from countries that have not applied sanctions. The EU, United Kingdom and US have also announced plans to phase out imports of Russian energy.

The war hit the global economy by creating new geopolitical and economic uncertainties, soaring energy prices, and disruptions to global value chains in which Russian and Ukrainian companies were involved. Economic sanctions exerted adverse effects not only on Russia, but also on countries that imposed them and, more generally, on other economies because of higher energy and commodity prices.

Isolating the impact on the global economy and trade of Russia's war is difficult because global inflation pressures were building up already before the war, along with the recovery from the COVID-19 pandemic. The pandemic resulted in shortages of various materials and machinery, and in increased transportation costs and times. The fiscal stimulus implemented by most countries around the world in 2020-2021 supported household incomes, but the uncertainty and lockdown restrictions boosted household savings in several countries, creating pent-up demand. Sandbu (2022) argued that one of the reasons for the global surge in inflation, which came earlier than the energy price shock, was the strong rebound in US consumer goods demand, leading to a global scarcity of goods, with spill-over effects on the rest of the world. As pandemic-related restrictions were eased and largely eliminated from 2021 or early

¹ The five countries that voted against the UN resolution in March 2022 were Belarus, North Korea, Eritrea, Russia and Syria, while in October 2022, Eritrea abstained and Nicaragua joined the other four countries voting against it. Most of those countries abstaining were African nations, alongside China and India. See <https://news.un.org/en/story/2022/03/1113152> and <https://news.un.org/story/2022/10/1129492>.

2022, demand for contact-intensive services has also resumed². These developments would have exerted upward pressure on various prices even without the war.

In fact, global commodity prices started to increase significantly already in 2021 and energy prices increased faster in 2021 than in 2022, suggesting that the war was not the main driver of energy prices (Figure 1). In the last week of 2020, Brent was traded at \$51, which had increased by 54 percent to \$79 by the last week of 2021. After the war began, the price temporarily increased to \$117 (weekly average in 7-11 March 2022) – a 48 percent increase from the last week of December 2021. The oil price then fluctuated around \$110 before peaking at \$122 on the week of 6-10 June 2022, followed by a reduction below \$100 from August 2022. The price fell below \$80 by the second week of December 2022, ie returned to its value in end-2021, despite the ongoing war and the implementation of oil sanctions by the EU, US and UK.

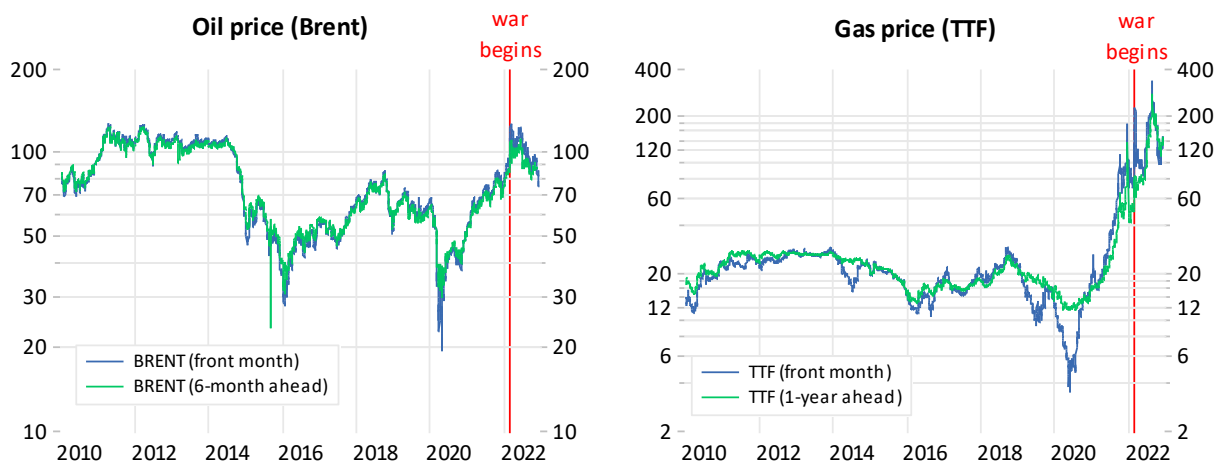
Gas prices were more volatile. The Dutch TTF gas price increased from €19 in the last week of 2020 to a staggering €149 by the fifty-first week of the year, ie an increase of 680 percent – in the absence of any war or sanctions. McWilliams *et al* (2022b) argued that even before it invaded Ukraine, Russia was manipulating European natural gas markets: it substantially reduced exports after summer 2021 and did not refill Gazprom-owned storage sites in the EU. At the same time, corrosion problems pushed France to shut down many of its nuclear power plants, increasing the need for gas in power generation, while a severe drought drained rivers and lakes to extremely low levels, compromising hydropower generation and also thermal plants that require cooling, and coal-fired power plants that rely on waterways to deliver coal. All these have increased demand for liquefied natural gas (LNG), which pushed gas prices up³. Gas prices declined ahead of the war by early February, then jumped to €171 by the second week of March, shortly after the invasion. The gas price remained highly volatile, depending on the need for gas in electricity generation and Russia's continued cut in gas supply to Europe, despite the absence of any European gas sanction. The peak of €300 (weekly average in 22-26 August 2022) was followed by a sudden decline and volatility, with the early-December 2022 price (€140) similar to the price towards the end of 2021.

² See Darvas and Martins (2022) for a comparative analysis of demand conditions in the euro area, Japan, the United Kingdom and the United States during the recovery from the pandemic recession.

³ The European Commission's November 2021 European Economic Forecast similarly concluded: "*The factors that have contributed to the outstanding surge in gas prices in Europe include strong demand as the economies reopened, reduced stocks after a cold winter, limited supply from Russia and exceptionally weak wind- and hydropower-generated electricity, and to a lesser extent the impact of rising carbon emission prices*". See https://economy-finance.ec.europa.eu/publications/european-economic-forecast-autumn-2021_en.

Thus, both oil and gas prices increased much more in 2021 than in 2022.

Figure 1: Oil and gas wholesale prices, 2010-2022 (daily data)



Source: Bruegel based on Bloomberg. Note: A front month is the nearest expiration date for a futures or options contract. Brent is measured in dollars, TTF is measured in euro. The last observation date is 12 December 2022. The vertical axes use logarithmic scaling to better capture percent changes (eg a change in Brent from \$50 to \$100 and from \$100 to \$200 represent the same percent change).

Rising inflation led the Federal Reserve, the European Central Bank (ECB) and the Bank of England to tighten monetary policy more aggressively than previously expected. This had spill-over effects on the rest of the world via trade and financial links.

In this paper, we analyse the implications for trade of Russia's war. We start by scrutinising global trade volumes and commodity prices, by comparing pre-war projections with current outcomes. Next, we examine monthly Russian trade statistics. Since Russia's central bank stopped publishing detailed foreign trade data after Russia invaded Ukraine⁴, we collected such bilateral data from European Union countries, China, the United States, South Korea, Japan, India, the United Kingdom and Turkey to analyse exports to and imports from Russia. These 34 countries accounted for around 75 percent of Russia's exports and imports in 2019. We then zoom in on the trade in some sanctioned product categories, also examining if there has been an attempt to circumvent sanctions. A concluding section closes the study.

⁴ Reuters, 'Russia suspends publication of import-export data to avoid "speculation"', 21 April 2022, <https://www.reuters.com/article/ukraine-crisis-russia-imports-idUSKCN2MD1T7>.

2 Global trade volumes and commodity prices

One way to approximate the impacts of the war is by comparing commodity price and trade volume projections made in October 2021 (when the perceived likelihood of a war was not taken into account in economic forecasts⁵), April 2022 (shortly after the war started) and October 2022. Three main other interrelated developments make this approximation imperfect.

First, expectations of monetary policy tightening by major central banks are greater now than in 2021, which might drag global economic activity, and hence global trade and commodity prices. Yet, one of the reasons for more tightening is the higher inflationary pressure resulting from the temporarily higher energy prices due to the war.

Second, the likelihood of new pandemic waves potentially necessitating further lockdown measures, as well as the pace of withdrawal of existing pandemic restriction measures, might have been predicted imprecisely in 2021. The October 2021 IMF *World Economic Outlook* (WEO) put pandemic-related risk as the first among a series of downside risk factors⁶, while a year later, the October 2022 WEO noted that *“Although the pandemic’s impact has moderated in most countries, its lingering waves continue to disrupt economic activity, especially in China”*, suggesting that in most countries except China, pandemic-related restrictions could be less of a constraint on economic growth than in the previous two years. If the 2022 pandemic waves became milder than expected, resulting in less-stringent restrictions, then on their own, less-stringent restrictions boosted growth, global trade and commodity prices.

Third, the Chinese economy started to slow down, which would have likely happened without the war. For 2024-2026, a period which will hopefully fall beyond the war, IMF expects about half a percent per year slower GDP growth in China in its October 2022 forecast than its October 2021 forecast.

Thus, even though the revisions to trade and commodity price forecasts do not reflect only the impact of the war, the war has likely played an important role in the revisions.

Figure 2 shows that the pandemic resulted in a major drop in global trade in 2020, followed by a strong rebound in 2021, resulting in a total trade volume that was 1.5 percent higher in 2021 than in 2019. Naturally, the rebound-driven pace of global trade growth in 2021 was set to decelerate from 2022. The

⁵ The October 2021 IMF WEO did not mention any risk related to Russia and Ukraine, nor did the November 2021 European Commission forecast or the December 2021 OECD *Economic Outlook*.

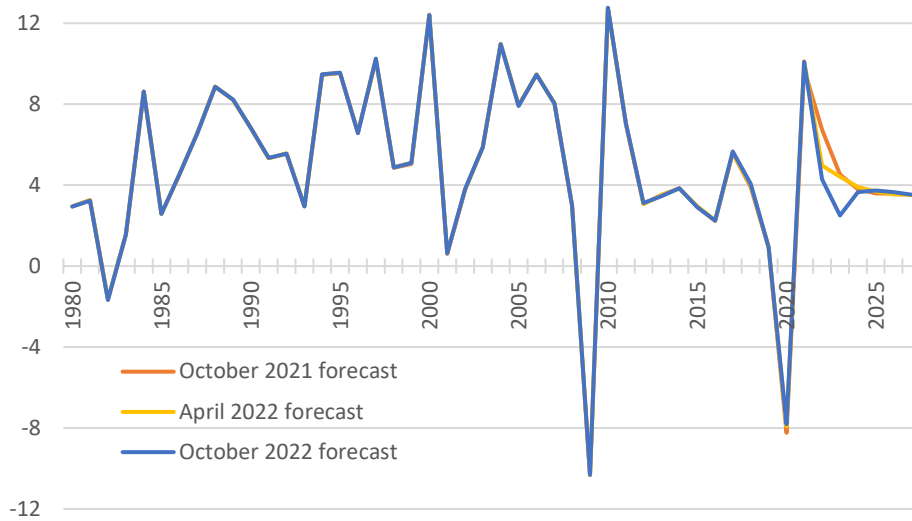
⁶ The October 2021 IMF WEO’s first downside risk factor was: *“Emergence of more transmissible and deadlier SARS-CoV-2 variants could further re-energize the pandemic’s spread and intensity, prolonging the pandemic and precipitating pullbacks of economic activity. Trade disruptions and supply-demand mismatches could increase with port closures due to renewed lockdowns.”*

October 2021 forecast for 2022 growth of global trade volume was 6.7 percent, which was reduced to 5.0 percent in the April 2022 forecast and 4.3 percent in the October 2022 forecast. Overall, the level of global trade volume in 2023 was forecasted to be 3.4 percent lower in October 2022 than the October 2021 forecast, with this gap forecasted to stabilise in 2024-2026. Whether 3.4 percent is small or large is subject to judgement. On the one hand, this is a large value in dollar terms, about \$1 trillion annually, given that global trade is around \$30 trillion a year⁷. On the other hand, Figure 2 shows that the annual fluctuations in the growth rate of global trade are rather large. There were 12 years between 1980 and 2018 (excluding 2009-2011, three years after the global financial crisis) when the change in the growth rate in one year was larger than 3.4 percentage points in absolute terms. Thus, annual changes exceeding this magnitude are rather common.

The fall in global trade resulted primarily from the decline in global economic activity, while Russia's overall trade (measured in US dollars) will likely increase in 2022 compared to 2021 and Ukraine's trade is too small to have a noticeable impact on global trade. Russia's share in global exports was 2.2 percent in 2021, while its share in global imports was 1.3 percent. Based on data up to October 2022, we estimate that Russian exports (in US dollars) will likely increase by 24 percent and Russian imports will likely decline by 25 percent in 2022 compared to 2021 (see further details in section 4). Russian exports exceed imports significantly, and thus, the sum of Russian exports and imports is estimated to increase by 8 percent in US dollars. Ukraine's share of both total global exports and imports was just 0.3 percent in 2021, so even a major decline in Ukrainian foreign trade would have a relatively small direct impact on total world trade.

⁷ See <https://unctad.org/news/global-trade-hits-record-77-trillion-first-quarter-2022>.

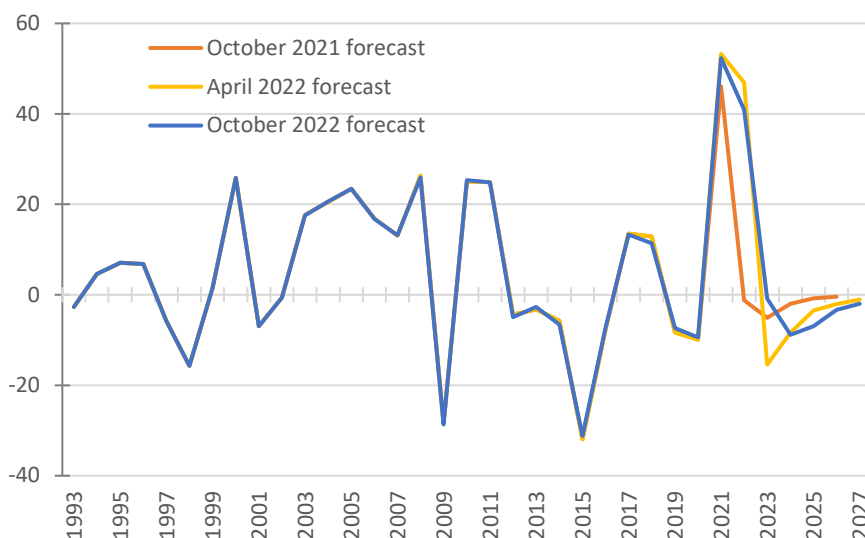
Figure 2: The global trade volume of goods and services, 1980-2027 (% annual change)



Source: IMF *World Economic Outlook* October 2021, April 2022 and October 2022.

In 2021, the year before Russia's war, commodity prices increased by 52 percent, faster than in any year since data became available from 1992 (Figure 3). In October 2021, the IMF forecasted some commodity price falls in 2022 (-1.2 percent) and some subsequent falls in later years. The forecast for 2022 was significantly revised upwards to a 47 percent increase in the April 2022 forecast, and then marginally reduced to a 41 percent increase in the October 2022 forecast. Thus, while these upward revisions in the 2022 commodity price increases are very substantial and were likely driven by the impacts of Russia's war, commodity prices in 2021 increased faster than what the latest forecasts suggest for 2022 – which is confirmed by the daily data we report up to mid-December 2022 in Figure 1.

Figure 3: Commodity prices, 1993-2027 (% annual change)



Source: IMF *World Economic Outlook* October 2021, April 2022, and October 2022. Note: the figure shows overall commodity prices including both fuel and non-fuel prices.

The composition of the commodity price increase offers insights into which market segments were hit hardest by the war. We compare the October 2022 IMF forecasts to those made a year earlier.

Table 1 suggests that the impact of the war has been mostly confined to energy prices, whereas non-energy commodity price forecasts changed little. Within energy, gas prices were revised upwards by about 244 percent. This upward revision came on top of the 254 percent increase in gas prices in 2021. So, compared to 2020, gas prices in 2022 are forecast to be nine times higher than in 2020⁸. The revision in coal prices was also significant, 181 percent, while the revision in petroleum prices was also rather large but smaller in magnitude, 51 percent.

Non-energy commodity prices were revised much more modestly, with an overall 8 percent upward revision. Food price forecasts went up by 11 percent, beverages by 14 percent, while agricultural raw material price and metal price forecasts hardly changed on average. The latter suggests that important industrial production input costs have not been much impacted by the war, though metal prices increased by almost one-half in 2021.

It should again be highlighted that non-energy commodity prices, including food prices, already increased by 26 percent on average in 2021, so the additional increase due to the war tops up these

⁸ The gas price index expressed as 2016=100 was 71.7 in 2020, 253.7 in 2021 and forecast to be 646.0 in 2022.

earlier price hikes and risk serious humanitarian consequences in poor, food-import dependent countries (Zachmann *et al*, 2022).

There is variation within each main component. For example, while food price forecasts went up by 11 percent on average, the revision in wheat prices was 25 percent, in barley prices it was 38 percent and in sunflower oil prices it was 30 percent – three products in which Russia and Ukraine had a combined global export market share above 20 percent in 2021 (Table 2). The correlation between the combined market share of the two countries and price forecast revisions is 0.47, suggesting that prices increased more for foods for which the two countries have larger market shares. There are exceptions though. For example, the largest upward revision within food prices was 41 percent for chicken, though the global export market share of Russia and Ukraine is 4.2 percent, well below their shares in wheat, barley and sunflower oil. The largest downward revision was for rice at -9 percent, which is hardly exported by the two countries.

Among metals, the close-to-zero average revision hides large differences (Table 3): uranium prices were revised upward by 40 percent, nickel by 32 percent, zinc by 23 percent and aluminium by 8 percent, while price forecasts were revised downward for iron ore (-10 percent), tin (-5 percent), copper (-3 percent) and lead (-3 percent). In contrast to food prices, metal-price forecast revisions do not correlate with the share of Russia and Ukraine in global exports of these metals. For example, Russia and Ukraine combined accounted for a relatively large share, 5 percent, of global iron ore exports in 2021, and one would have expected that the war brought uncertainties in whether these exports would be sustained. This should have resulted in higher prices. But iron ore price forecasts were revised downward. Similarly, Russia accounted for more than 9 percent of global lead exports, yet lead price forecasts were revised downward.

Table 1: Revision in commodity price forecasts, October 2022 vs October 2021

	2021 % change	2022 % change		Revision in 2022 price level forecast
		October 2021 forecast	October 2022 forecast	
Total	52%	-1%	41%	49%
Energy	100%	-2%	80%	102%
Petroleum	66%	-2%	41%	51%
Gas	254%	-4%	155%	244%
Coal	111%	-2%	158%	181%
Non-energy	26%	-1%	7%	8%
Food	26%	2%	14%	11%
Beverages	22%	6%	16%	14%
Agricultural raw materials	15%	0%	3%	1%
Metals	47%	-7%	-5%	-1%

Source: Bruegel using the October 2021 and October 2022 editions of the IMF *World Economic Outlook*. Note: the 2021 values are from the October 2022 WEO, which marginally differ from the forecast made in October 2021 for 2021. The last column of the table includes the effect of revisions for both 2021 and 2022.

Table 2: Revision in commodity food price forecasts, October 2022 vs October 2021

	Commodity prices				Share in global exports in 2021	
	2021 % change	2022 % change		Revision in 2022 price level forecast	Russia	Ukraine
		October 2021 forecast	October 2022 forecast			
Food	26%	2%	14%	11%	2.0%	1.6%
Cereals	41%	4%	23%	18%	6.3%	8.1%
Wheat	43%	9%	31%	25%	13.5%	8.7%
Maize (corn)	57%	-1%	20%	17%	1.4%	11.5%
Rice	-8%	-1%	-4%	-9%	0.3%	0.0%
Barley	70%	7%	39%	38%	9.4%	11.4%
Vegetable Oil	48%	-5%	11%	17%	3.7%	4.8%
Soybeans	44%	-6%	12%	16%	n.a.	n.a.
Soybean Meal	20%	-8%	14%	23%	n.a.	n.a.
Soybean Oil	85%	0%	20%	18%	3.5%	1.9%
Rapeseed oil	42%	5%	-3%	-7%	8.3%	1.4%
Palm oil	61%	-11%	13%	33%	0.1%	0.0%
Sunflower Oil	63%	-6%	18%	30%	12.6%	13.5%
Olive Oil	59%	4%	-1%	-6%	0.0%	0.0%
Fishmeal	12%	2%	0%	-3%	0.1%	0.0%
Groundnuts (peanuts)	8%	2%	14%	14%	0.0%	0.0%
Meat	33%	5%	18%	11%	0.7%	0.5%
Beef	18%	16%	16%	-1%	0.1%	0.0%
Lamb	26%	4%	0%	-2%	0.0%	0.0%
Swine (pork)	56%	-7%	11%	13%	0.9%	0.0%
Poultry (chicken)	38%	6%	47%	41%	1.8%	2.4%
Seafood	10%	2%	17%	16%	4.8%	0.0%
Fish (salmon)	13%	4%	25%	19%	0.0%	0.0%
Shrimp	5%	0%	0%	7%	7.0%	0.0%
Sugar	37%	6%	4%	-3%	1.2%	0.5%
Sugar, Free Market	39%	7%	4%	-4%	n.a.	n.a.
Sugar, US import price	25%	2%	7%	5%	n.a.	n.a.
Bananas	-1%	0%	19%	16%	0.4%	0.0%
Oranges	8%	14%	34%	16%	0.1%	0.0%

Source: Bruegel using the October 2021 and October 2022 editions of the IMF *World Economic Outlook*. Note: the 2021 values are from the October 2022 WEO, which marginally differ from the forecast made in October 2021 for 2021. The last column of the table includes the effect of revisions for both 2021 and 2022.

Table 3: Revision in commodity metal price forecasts, October 2022 vs October 2021, and the share of Russia and Ukraine in global exports in 2021

	Commodity prices			Share in global exports in 2021		
	2021 % change	2022 % change October 2021 forecast	October 2022 forecast	Revision in 2022 price level forecast	Russia	Ukraine
Metals	47%	-7%	-5%	-1%	1.9%	2.1%
Aluminium	45%	6%	11%	8%	0.01%	0.003%
Copper	51%	-1%	-5%	-3%	1.4%	---
Iron Ore	46%	-21%	-23%	-10%	1.8%	3.2%
Lead	21%	2%	-1%	-3%	9.3%	---
Nickel	34%	4%	35%	32%	6.9%	---
Tin	89%	8%	0%	-5%	4.0%	---
Uranium	12%	3%	34%	40%	---	---
Zinc	32%	2%	22%	23%	3.0%	---

Source: Bruegel using the October 2021 and October 2022 editions of the IMF *World Economic Outlook* (commodity prices) and UN Comtrade Database (share in global exports). Note: the 2021 values are from the October 2022 WEO, which marginally differ from the forecast made in October 2021 for 2021. The last column of the table includes the effect of revisions for both 2021 and 2022.

3 Changes in trade balances

Trade balances have been impacted by commodity price changes. Countries exporting commodities, such as Russia's exports of mineral fuels, have benefitted from rising prices, while countries importing commodities, such as the European Union, have had to pay higher prices.

The European Union's monthly trade balance averaged a surplus of about \$21 billion from 2011-2019 (Figure 4). There were some variations in the trade balance during the most acute phase of the pandemic, but then, from early 2021 onwards, the EU's trade balance steadily deteriorated. The trade balance turned into a deficit in November 2021 and had a deficit of around \$31 billion in December 2021, before the war started. The deterioration continued after the war began, with the EU's trade deficit increasing above \$55 billion in August 2022. The sharp deterioration was mainly driven by higher energy prices.

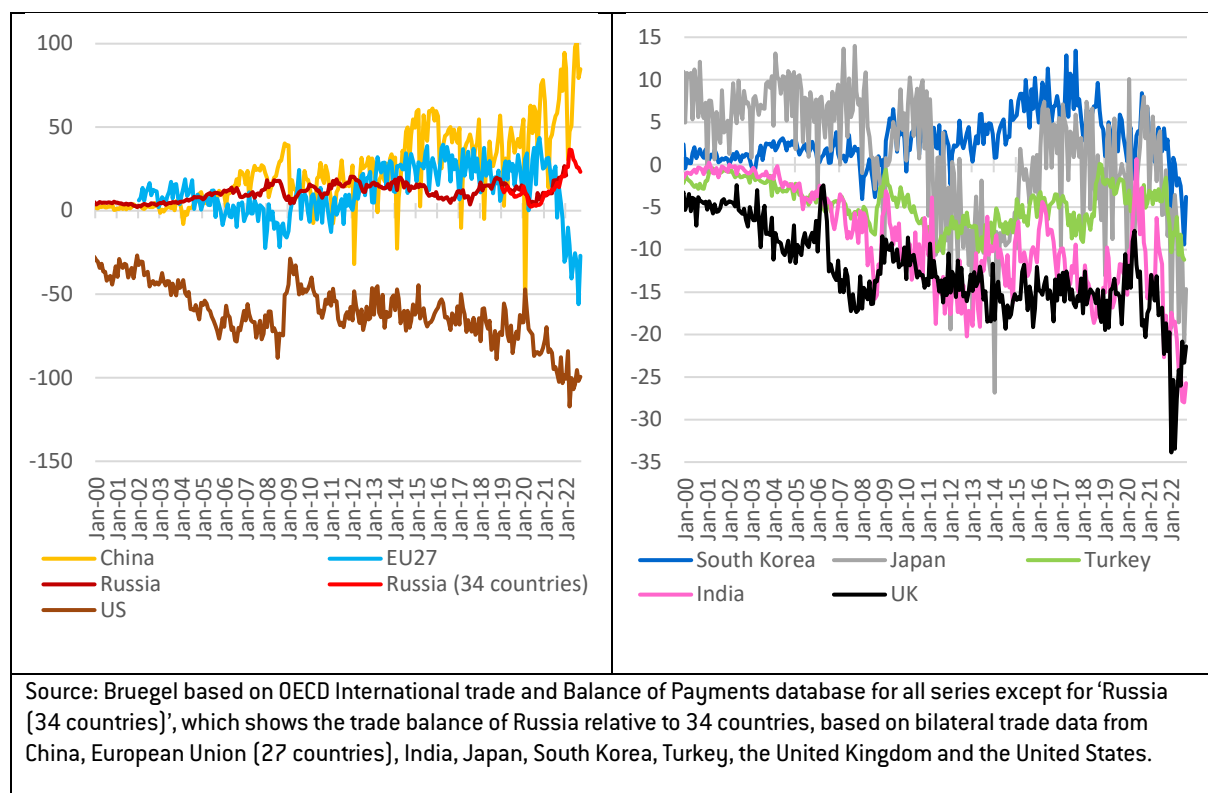
Russia, which was the EU's largest supplier of energy before the war, has benefitted from higher energy prices, but to a lesser extent than the deterioration of the EU's trade surplus. Russia's trade surplus increased from about \$7 billion in late 2020 to \$21 billion in January 2022, after which the Russian central bank stopped publishing detailed trade data.

To track Russian trade, we collected bilateral data from European Union countries, China, the United States, South Korea, Japan, India, the United Kingdom and Turkey. These 34 countries accounted for around 75 percent of Russia’s exports and imports in 2019, and for about 90 percent of the Russian trade surplus in the half-year period before the war. Russia’s trade balance relative to these countries increased in the first two months of the war, but then fell back to the December 2021 level by October 2022. In the next section, we scrutinise the components of Russian trade since the start of the war.

Since 1999, China recorded its highest trade surpluses in July 2022, while the United States recorded its largest trade deficit in March 2022. In both countries, the trend for the trade balance (increase for China, decline for the US) started well before the war erupted. In the case of the US, the deficit has been accentuated by a faster increase in imports. For China, export growth has been higher than its imports, sustaining an increase in the trade balance.

Being net energy importers, the trade balances of India, Japan, South Korea, Turkey and the United Kingdom deteriorated. For these countries, an accentuated decline after the start of the war is visible.

Figure 4: Overall trade balance of goods, January 2000 - September 2022 (\$ billions)



4 Changes in Russian trade

Because of the suspension of the publication of detailed trade statistics by the Russian authorities, in this section, we reconstruct data on Russia's foreign trade based on the bilateral statistics published by the statistical offices or trade ministries of 34 countries: 27 European Union countries, China, India, Japan, South Korea, Turkey, the United Kingdom and the United States⁹. Official import statistics provide the best source of trade data as methodologies of consignee countries differ, and final destinations of goods reported at export customs authorities sometimes misreport the actual final destination because of uncertainty at the time of export and entrepôt trade. Given the lack of official trade statistics from the Russian authorities, mirror statistics of Russia's trading partners provide the best source available.

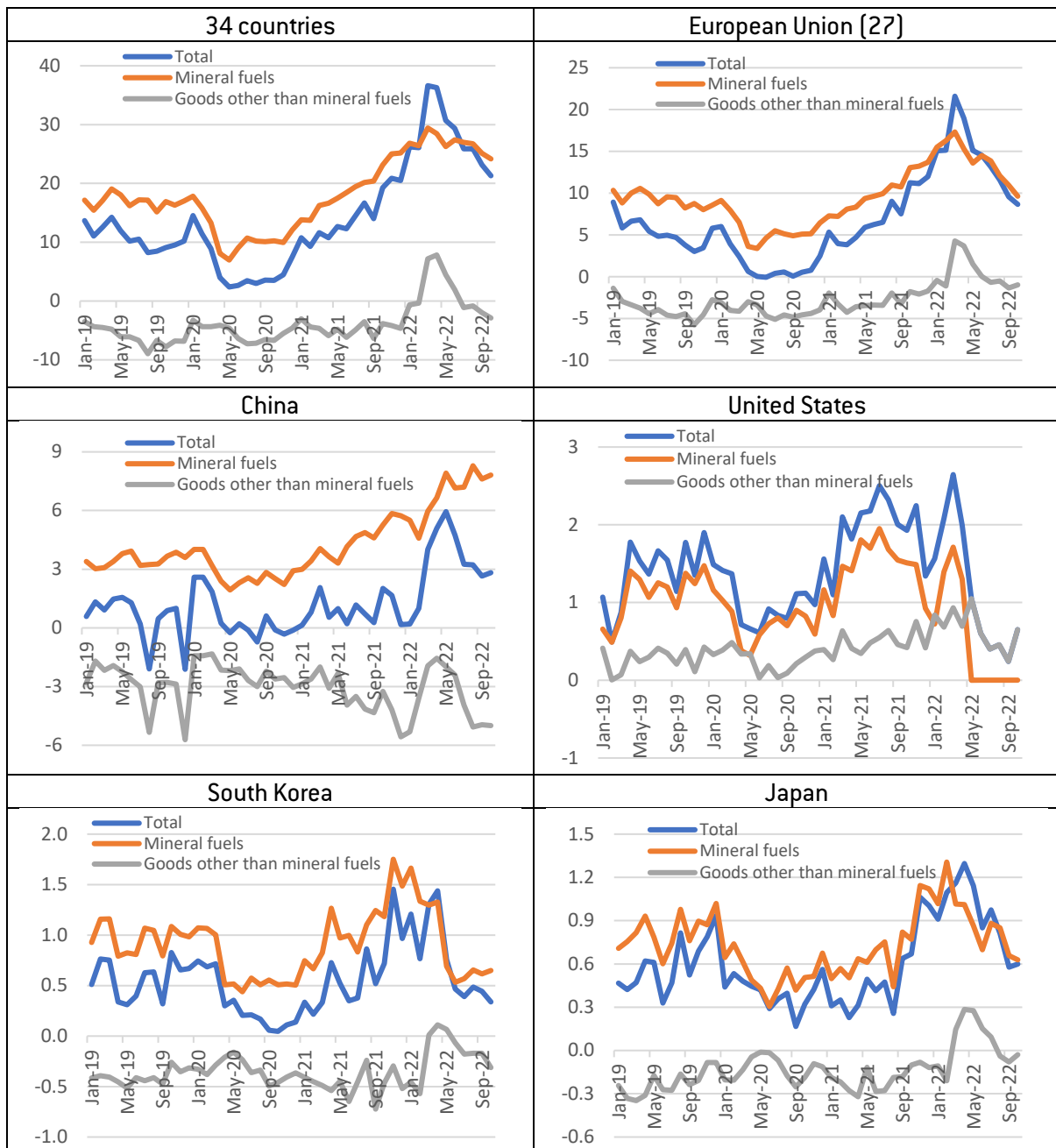
Figure 5 shows that Russia's monthly trade surplus with the 34 countries we study fluctuated between \$8 billion and \$15 billion in 2019 (the most recent year without a major global shock). The surplus for mineral fuels and related products was \$15 billion to \$20 billion per month, while for other goods, Russia recorded a deficit of about \$5 billion per month. The COVID-19 pandemic depressed mineral fuel revenues, as demand and prices declined. From early 2021, however, mineral fuel demand and prices started to increase and thus so did revenues. There was a sudden jump in Russian trade surplus with the start of the war.

The war also brought about a jump in Russia's trade balance on goods other than mineral fuels. Before the war, Russia recorded a deficit of about \$5 billion per month, which increased to a surplus of about \$7 billion in March and April 2022. This had declined to a balanced position by July 2022 and declined further by October 2022, the last observation available at the time of writing.

The March-October 2022 trade surplus with the 34 countries was \$117 billion larger than the March-October 2021 trade surplus. From this overall \$117 billion increase in Russia's trade surplus, mineral fuels accounted for \$63 billion, while goods other than mineral fuels accounted for \$54 billion. Slightly more than half of the latter resulted from the drop in sales by the 34 countries of machinery and transport equipment to Russia, which will likely undermine Russia's ability to produce advanced technological products, including military equipment.

⁹ The EU, Japan, Turkey, the United Kingdom and the United States report trade statistics according to the Standard International Trade Classification (STIC). China, India and South Korea report trade statistics according to the Harmonized System (HS). There is a perfect correspondence between HS and STIC for 4-digit product categories, but unfortunately, some of these countries report data for only 2-digit categories. In the Annex, we describe how we matched the 2-digit HS categories with the 2-digit STIC categories.

Figure 5: Russia's trade balance with selected countries, January 2019 - October 2022 (% billions)



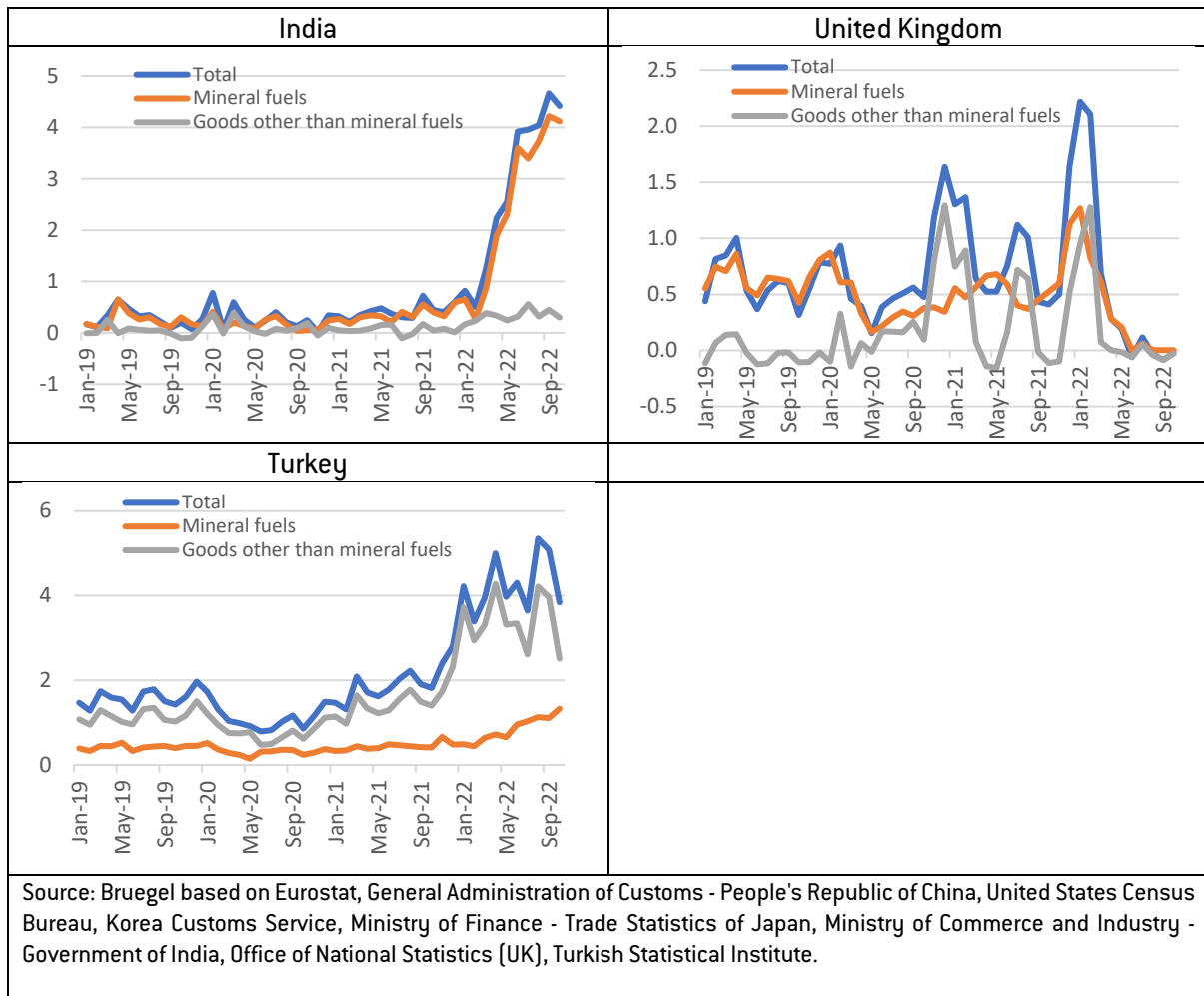


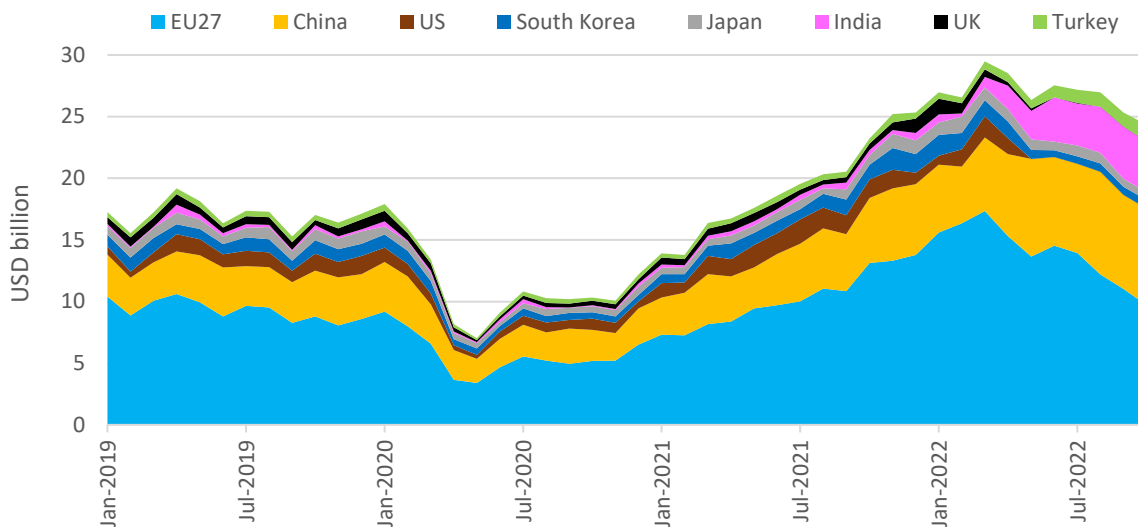
Figure 5 shows significant differences across partner countries. The most striking picture emerges for India, which typically had a small, less than \$0.5 billion a month, trade deficit relative to Russia up to January 2022. But India's trade deficit with Russia (or Russia's trade surplus with India) increased to about \$4 billion in June 2022 and slightly further in the subsequent four months. This increase is almost entirely driven by mineral fuels, suggesting the reallocation of Russian mineral fuel exports as western nations purchased less. See the figures in Annex 1 and Annex 2 for Russia's exports to and imports from the partner countries we study.

Turkey's trade balance with Russia has also substantially deteriorated. While Russia's pre-war trade balance with Turkey showed a surplus between \$1-2 billion per month, it exceeded \$5 billion by August 2022, but fell back below \$4 billion in October 2022. Most of the increase resulted from Russia's exports of goods other than mineral fuels to Turkey (Figure 7).

On the contrary, Russia's trade surplus with the US and UK fell to very low values given the complete elimination of mineral fuel imports from Russia by these countries.

By zooming on the components of the trade balance, Russian mineral fuel exports to the 34 countries have steadily increased from low values observed in early 2020, at the time of the global outbreak of the COVID-19 pandemic, until a peak in March 2022 (Figure 6). Since March 2022, Russia’s mineral fuel exports to the EU have declined both in value (from \$17.3 billion in March 2022 to \$9.7 billion in October 2022) and as a share of total Russian mineral fuels exports (from 59 percent in March 2022 to 40 percent in October 2022), but the EU has remained dominant so far. Meanwhile, there has been a significant increase in both the quantity and the share of these exports going to China and, especially, to India. The US and the UK have phased out Russian-sourced fossil fuels, and Japan’s imports have been declining since the war started. In contrast, South Korean fossil fuels imports from Russia declined only up to June 2022, but increased somewhat in the subsequent four months.

Figure 6: Russia’s mineral fuel exports to 34 countries, January 2019 - October 2022 (\$ billions)



Source: Bruegel based on Eurostat, General Administration of Customs - People's Republic of China, United States Census Bureau, Korea Customs Service, Ministry of Finance - Trade Statistics of Japan, Ministry of Commerce and Industry - Government of India, Office of National Statistics (UK), Turkish Statistical Institute.

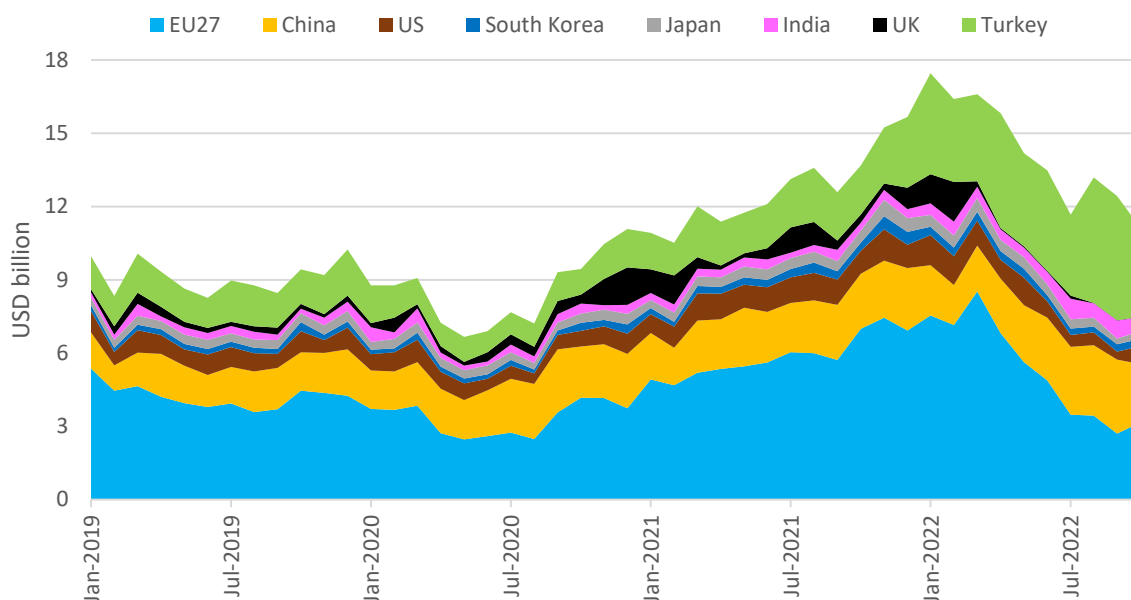
The fall in Russian exports of goods other than mineral fuels from January 2022 is spectacular. The notable increase in Russian exports to Turkey in August 2022 proved to be a temporary reversal (Figure 7). Among the different categories of goods¹⁰, a large drop, 37 percent, was observed for material manufactures, followed by ‘machinery and transport equipment’ and ‘miscellaneous manufactures’, both at a 27 percent decline¹¹. These declines might suggest that the war and the various sanctions imposed (see the next section) have already started to damage the productive capacity of the Russian

¹⁰ Here considered at the 1-digit level Standard International Trade Classification (SITC) categories.

¹¹ Russian exports of beverages and tobacco declined by 62 percent from February-October 2022, but this group category had a minor share in Russian exports.

economy. The drop in chemicals was 21 percent and the drop in crude materials (not including mineral fuels) was 11 percent. Food and live animal exports remained broadly unchanged.

Figure 7: Russia’s exports of goods other than mineral fuels to 34 countries, January 2019 - October 2022 (\$ billions)



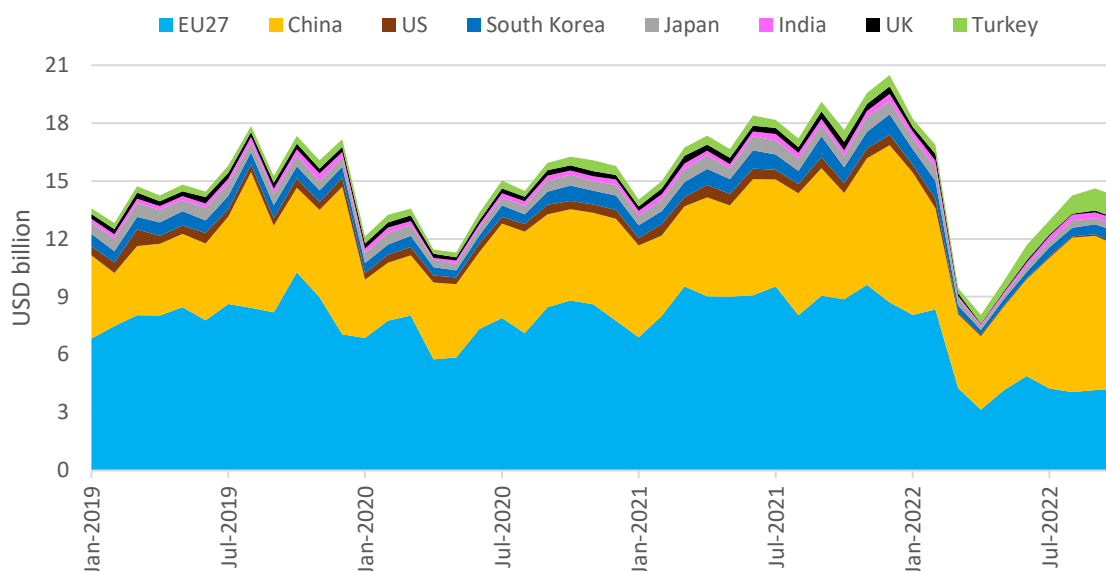
Source: Bruegel based on Eurostat, General Administration of Customs - People’s Republic of China, United States Census Bureau, Korea Customs Service, Ministry of Finance - Trade Statistics of Japan, Ministry of Commerce and Industry - Government of India, Office of National Statistics (UK), Turkish Statistical Institute.

As for changes in the destination of Russian goods other than mineral fuels, there has been a clear increase in Turkey’s overall weight (from 21 percent in February 2022 to around 41 percent in September), while Russia’s exports to the UK have stopped almost completely (Figure 7). The shares of Russian exports going to the US, EU and Japan have also decreased since March 2022.

The drop in Russian imports has been dramatic: the initial drop shortly after the war started was slightly more than 50 percent, followed by some recovery. Still, the average value in March-October 2022 was 35 percent lower than in the preceding eight months (Figure 8). This affected all major product categories, with the biggest drops among the main product categories being recorded for machinery and transport equipment, with a 50 percent reduction. Russia’s imports from every country, including China, dropped substantially shortly after the war started, though imports from China recovered to close to their pre-war peak by August 2022. The momentum of Russian import recovery from China reversed in October 2022: data from the next months will tell whether this was just a temporary blip or a trend reversal. The strongest recovery was seen in Turkey’s exports to Russia, which in autumn 2022 reached

more than double the pre-war values, though the total magnitude of Turkey’s exports to Russia is small compared to the EU and China.

Figure 8: Russia’s imports from selected countries, January 2019 - October 2022 (\$ billions)



Source: Bruegel based on Eurostat, General Administration of Customs - People's Republic of China, United States Census Bureau, Korea Customs Service, Ministry of Finance - Trade Statistics of Japan, Ministry of Commerce and Industry - Government of India, Office of National Statistics (UK), Turkish Statistical Institute.

The much bigger drop in Russia’s non-fossil fuel imports compared to its exports of these goods reflects the impact of sanctions (though most sanctions did not take immediate effect; see the next section). It could also reflect the difficulties Russian companies have in paying for imports, partly because several Russian banks have been sanctioned, making it more difficult for their clients to make payments abroad, and partly because, since the war started, Russian companies must convert 80 percent (recently reduced to 50 percent) of hard currency revenues to rubles with the Bank of Russia¹². Reduced activities of foreign companies in Russia seem to have also contributed to falling Russian imports (Demertzis *et al*, 2022), as has the substantial initial depreciation of the Russian ruble.

The rebound in Russia’s imports from May 2022 might have been helped by the ruble’s recovery and relative stability, and the fact that some companies initially went further than sanctions in halting business with Russia (Chorzempa, 2022). With a better understanding of sanctions, some activities have been resumed.

¹² Reuters, ‘Russia cuts mandatory FX conversion level for exporters to 50%’, 23 May 2022, <https://www.reuters.com/markets/europe/russia-cuts-mandatory-fx-conversion-level-exporters-50-2022-05-23/>.

5 Are sanctions circumvented via China and Turkey?

Sanctions have included prohibitions by several countries of exports to Russia of strategic goods, including high-tech goods and components for use in electronics, telecommunications, aerospace and oil refining. US sanctions apply not only to goods exported by US companies, but also to goods produced elsewhere using US technologies (Box 1). The extra-territorial nature of US sanctions could help explain the generalised drop in Russia's imports since March 2022, even from countries that have not announced sanctions.

Box 1: The sanctions imposed on Russia

Since the 2014 annexation of Crimea, Russia has been subject to sanctions, some of them trade related. With the recognition of the independence of the regions of Donetsk and Luhansk, and the subsequent invasion of Ukrainian territory on 24 February 2022, further sanctions have been announced continuously since end-February 2022, ranging from the financial sector to travel and trade, covering also penalties for individuals. In this box, we focus on trade-related sanctions imposed on Russia since February 2022 by the United States, the European Union, the United Kingdom, Japan and South Korea.

China, India and Turkey have not joined other countries in imposing sanctions on Russia as a response to the invasion of Ukraine. In the case of China, there was even a decision favouring coal imports, with a tariff cut to zero.

Export bans to Russia

The US acted promptly by announcing on 24 February¹³ stringent export controls¹⁴ that aimed to severely restrict Russia's access to technologies and other items needed to sustain its military capabilities, primarily targeting Russia's defence, aerospace and maritime sectors. The export controls not only restrict trade in US-produced items, but also foreign items produced using US technology (for instance, equipment, software and blueprints). Some of the items under export controls are semiconductors, computers, telecommunications, information security equipment,

¹³ See US Department of Commerce press release, 'Commerce Implements Sweeping Restrictions on Exports to Russia in Response to Further Invasion of Ukraine', 24 February 2022, <https://www.commerce.gov/news/press-releases/2022/02/commerce-implements-sweeping-restrictions-exports-russia-response>.

¹⁴ See Federal Register, 'Implementation of Sanctions Against Russia Under the Export Administration Regulations (EAR)', 3 March 2022, <https://www.federalregister.gov/documents/2022/03/03/2022-04300/implementation-of-sanctions-against-russia-under-the-export-administration-regulations-ear>.

lasers and sensors. The EU¹⁵, the UK¹⁶, Japan¹⁷ and South Korea¹⁸ have also announced export bans on various strategic goods for Russia, which included high-tech goods and components for use in sectors including electronics, telecommunications, aerospace and oil refining.

After the G7 meeting on 11 March 2022¹⁹, the G7 countries announced export bans of luxury goods, and after the 27 June G7 meeting²⁰, importing gold from Russia was also prohibited. Other products added to the lists of sanctioned goods of various countries include wood, machinery, cutting-edge goods such as quantum computers, iron and steel, and spirit drinks.

Import bans from Russia – a focus on fossil fuels

The US, EU and the UK all announced plans to phase out Russian sources of energy. On 8 March²¹, the US announced a ban on imports of Russian fuels, including oil, liquefied natural gas (LNG) and coal. For contracts agreed before this date, the ban became effective on 22 April. By May, US imports of Russian mineral fuels had declined to zero.

The UK first announced plans to phase out Russian oil²² by the end of 2022, then reinforced the stance by declaring²³ that they would also end all imports of Russian coal by end 2022, and of gas as

¹⁵ See Council of the EU press release, 'Russia's military aggression against Ukraine: EU imposes sanctions against President Putin and Foreign Minister Lavrov and adopts wide ranging individual and economic sanctions', 25 February 2022, <https://www.consilium.europa.eu/en/press/press-releases/2022/02/25/russia-s-military-aggression-against-ukraine-eu-imposes-sanctions-against-president-putin-and-foreign-minister-lavrov-and-adopts-wide-ranging-individual-and-economic-sanctions/>.

¹⁶ UK Foreign, Commonwealth & Development Office, 'Foreign Secretary imposes UK's most punishing sanctions to inflict maximum and lasting pain on Russia', 24 February 2022, <https://www.gov.uk/government/news/foreign-secretary-imposes-uks-most-punishing-sanctions-to-inflict-maximum-and-lasting-pain-on-russia>.

¹⁷ See Ministry of Foreign Affairs of Japan press release, 'Sanction Measures following the launch of military actions by Russia in Ukraine', 25 February 2022, https://www.mofa.go.jp/press/release/press6e_000371.html.

¹⁸ Ministry of Foreign Affairs, Republic of Korea, 'Korean Government's Decision Regarding Situation in Ukraine', 28 February 2022, https://www.mofa.go.kr/eng/brd/m_5676/view.do?seq=322003&page=1.

¹⁹ G7 German Presidency, 'G7 Leaders' statement', 11 March 2022, <https://www.bundesregierung.de/resource/blob/997532/2014234/39e142fa878dce9e420ef4d29c17969d/2022-03-11-g7-leader-eng-data.pdf?download=1>.

²⁰ G7 German Presidency, 'G7 Statement on Support for Ukraine', 27 June 2022, <https://www.g7germany.de/resource/blob/974430/2057196/4628490eda0863e429c30136ec180feb/2022-06-27-g7-erklaerung-ukraine-en-data.pdf?download=1>.

²¹ The White House, 'Fact Sheet: United States Bans Imports of Russian Oil, Liquefied Natural Gas, and Coal', 8 March 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/08/fact-sheet-united-states-bans-imports-of-russian-oil-liquefied-natural-gas-and-coal/>.

²² Statement by Kwasi Kwarteng, UK Secretary of State for Business, Energy and Industrial Strategy, 'Statement on the phasing out of Russian oil imports', 9 March 2022, <https://www.gov.uk/government/speeches/statement-on-the-phasing-out-of-russian-oil-imports>.

²³ UK Foreign, Commonwealth & Development Office, 'UK imposes sweeping new sanctions to starve Putin's war machine', 6 April 2022, <https://www.gov.uk/government/news/uk-imposes-sweeping-new-sanctions-to-starve-putins-war-machine>.

soon as possible. Trade data shows that the UK's mineral fuel imports fell to zero by June, though some minor magnitudes were imported in subsequent months.

The EU started by announcing on 8 April²⁴ a prohibition on coal imports starting from August 2022, and two months later added²⁵ that it would also prohibit imports of crude oil and certain petroleum products, effective from December 2022 and February 2023, respectively (with exceptions for crude oil by pipeline and also for Bulgaria and Croatia).

Price cap on Russian oil

To limit Russian oil revenue while not increasing global oil prices, the EU and G7 nations agreed on a price cap on Russian oil²⁶, which is enforced by prohibiting companies in participating countries from maritime transport of Russian crude oil (as of 5 December 2022) and petroleum products (as of 5 February 2023) to third countries, and the related provision of technical assistance, brokering services or financing or financial assistance, which are purchased above the price cap. The initial price cap was set at \$60 per barrel, which will be reviewed every two months to respond to developments in the market and will be set at least 5 percent below the average market price for Russian oil and petroleum products.

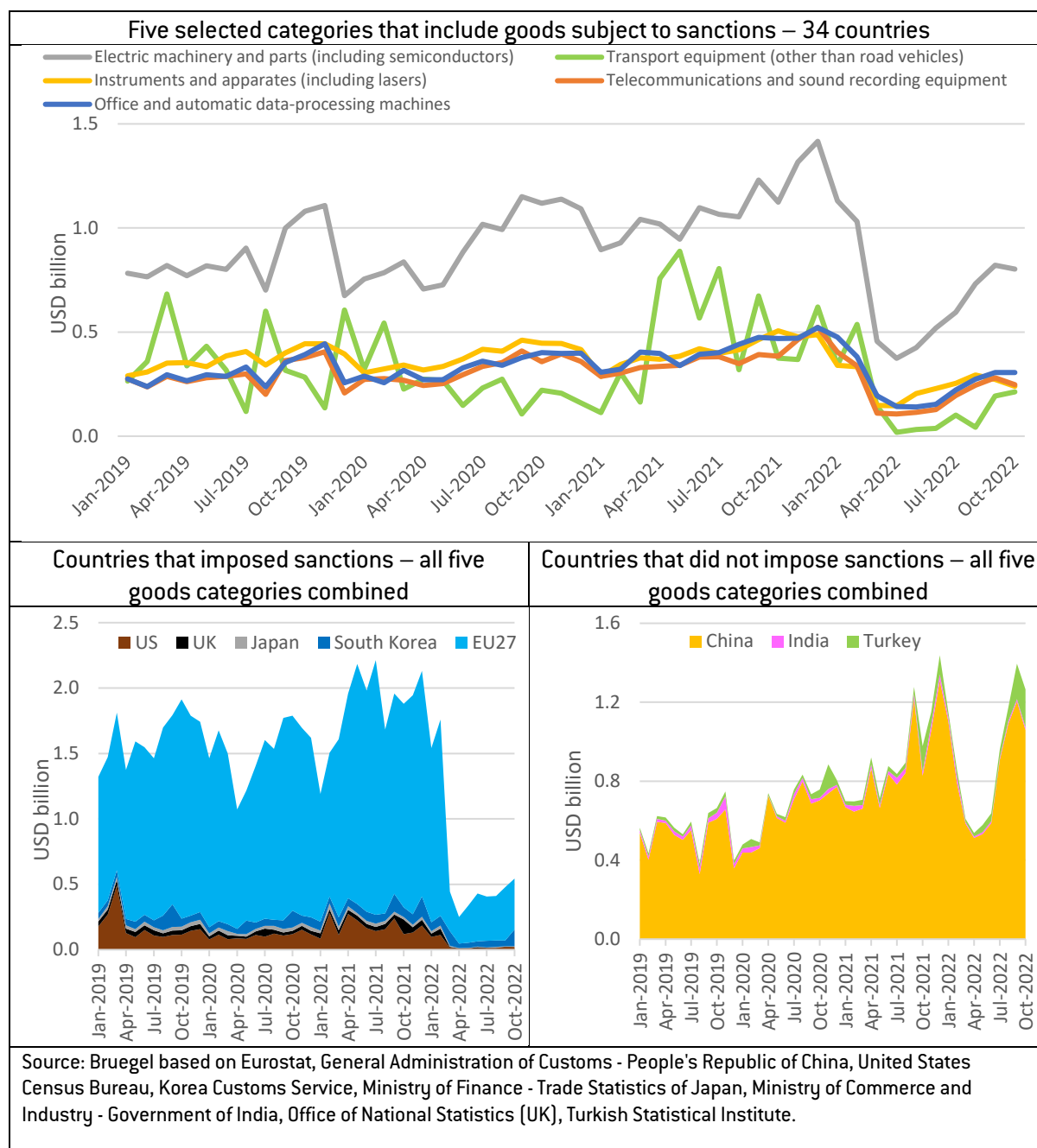
The categories we use from the 2-digit level classification for the Standard International Trade Classification (SITC) do not correspond precisely to sanctioned products. Categories that surely include sanctioned items also include non-sanctioned items. Nevertheless, for Figure 9, we selected some categories which could be dominated by sanctioned items.

²⁴ See Council of the EU press release, 'EU adopts fifth round of sanctions against Russia over its military aggression against Ukraine', 8 April 2022, <https://www.consilium.europa.eu/en/press/press-releases/2022/04/08/eu-adopts-fifth-round-of-sanctions-against-russia-over-its-military-aggression-against-ukraine/>.

²⁵ See Council of the EU press release, 'Russia's aggression against Ukraine: EU adopts sixth package of sanctions', 3 June 2022, <https://www.consilium.europa.eu/en/press/press-releases/2022/06/03/russia-s-aggression-against-ukraine-eu-adopts-sixth-package-of-sanctions/>.

²⁶ See Council of the EU press release, 'Russian oil: EU agrees on level of price cap', 3 December 2022, <https://www.consilium.europa.eu/en/press/press-releases/2022/12/03/russian-oil-eu-agrees-on-level-of-price-cap/>.

Figure 9: Russia’s imports of selected categories that include goods subject to export bans from advanced economies, January 2019 - October 2022 (\$ billions)



The decline in Russia’s imports from the 34 countries from February to October 2022 was 35 percent from the preceding eight months for all goods, but 56 percent for the selected five (2-digit level SITC) product categories that include sanctioned products (Figure 9). Thus, Russia’s imports of sanctioned products have declined much more than imports of other products, suggesting that sanctions have influenced trade flows.

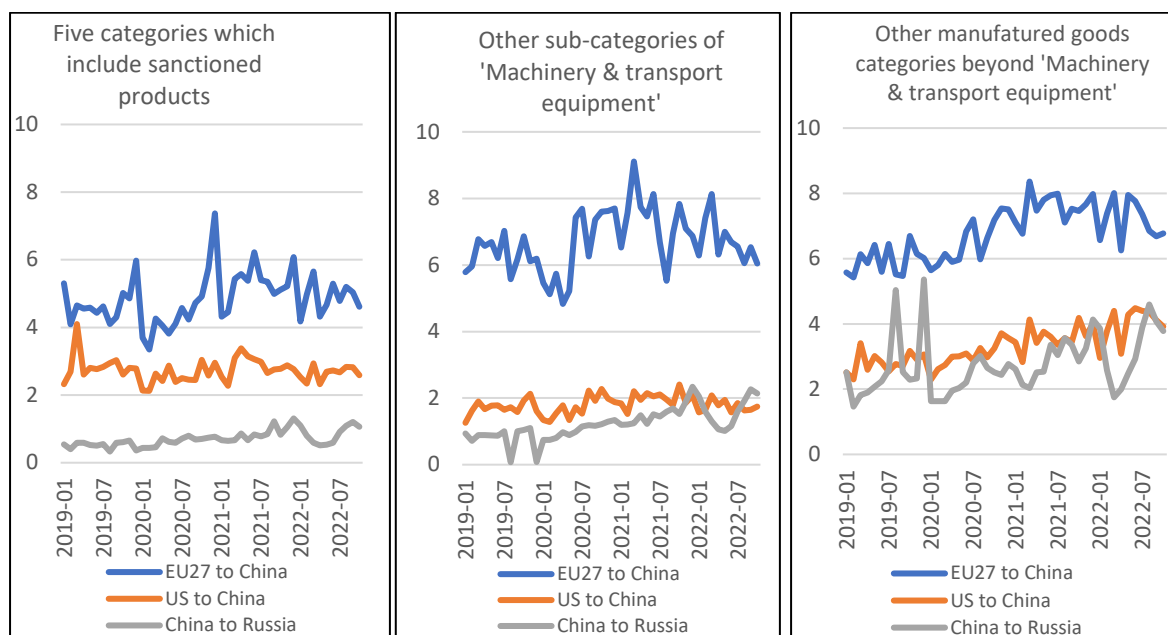
Strikingly, Russia's imports of the five product categories from the EU, US, UK, Japan and South Korea, which imposed sanctions, declined massively after February 2022, by 78 percent in March-October 2022 from the preceding eight months (second panel of Figure 9). Russian imports of the same five product categories from China fell by about one-half after February 2022, but recovered close to the pre-war peak by the summer of 2022 (third panel of Figure 9). Similarly to the general decline of Russian imports from China in October 2022, the imports of these five product categories have also declined.

An important question is whether companies established in countries that imposed sanctions have tried to circumvent those sanctions by re-routing via China and Turkey, with products then re-exported from China and Turkey to Russia. We check if this was the case for the EU and the US, the largest western exporters to Russia.

Chinese exports to Russia in the five product categories that include sanctioned goods have indeed increased since May 2022, but EU and US exports of goods in the same categories to China have hardly changed (left panel of Figure 10). The middle and right panels of Figure 10 show similar tendencies for product categories which likely do not include sanctioned products: an increase in Chinese exports to Russia and little change in EU and US exports to China. This suggests that EU and US companies did not circumvent sanctions by re-routing their Russian exports via China²⁷.

²⁷ Data quality is a crucial issue for this exercise. We believe EU and US data quality is high and thus our conclusion for the first leg of a possible circumvention (EU and US companies have not increased exports of sanctioned products to China and Turkey) is probably sound, which is in itself sufficient to conclude that EU and US companies have not circumvented sanctions by re-routing their previous Russian exports via China and Turkey.

Figure 10: EU and US exports to China and Chinese exports to Russia, January 2019 - October 2022 (\$ billions)



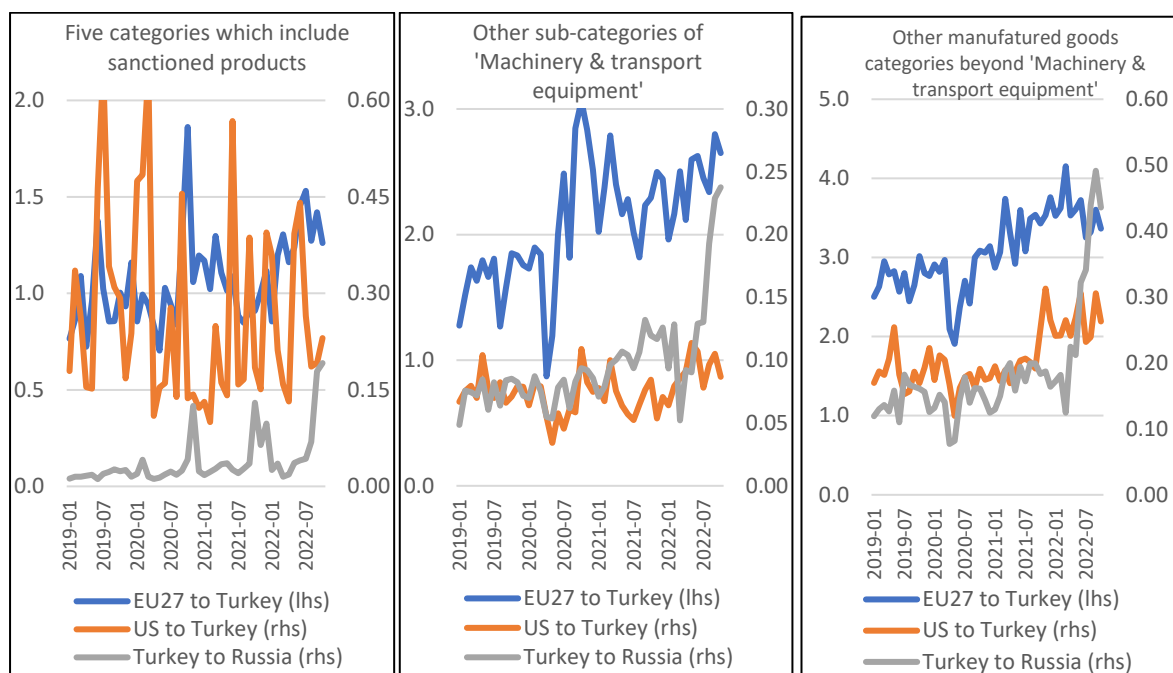
Source: Bruegel based on Eurostat, General Administration of Customs - People's Republic of China, United States Census Bureau. Note: the five categories of goods that include sanctioned items are specified in Figure 9. Since 'Machinery & transport equipment' includes sub-categories with sanctioned products, in the second panel we show the remaining sub-categories. Other manufactured goods categories include Chemicals and related products, Manufactured goods classified chiefly by material, and Miscellaneous manufactured articles.

An increase in EU exports of the five product categories that include sanctioned goods to Turkey started in September 2021, well before the war (left panel of Figure 11). While Turkey has increased its exports of these product categories to Russia since April 2022, there is no clear sign that this coincides with a change in the trend of EU exports of these categories to Turkey. Moreover, the dollar value of the increase in Turkish exports from March to October 2022 (which is plotted on the right scale of Figure 11), is negligible compared to the level of EU exports to Turkey (left scale of Figure 11).

Furthermore, the increase in Turkish exports to Russia in goods categories that do not include sanctioned products (the middle and right panels of Figure 11) was much steeper than the increase in goods categories that include sanctioned products (left panel of Figure 11).

All these findings suggest that circumvention of sanctions via China and Turkey has not really happened. Instead, we see a general trade diversion, whereby Russia trades more with China, Turkey and India in all product categories, and trades less with western nations that imposed sanctions.

Figure 11: EU and US exports to Turkey and Turkish exports to Russia, January 2019 - October 2022 (\$ billions)



Source: Bruegel based on Eurostat, General Administration of Customs - People's Republic of China, United States Census Bureau. Note: the five categories of goods that include sanctioned items are specified in Figure 9. Since 'Machinery & transport equipment' includes sub-categories with sanctioned products, in the second panel we show the remaining sub-categories. Other manufactured goods categories include Chemicals and related products, Manufactured goods classified chiefly by material, and Miscellaneous manufactured articles.

6 Russia's mineral fuel exports

The US, EU and UK announced plans to phase out Russian energy. Mineral fuel exports from Russia to the US and UK fell to zero by May and June 2022 respectively, though in the UK a small amount of coal and oil imports resumed in subsequent months (Figure 12).

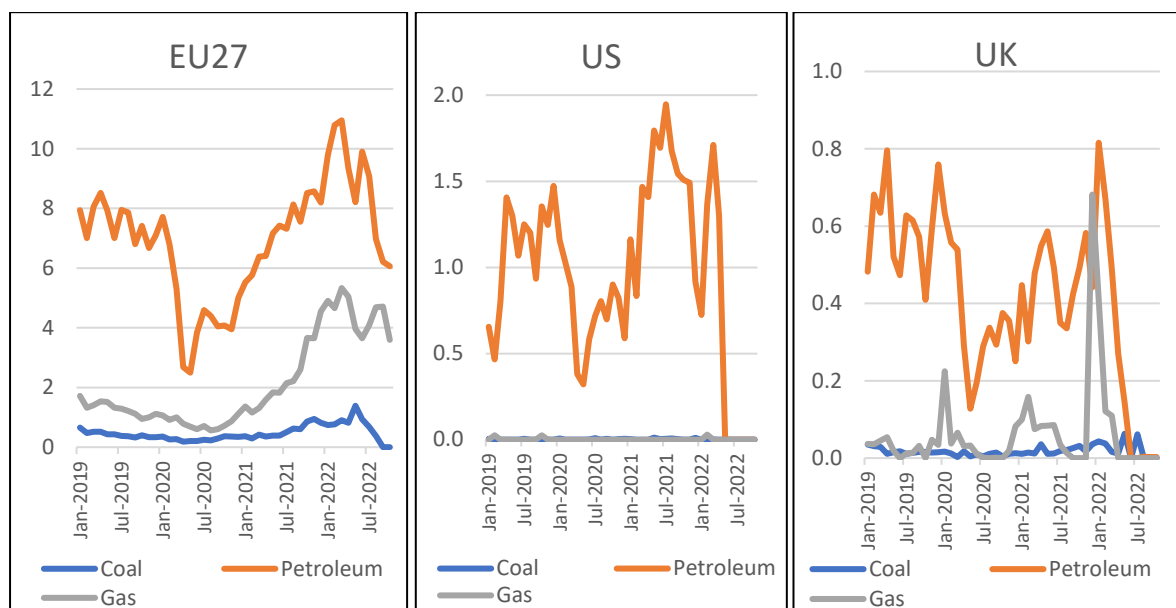
Russian gas exports to the EU have reduced in quantity, but because of high and volatile gas prices, the dollar value of gas exports has also been volatile. The EU has not introduced limits on Russian gas, but supply cuts have resulted in a reduction. Since gas prices peaked in August 2022, so did the dollar value of Russian gas exports to the EU, even though the quantity was smaller in this month than in preceding months²⁸.

The dollar value of Russian oil and coal exports to the EU increased shortly after the war began, which hints at attempts to compensate for shortfalls in other energy sources ahead of deadlines to phase out

²⁸ See the quantity of EU gas import by source countries at: <https://www.bruegel.org/dataset/european-natural-gas-imports>.

coal completely (August 2022), and oil and oil products (December 2022 and February 2023, with exceptions for crude oil by pipeline and for Bulgaria and Croatia; see Box 1). But, since June, both Russian coal and petroleum exports to the EU started to decline and the dollar values of these exports were smaller than exports one or two years earlier, suggesting a reduction in quantity.

Figure 12: Russia’s mineral fuel exports to the EU, US and UK, January 2019 - October 2022 (\$ billions)



Source: Bruegel based on Eurostat, United States Census Bureau, Office of National Statistics (UK).

The values reported so far are in US dollars and reflect both quantity changes and price changes. Unfortunately, distinguishing quantity and price is not possible based on the trade statistics that we use. However, Eurostat publishes trade data in both current prices and kilogrammes. The latter can be an indirect and imperfect proxy for quantity: a kilo of paper weighs the same as a kilo of gold, but their values differ greatly, so for total trade, which adds up the weights of various product, the weight can be a bad proxy for quantity. The weight of a product can be a good proxy for quantities if a particular product is homogeneous. For a product category including multiple products, the weight can be a good proxy for quantity if the shares of different products in the product category do not change and there are no quality changes. For gas, probably there is no major violation of these conditions, but there are different types of petroleum and coal products, so these conditions might be violated to a greater degree.

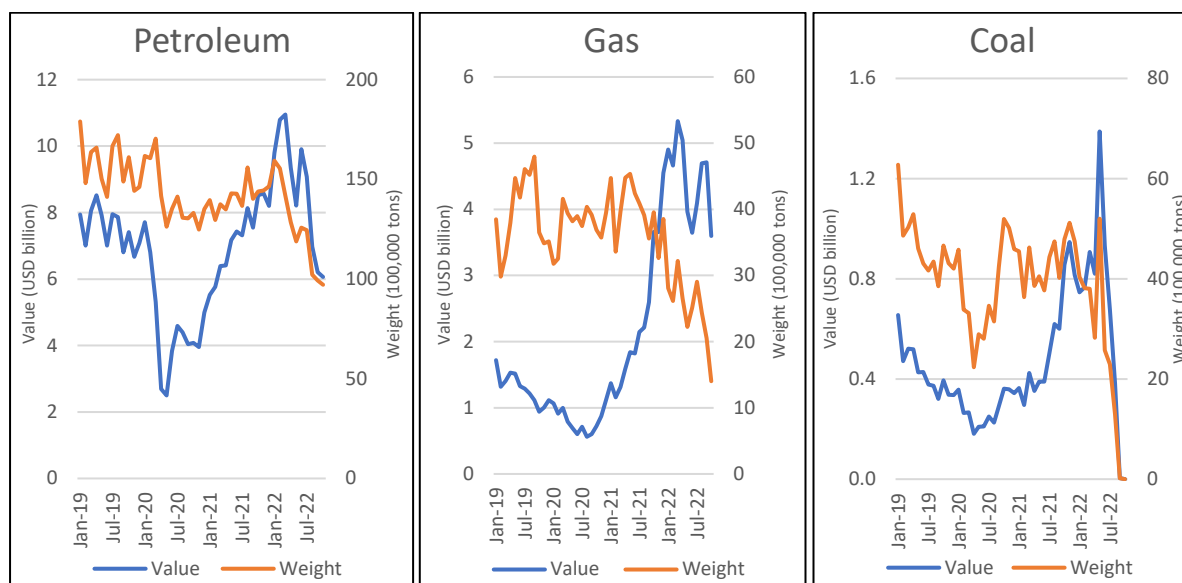
Nevertheless, it is instructive to plot the value and weight of Russian petroleum, gas and coal exports to the EU (Figure 13). For petroleum, the weight fluctuated in a more or less horizontal range from 2019

until the start of the war in February 2022. The weight of EU gas imports from Russia started to drop from May 2021, confirming the arguments of McWilliams *et al* (2022b) suggesting that Russia started to manipulate the EU's gas markets well before the war. As for dollar values, there were big swings in the period from 2019 to February 2022, reflecting changes in prices. Since the war erupted, the weight of Russian exports of gas and petroleum has fallen, even though no gas sanction has been introduced. The EU's embargo on seaborne crude oil became effective on 5 December 2022 and the high-frequency data reported by Pukarinen (2022) shows a dramatic drop in overall crude oil shipments from Russian ports. The EU's refined-petroleum sanctions will become effective in February 2023.

Most of Russia's petroleum exports to the EU are bound to end (Box 1). Most likely a significant share of current petroleum exports to the EU cannot be sold by Russia to other countries because of the limitations in transport capacity and access to insurance (McWilliams *et al*, 2022a). The EU and G7 nations also introduced a price cap on Russian oil sold globally (Box 1). Pukarinen (2022) concluded that the price of Russian oil fell below the price cap in the first week after its introduction and the share of tankers covered by the price cap in crude oil shipments out of Russia remained rather stable or even increased slightly, illustrating Russia has so far not found alternatives to vessels owned and/or insured in the countries that take part in the price cap. Thus suggests that the price cap works as intended and will reduce Russian revenues from selling oil.

For coal, there were larger fluctuations in weight in the pre-war period, including a notable decline in spring 2020, when the COVID-19 pandemic hit Europe. After the war started, a spike in May 2022 is visible in both weight and value, suggesting that EU importers purchased some extra amounts of coal before the ban took effect. The September 2022 data shows that EU's coal imports have drastically reduced to values close to zero, which remained zero in October 2022, indicating that the ban has been respected.

Figure 13: Value and weight of Russia’s mineral fuel exports to the EU, January 2019 - October 2022
(\$ billions, 100,000 tons)



Source: Bruegel based on Eurostat.

7 Conclusions and policy implications

Beyond its devastating humanitarian consequences and global security implications, Russia’s invasion of Ukraine is having major repercussions for the global economy, in the form of new uncertainties, higher prices and disruption to global value chains. We have focused on the implications on trade of Russia’s war, first on an international scale and then zooming on trade with Russia.

The war hit the global economy when recovery from the COVID-19 pandemic was underway, and strong inflationary pressures had already emerged. In 2021, the year before the war erupted, commodity prices increased by 52 percent, a record growth rate in at least three decades. Within commodities, energy prices doubled in 2021, while non-energy commodities increased by a quarter on average. Energy prices increased more in 2021 than in 2022, suggesting that the war was not the most important determinant.

We analysed IMF forecast revisions for global trade and commodity prices from October 2021 to October 2022, which can serve as a proxy for the impact of the war, though other factors also influenced these revisions. We found that the volume of global trade in goods and services was revised downward by 3.4 percent from October 2021 to October 2022, implying a shortfall in global trade of about \$1 trillion annually. Nevertheless, there were many years in the past three decades when global trade changed by

larger magnitudes. The fall in global trade primarily resulted from the decline in global economic and trade activity, while Russia's overall trade (measured in US dollars) will likely increase in 2022 compared to 2021, and Ukraine's trade is too small to have a noticeable impact on global trade.

Energy price forecasts were revised upward by about 100 percent, while non-energy commodity prices were revised upward by only 8 percent on average. Within energy, gas prices soared the most, followed by coal prices. Within non-energy commodities, food-price forecasts went up by 11 percent compared to the forecast made a year earlier, while agricultural raw material price and metal price forecasts remained practically unchanged. The latter suggests that major input costs of industrial production have not been impacted by the war, though we should recall that metal prices increased by almost one-half in 2021. There is a positive correlation between the price revision of various components of food and the share of Russia and Ukraine in total world trade, implying that those food prices increased more in food commodities in which the two countries have larger market shares. This can make poor, food-import dependent countries more vulnerable, with potentially serious humanitarian consequences²⁹. We did not find such a correlation within metal prices.

Soaring energy prices deteriorated the trade balance of countries importing energy. The gap between the Chinese trade surplus and the US trade deficit has widened considerably, though this started before the war, during the pandemic lockdown period, and is thus more likely related to elevated goods demand in the US than the war.

Since Russian authorities suspended the publication of detailed trade statistics, we collected bilateral trade data from 34 countries (27 European Union countries, China, India, Japan, South Korea, Turkey, the United Kingdom and the United States) to reconstruct and analyse Russia's foreign trade since the war erupted. While Russia registered record trade surpluses in the first months of the war, only about half of its increase was related to soaring energy prices, the other half was due to the collapse of imports, which will likely undermine the Russian economy's productive capacity.

Russian exports of goods other than mineral fuels have suffered from a gradual decline since the war started, with the largest falls in the categories of 'material manufactures', 'chemicals', and 'machinery and transport equipment'. These declines suggest that the war and the various sanctions imposed have already started to damage the productive capacity of the Russian economy.

²⁹ See Zachmann *et al* (2022) for an analysis of food insecurity linked to Russia's war.

Russia's trade has been reoriented from advanced countries imposing sanctions to China, India and Turkey, three countries that did not impose sanctions. Nevertheless, Russian imports of product categories that include sanctioned products suffered a hit, even from those countries that did not impose sanctions, which suggests that sanctions have had an impact on trade. The momentum of trade reorientation to China, India and Turkey reversed considerably in October 2022, the last observation of our sample period. Data from subsequent months can tell whether this was a temporary bump, or the start of a more secular decline. We analysed whether European and US companies tried to circumvent sanctions by re-routing sanctioned goods to Russia via China and Turkey, but we did not find evidence for this hypothesis.

On the energy front, the EU, UK and US announced plans to phase out Russian sources of energy. Mineral fuel exports from Russia to the US and UK fell to zero a few months after the war erupted. Russian mineral fuel exports to the EU have declined and Russian coal exports to the EU were practically eliminated by September 2022 in line with EU sanctions; nevertheless, the EU was Russia's largest energy customer in October 2022. This is, however, bound to change, and high frequency data suggests that the EU's crude oil imports from Russia collapsed in December 2022 when the embargo entered into force.

We highlight three important policy implications from our research.

First, the war and the sanctions are not the most important drivers of energy prices. Energy prices increased more in 2021 than in 2022. The extraordinary low prices during the first few months after the breakout of the pandemic resulted in a low base from which prices could increase, and prices indeed soared in 2021 along with the rebound in global demand with supply and transportation bottlenecks. The EU's gas prices were further increased from summer 2021 because of substantially reduced Russian gas exports to Europe, Gazprom's failure to refill its storage sites in the EU, the mothballing of several French nuclear power plants due to corrosion problems, and a severe drought that compromised hydropower generation and thermal and coal-fired power plants. The war has also pushed up energy prices (but by less than the 2021 price surge). Nevertheless, the sizeable decline in oil prices in recent months despite the ongoing war and the entry into force of the EU embargo on Russian crude oil suggests that other factors beyond the war and sanctions have a stronger influence on oil prices. Gas prices soared by a staggering 680 percent in 2021, and were volatile in 2022, even though the EU has not imposed any sanction on gas. These considerations have implications for the narrative that politicians should use to explain high energy prices to society.

Second, the direct aim of sanctions seems to have been achieved. Russian imports of sanctioned products fell much more than imports of other products, even from countries that have not imposed sanctions. There was a subsequent rebound of Russian imports of sanctioned products from some non-sanctioning countries, most notably from China, but this has not compensated for the fall in imports from western nations that imposed sanctions, and we did not find evidence for sanctions being evaded by rerouting Russian imports via China, Turkey or India. On the other hand, the significant decline in Russian exports of goods other than fossil fuels suggests that sanctions have already started to undermine the productive capacity of the Russian economy. Sanctions also facilitated the reduction of oil prices, with the Brent oil price falling 20% and the Russian Urals oil price falling by 40% below their pre-war values by the second week of December 2022. Thus, the direct aim of the sanctions seems to have been achieved. This runs counter to the idea that Russia's large trade surplus reflects the inefficiency of western sanctions. The continued imposition of sanctions will fundamentally undermine the productive capacity of the Russian economy.

Third, only about half of the increase in Russia's trade surplus since the eruption of the war has resulted from higher Russian energy revenues caused by higher prices. The other half resulted from a collapse of Russian imports, with adverse effects on the Russian economy. And the energy surplus of Russia already started to decline in May 2022. In October 2022, the Russian trade surplus from fossil fuels amounted to \$24 billion a month, of which \$10 billion was from the EU. The EU's petroleum sanctions became effective for seaborne crude oil in December 2022 and will become effective for refined petroleum in February 2023. Limitations in transport capacity and access to insurance will prohibit the redirection of a significant share of current Russian petroleum and gas exports to other countries. This implies that most of the current Russian revenues from petroleum and gas from Europe will be gone. The price cap on Russian oil exports also became effective in December 2022 and resulted in a fall of Russian oil prices, implying lower Russian revenues from selling oil to non-EU countries. These developments will have a significant impact on Russia's trade surplus, which is doomed to deteriorate. Since the Russian government collects taxes on the difference between production and transportation costs of oil and the selling price (CREA, 2022), lower Russian oil revenues will undermine the capacity of the Russian state to finance the war.

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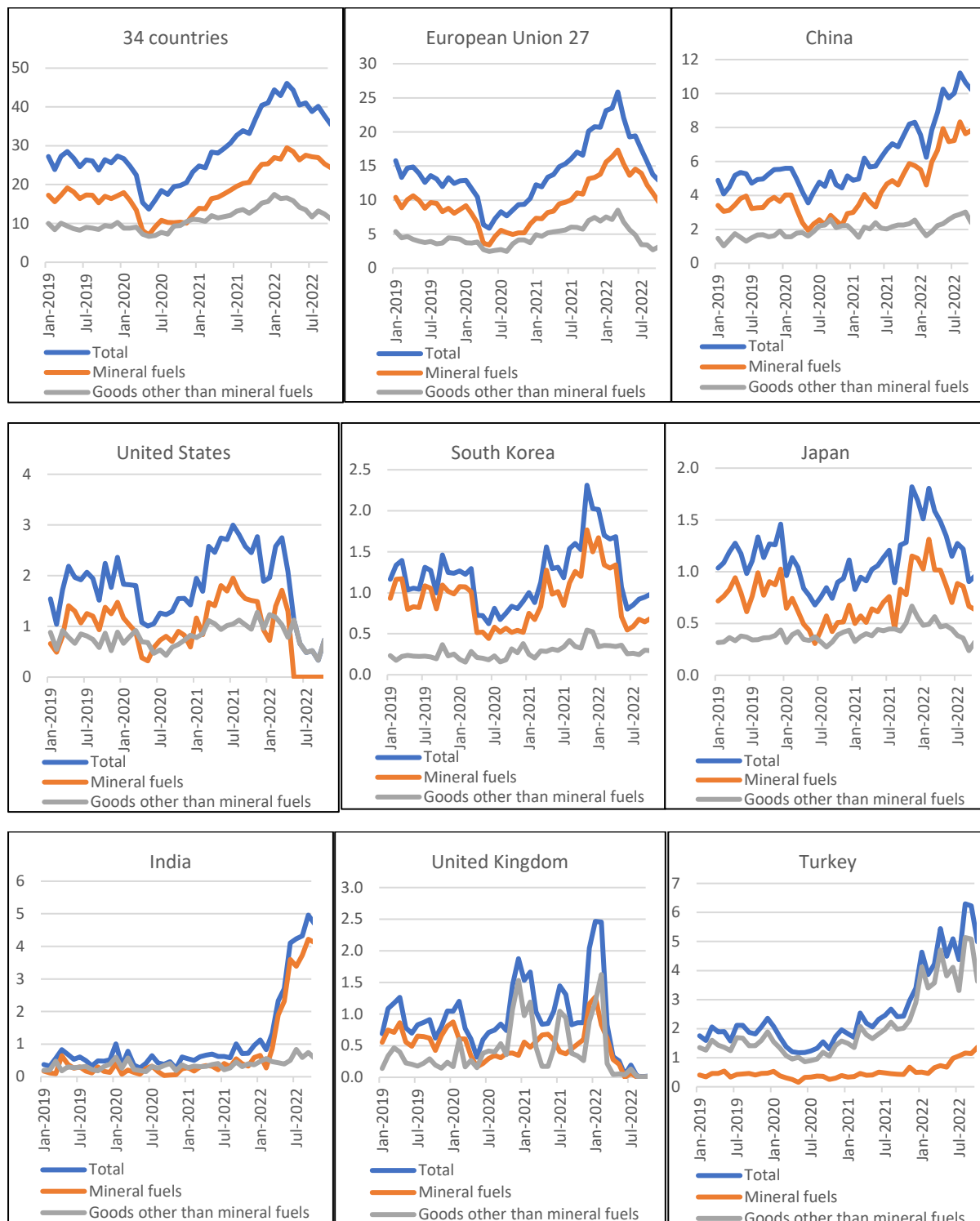
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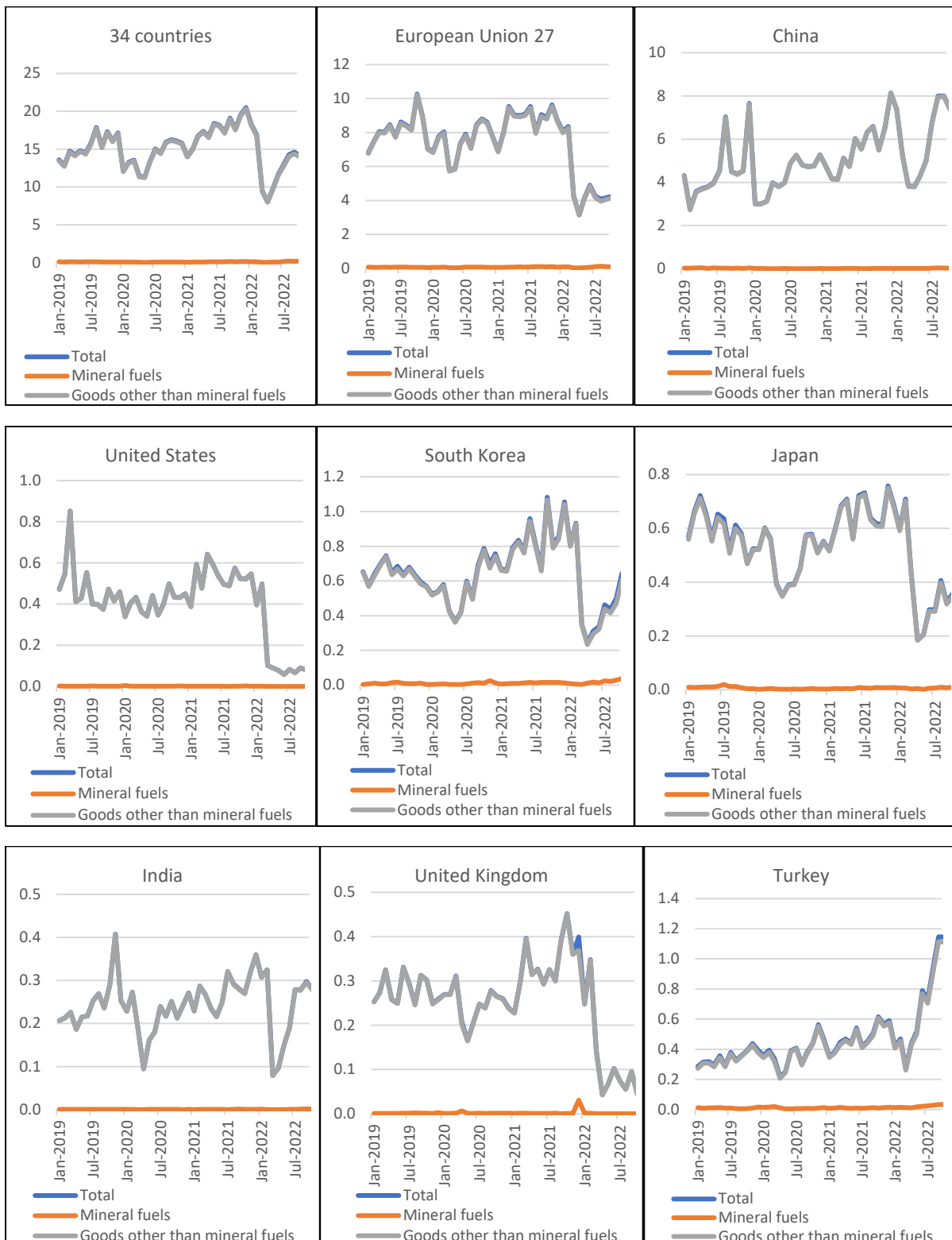
ANNEX 1

Annex 1: Russia's exports to selected countries, January 2019 – October 2022 (\$ billions)



Source: Bruegel based on Eurostat, General Administration of Customs - People's Republic of China, United States Census Bureau, Korea Customs Service, Ministry of Finance - Trade Statistics of Japan, Ministry of Commerce and Industry - Government of India, Office of National Statistics (UK), Turkish Statistical Institute.

Annex 2: Russia's imports from selected countries, January 2019 – October 2022 (\$ billions)



Source: Bruegel based on Eurostat, General Administration of Customs - People's Republic of China, United States Census Bureau, Korea Customs Service, Ministry of Finance - Trade Statistics of Japan, Ministry of Commerce and Industry - Government of India, Office of National Statistics (UK), Turkish Statistical Institute.

Annex 3: Methodology to match HS and SITC codes at 2-digit level

Different countries use different reporting standards for trade statistics. The EU, Turkey, the United Kingdom and the United States report trade statistics according to the Standard International Trade Classification (SITC). China, India and South Korea report trade statistics according to the Harmonized System (HS). In the case of Japan, data is reported using Principal Commodity Code, which closely resembles SITC codes.

There is a perfect correspondence between HS and SITC for SITC 4-digit product categories and higher levels of granularity. But existing correspondence tables do not offer a match at the 2-digit level. For some countries, data reported would have a maximum detail of 2-digits, hence we tried to match the 2-digit HS categories with the 2-digit SITC categories using correspondence tables from the UN Statistics division³⁰.

We started by truncating the codes in the correspondence tables at 2 digits. Then, we analysed how frequently each 2-digit category of HS would match with each SITC 2-digit category. For about 41 percent of the HS categories, there was a perfect match with the corresponding SITC category. For another 12 percent, the matching was not exactly precise, but HS codes would fall within the same 1-digit category of SITC. The analysis would be mostly focused on 1-digit SITC categories, so this did not constitute a major issue. For the remaining 46 percent of the HS 2-digit categories, we did the matching by distributing the HS category by various SITC categories. To do so, we first carefully analysed the description of HS and SITC 2-digit categories. In the cases in which the match of one HS category with various SITC categories would seem reasonable and proportionate, we distributed the HS 2-digit category by various SITC 2-digit categories using equal proportions. For the remaining cases, we used discretion to distribute more weight among the categories that seemed like a stronger match. By the end of this process, we had created a matching table between HS and SITC 2-digit categories, which we then used to ensure all the data used in our analysis was using SITC codes.

³⁰ <https://unstats.un.org/unsd/classifications/Econ>.



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