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CHINESE EXPORT GAINS, EU EXPORT LOSSES, AND RUSSIAN IMPORT REORIENTATION AFTER THE 2022 SANCTIONS

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ABSTRACT

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JEL CLASSIFICATION: F14, F51, P33

KEYWORDS: sanctions; trade diversion; rerouting; Russia; China

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Abstract

This paper examines how Russian imports were reoriented after the 2022 sanctions. Using annual bilateral trade data at the product level, it asks whether direct Chinese export gains to Russia were concentrated in the same product lines in which EU exports to Russia declined. It also studies rerouting through Hong Kong, Armenia, Kazakhstan, Kyrgyzstan, and Türkiye. The results point to substantial post-2022 import reorientation in Russia. Direct Chinese export gains are larger in product lines where Russia had depended more heavily on EU suppliers before the sanctions. Including transit-linked flows strengthens this relationship and points to broader rerouting through intermediary economies in those same product lines. In sanction-relevant goods, direct Chinese gains offset only part of the EU shortfall, while intermediary-country channels account for a substantial additional share. On the EU side, product-level evidence also suggests that some of the lost Russian market was absorbed through higher exports of the same products to other non-transit destinations. The evidence is therefore consistent with partial direct substitution by China, broader rerouting through intermediary economies, and partial outward redirection by EU exporters, not full replacement of lost EU exports.

Keywords: sanctions; trade diversion; rerouting; Russia; China; BACI.
JEL codes: F14, F51, P33.

1 Introduction

Economic sanctions are often evaluated by whether they reduce trade with the target country. But an equally important question is how trade adjusts after the initial disruption: whether lost supplier relationships persist, whether they are replaced by new partners, and whether

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adjustment occurs directly or through intermediary routes. Russia after 2022 provides an important setting in which to study these issues. The sanctions imposed after the full-scale invasion of Ukraine triggered one of the largest recent disruptions to a major economy's external trade, while the simultaneous expansion of Russia's trade with non-sanctioning economies raised broader questions about the limits of sanctions in an environment of flexible supply chains and third-country rerouting (Crozet & Hinz, 2020; Ghironi et al., 2024; Kwon et al., 2024).

The European Union (EU27, hereafter EU) is central to this question. Before 2022, the EU was Russia's largest trading partner and a major supplier across a wide range of industrial products. After the invasion, the EU adopted successive sanctions packages that combined export restrictions, financial measures, and controls on goods considered economically or strategically important. These measures were intended not only to reduce direct trade with Russia, but also to limit access to inputs and technologies relevant for military and industrial capacity. Yet the sharp decline in direct EU–Russia trade was accompanied by rapid growth in Russia's trade with non-sanctioning economies, most notably China, and by growing concern that part of the adjustment was taking place through intermediary economies rather than only through direct bilateral substitution (Chupilkin, Javorcik, & Plekhanov, 2025; Egorov et al., 2025a; Hayakawa & Kumagai, 2022).

This paper focuses on a more precise question. Using annual BACI bilateral trade data for 2017–2024 at the HS6 product-by-year level, it asks whether Chinese export gains to Russia were concentrated in the same product lines in which EU exports to Russia declined after 2022. It also examines whether part of that adjustment operated through a selected group of transit economies—Hong Kong, Armenia, Kazakhstan, Kyrgyzstan, and Türkiye. The paper tracks EU exports to the transit economies, Chinese exports to those same economies, and transit-economy exports to Russia separately. This makes it possible to distinguish more clearly between direct Chinese export gains and broader rerouting through intermediary economies, which may originate in China, the EU, or elsewhere.

The paper makes three contributions to the emerging literature on Russia's post-2022 trade adjustment. First, it moves from aggregate bilateral trade patterns to HS6 product-level reorientation by asking whether Chinese export gains to Russia were concentrated in the same product lines in which EU exports to Russia fell. Second, it treats transit symmetrically by tracking EU exports to selected transit economies, Chinese exports to those same economies, and transit-economy exports to Russia separately. This makes it possible to distinguish more clearly between direct Chinese export gains and broader rerouting through intermediary economies, which may originate in China, the EU, or elsewhere. Third, it shows that this distinction matters especially in sanction-relevant goods, where direct Chinese gains offset only part of the EU shortfall and broader rerouting through intermediary economies accounts for an additional share. The aim is not to show that China–Russia trade increased after 2022, which is already well established. It is to document how sanctions-era import adjustment

was structured across products and channels, and to show that direct bilateral China–Russia trade understates the broader Russia-bound adjustment once intermediary routes are taken seriously.

The focus on the EU rather than on "the West" more generally is deliberate. The EU was both Russia's most important pre-war supplier and the neighboring economic bloc most directly affected by the breakdown of the pre-2022 European trade and security order. It therefore provides a coherent benchmark for identifying the product lines in which Russian dependence on pre-war suppliers was greatest. The focus on China is equally deliberate. China is the single most important large non-sanctioning economy in Russia's post-2022 trade reorientation, and its size, industrial breadth, and pre-existing trade relationship with Russia make it the natural case for studying whether non-sanctioning suppliers expanded into the product lines from which EU exporters withdrew. Other non-sanctioning countries remain relevant, especially through rerouting, which is why the paper also examines intermediary economies explicitly.

The empirical strategy combines descriptive product-level evidence with an exposure-based reduced-form design. First, the paper compares post-2022 changes in EU exports to Russia with corresponding changes in direct Chinese exports and in a broader China-plus-transit measure. Second, it constructs a pre-war exposure measure based on the EU share in Russia's imports of each HS6 product during 2017–2021 and asks whether post-2022 China-side gains were larger in products with greater pre-war dependence on EU suppliers. This formulation is more informative than a purely contemporaneous comparison of EU losses and Chinese gains because it links post-2022 reorientation to predetermined product-level exposure.

The evidence points to substantial post-2022 reorientation in Russian imports. At the aggregate level, EU exports to Russia contract sharply after 2022, while both direct Chinese exports and broader transit-linked inflows increase. At the HS6 level, direct Chinese gains are concentrated in many of the same product lines in which EU exports to Russia decline. The reduced-form estimates are consistent with larger post-2022 China-side gains in products where Russia had depended more heavily on EU suppliers before the sanctions, and this relationship becomes stronger when transit-linked flows are included. A separate table shows that direct Chinese gains offset only part of lost EU exports to Russia, while the broader Russia-bound adjustment is larger once rerouting through transit economies is taken into account. The product-level evidence also indicates that EU export losses in Russia were partly accompanied by stronger EU exports of the same products to other non-transit destinations. Because the physical origin of transit-linked flows is not observed, these broader channels are interpreted as rerouting through intermediary economies with upstream origins that may lie in China, the EU, or elsewhere.

The remainder of the paper proceeds as follows. Section 2 reviews the related literature. Section 3 describes the data and empirical framework. Section 4 presents the results. Section 5 concludes.

2 Related literature and contribution

This paper speaks to three related literatures: sanctions and economic statecraft, trade diversion and third-country effects, and Russia's post-2022 trade reorientation. Across these literatures, a common theme is that the effects of sanctions depend not only on formal restrictions, but also on sectoral structure, substitution possibilities, enforcement, and the scope for firms and countries to reorganize trade through alternative suppliers and routes.

First, it contributes to the broader literature on sanctions as instruments of economic statecraft. Early work emphasized the substantial trade and welfare costs that sanctions can impose on targeted economies and their trading partners (Hufbauer et al., 2007). More recent research has stressed that sanctions may alter not only bilateral trade volumes, but also the composition and direction of trade, with effects shaped by enforcement, adjustment frictions, and the ability of firms and countries to reorganize supply relationships (Becko, 2024; de Souza et al., 2024; Ghironi et al., 2025; Itskhoki & Ribakova, 2024). Related work also suggests that sanctions may redirect trade not only toward third countries, but also toward domestic producers and consumers in sender and target economies (Shingal, 2024).

Second, the paper speaks to the literature on trade diversion, spillovers, and extraterritorial effects. In this literature, an important insight is that sanctions should not be studied solely within the bilateral relationship between the sanctioning and sanctioned economies. Instead, sanctions may generate substantial reallocation toward third countries, both through direct trade diversion and through broader rerouting mechanisms. Crozet and Hinz (2020), studying the 2014 Russia sanctions episode, document large trade losses together with partial reallocation toward non-sanctioning partners. Kwon et al. (2024) show more generally that estimates of sanctions effects may be incomplete or misleading if third-country responses are ignored. A related macro-trade perspective is developed by Ghironi et al. (2024), who emphasize that third-country responses can materially reshape the welfare and adjustment consequences of sanctions. This perspective is directly relevant in the present setting, where post-2022 adjustment may reflect both direct replacement of EU suppliers and broader rerouting through intermediary economies.

Third, the paper contributes to the emerging literature on Russia's post-2022 trade adjustment. Early evidence documented rapid changes in Russia's trade links with non-sanctioning economies, particularly China and India (Hayakawa & Kumagai, 2022). Subsequent work has emphasized that post-2022 adjustment involved not only direct bilateral expansion, but also rerouting through economies in the Caucasus and Central Asia, as well as broader changes in financial and invoicing channels (Chupilkin, Javorcik, Peeva, & Plekhanov, 2025; Chupilkin, Javorcik, & Plekhanov, 2025). Related contributions show that non-sanctioning countries compensated a significant share of Russia's lost access to sanctioned and strategic products, though often at higher cost (Emlinger & Lefebvre, 2025), and that post-2022 export controls left important parts of Russian import demand outside the most tightly constrained categories

(Egorov et al., 2025b). More recent evidence using customs and firm-level information likewise finds substantial rerouting through third countries, but not full offset of the direct losses in sanctioned imports (Egorov et al., 2025a). A closely related contribution is Yalcin et al. (2025), who combine the latest release of the Global Sanctions Data Base with a gravity model to estimate how sanctions changed Russia's bilateral trade costs. They find that the effects were heterogeneous across trading partners: trade costs rose for sanctioning economies, while Russia's bilateral trade links with several non-sanctioning economies, including China, India, and Türkiye, became relatively less costly after 2022.

Relative to this literature, the paper makes three contributions. First, it shifts attention from aggregate bilateral trade patterns to product-level import reorientation by asking whether direct Chinese gains were concentrated in the HS6 lines in which EU exports to Russia fell. Second, it treats transit symmetrically by tracking EU exports to transit economies, Chinese exports to those same economies, and transit-economy exports to Russia separately. Third, it shows that this distinction matters especially in sanction-relevant goods, where direct Chinese gains offset only part of the EU shortfall and broader rerouting accounts for an additional share.

3 Data and empirical framework

The analysis uses annual BACI bilateral trade data for 2017–2024. BACI is a harmonized bilateral trade dataset constructed by CEPII from United Nations Comtrade data.[1] The main unit of observation is the HS6 product-by-year cell. Exact sample sizes differ across specifications, because some outcomes add rest-of-world comparisons while others require positive-flow observations; the corresponding observation counts are therefore reported directly in the regression tables. Russian imports are tracked from three exporter groupings: the EU, China, and a broader China-plus-transit measure that combines direct Chinese exports to Russia with exports from selected intermediary economies to Russia. Throughout the paper, the descriptive comparison contrasts pre-war averages in 2017–2021 with post-2022 averages in 2022–2024.

Transit to Russia denotes exports from the selected transit economies to Russia, EU to transit denotes EU exports to those same economies, and China to transit denotes Chinese exports to them. The variable China-plus-transit to Russia combines direct Chinese exports to Russia with exports from the transit economies to Russia. This construction is intentionally mechanical. It is designed to capture the scale of indirect channels into Russia without imposing an origin assumption on transit flows. In particular, transit exports to Russia are not interpreted as Chinese by default. Rather, they are treated as evidence of rerouting that may reflect upstream supply relationships originating in China, the EU, or elsewhere. That

[1] Gaulier and Zignago (2010).

distinction is important for the interpretation of the results and is maintained throughout the paper.

The set of transit economies is not intended to capture every possible third-country route into Russia. It instead focuses on a small group of intermediary economies that are prominent in the emerging literature on post-2022 rerouting and economically plausible as transit hubs. Armenia, Kazakhstan, and Kyrgyzstan are directly motivated by Chupilkin, Javorcik, and Plekhanov (2025), who document substantial rerouting through the Caucasus and Central Asia after the imposition of sanctions. Hong Kong and Türkiye are included because of their broader role as commercial and logistical hubs and because post-2022 sanctions-enforcement discussions have repeatedly emphasized diversion risks through third countries. The sample should therefore be read as a policy-relevant set of plausible transit channels, not as an exhaustive list of all intermediary economies.

The paper also studies a sanction-relevant subset of HS6 products constructed from two official European Commission lists: the Common High Priority Items list and the Economically Critical Goods list. Using a hand-coded HS6 concordance, BACI products are classified as sanction-relevant if the corresponding HS6 code appears on at least one of these lists. Appendix Table A5 lists the 73 HS6 products included in this subset together with their source-list classification and pre-war EU export values to Russia. This classification is time-invariant over 2017–2024 and should be interpreted as identifying goods that are especially relevant for sanctions enforcement and circumvention risk, rather than the full set of items legally prohibited in every year. Focusing on this subset allows the analysis to assess whether the balance between direct substitution and rerouting differs between the full sample and the goods most relevant for post-2022 export controls.[2]

The empirical strategy combines descriptive product-level comparisons with reduced-form regressions. The descriptive analysis asks whether post-2022 gains in Chinese exports to Russia were concentrated in the same HS6 product lines in which EU exports to Russia declined. These descriptive patterns are reported in aggregate form, by broad sector, and at the HS6-product level.

To sharpen the empirical design, the paper also constructs a pre-war exposure measure at the HS6 level using 2017–2021 BACI data. For each product, pre-war EU dependence is defined as the EU share in Russia's total imports before the 2022 sanctions. The paper then estimates reduced-form specifications in which the outcome is either log(1 + China to Russia exports), log(1 + China-plus-transit exports to Russia), or log(1 + China to Russia exports) minus log(1 + China to rest of world (ROW) exports). The broader China-plus-transit outcome combines direct Chinese exports to Russia with exports from the selected transit economies to Russia and is interpreted as a measure of broader rerouting rather than as evidence of Chinese-origin flows alone. The key regressor is the interaction between the

[2]The concordance is based on the Common High Priority Items list, version dated 22 February 2024, and the Economically Critical Goods list, version dated 24 February 2025.

post-2022 indicator and pre-war EU dependence. All specifications include product and year fixed effects, weight products by pre-war Russian import size, and cluster standard errors at the HS6 level. This design uses a predetermined product-level exposure measure rather than a purely contemporaneous comparison of EU losses and post-2022 outcome changes. It is therefore better suited to asking whether post-2022 reorientation was systematically larger in product lines where Russia had relied more heavily on EU suppliers before the sanctions.

$$y_{pt} = \alpha_p + \gamma_t + \beta \left(Post_t \times EUDependence_p \right) + \varepsilon_{pt}, \tag{1}$$

where p indexes HS6 products, t indexes years, α_p denotes product fixed effects, γ_t denotes year fixed effects, $Post_t$ equals one from 2022 onward, and $EUDependence_p$ denotes pre-war EU dependence measured over 2017–2021. Depending on the specification, y_{pt} is either direct Chinese exports to Russia, China-plus-transit exports to Russia, or the corresponding China-to-Russia outcome relative to China-to-ROW exports.

The estimates are interpreted as reduced-form associations rather than causal replacement effects. Pre-war EU dependence may for instance still be correlated with product-level characteristics that affect post-2022 adjustment, including differences in demand, sanction coverage, prices, and quality. The contribution of the paper is therefore not to estimate a structural one-for-one displacement parameter, but to document whether post-2022 import reorientation was systematically larger in product lines with greater pre-war dependence on EU suppliers.

4 Results

4.1 Aggregate results

The aggregate evidence shows a sharp reversal in Russian import sourcing after 2022. As Table 1 shows, average annual EU exports to Russia fell from 94.9 to 42.9 billion USD between 2017–2021 and 2022–2024, while Chinese exports rose from 55.5 to 99.7 billion USD. When exports from the five selected transit economies to Russia are added, the broader China-plus-transit measure increases from 67.6 to 124.8 billion USD. In annual average terms, this corresponds to an EU decline of about 52 billion USD, a direct China increase of about 44 billion USD, and a broader China-plus-transit increase of about 57 billion USD. These aggregate patterns establish the scale of the shock, but not yet whether adjustment occurred in the same HS6 product lines.

This aggregate shift is economically large. On the EU side, the decline is not a marginal adjustment but a major contraction in one of Russia's pre-war supplier relationships. On the China side, the increase is similarly substantial, both in absolute value and relative to pre-war levels. The broader China-plus-transit measure rises even more. At the aggregate

level, the data therefore point to two simultaneous developments: a sharp weakening of EU supply to Russia and a strong expansion of both direct and indirect alternative channels.

The sectoral composition of the adjustment is also informative. The largest changes are concentrated in transport equipment, machinery, electronics, and chemicals. In transport equipment, EU exports to Russia fall from 13.5 to 1.4 billion USD, while Chinese exports rise from 3.2 to 19.0 billion USD and the broader China-plus-transit measure rises to 20.5 billion USD. In machinery, EU exports fall from 22.0 to 6.1 billion USD, while Chinese exports rise from 12.8 to 23.1 billion USD and China-plus-transit rises to 27.2 billion USD. Electronics display a similar, though somewhat less dramatic, pattern, with EU exports declining from 8.1 to 1.5 billion USD and China-plus-transit inflows rising from 14.2 to 18.7 billion USD. Chemicals stand out somewhat differently: EU exports remain comparatively large even after 2022, but Chinese and transit-linked gains are still substantial.

These sectoral patterns show that the reorientation was not confined to peripheral products, but was concentrated in economically central sectors such as transport equipment, machinery, electronics, and chemicals. At the same time, aggregate shifts do not by themselves establish product-level supplier substitution. An increase in Chinese exports to Russia can coexist with a decline in EU exports without implying that Chinese firms expanded in exactly the same HS6 products from which EU suppliers withdrew. The aggregate evidence is therefore best viewed as motivation for the product-level analysis that follows.

Table 1: Average annual Russian imports by broad sector, pre-war (2017–2021) and post-2022 (2022–2024), USD billions.

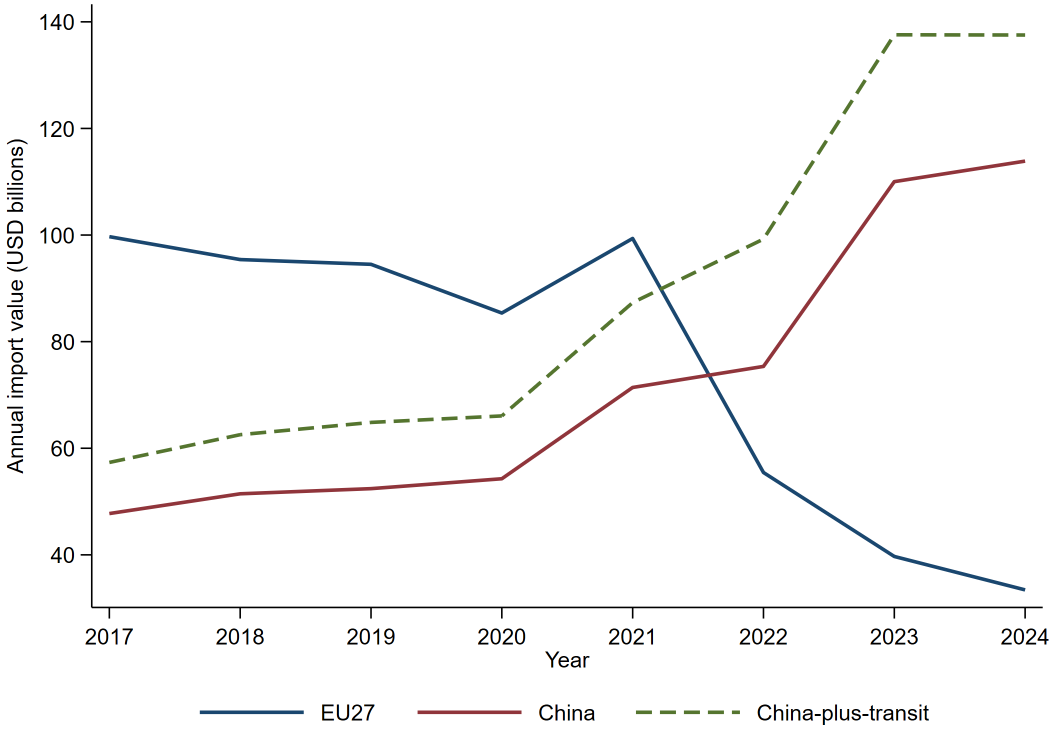
Sector	EU pre-war	EU post-2022	China pre-war	China post-2022	China-plus-transit pre-war	China-plus-transit post-2022
All products	94.9	42.9	55.5	99.7	67.6	124.8
Transport equipment	13.5	1.4	3.2	19.0	3.9	20.5
Machinery	22.0	6.1	12.8	23.1	13.9	27.2
Electronics	8.1	1.5	13.7	15.5	14.2	18.7
Chemicals	17.1	14.7	3.0	7.0	4.0	10.4

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: Entries are average annual import values over 2017–2021 and 2022–2024. Sector rows aggregate HS6 products into the broad sector groups used in the paper. China-plus-transit combines direct Chinese exports to Russia with exports from the selected transit economies to Russia.

Figure 1 shows the timing of the aggregate reversal over 2017–2024. EU exports to Russia decline sharply after 2022, while Chinese exports to Russia rise and the China-plus-transit series rises even more strongly. Read together, Table 1 and Figure 1 show that post-2022 Russian import adjustment involved not only a reweighting away from the EU and toward China, but also a widening role for intermediary channels. They do not, however, show whether these changes occurred in the same product lines. That question requires moving

Figure 1: Aggregate Russian imports from the EU, China, and China-plus-transit flows, 2017–2024.



Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

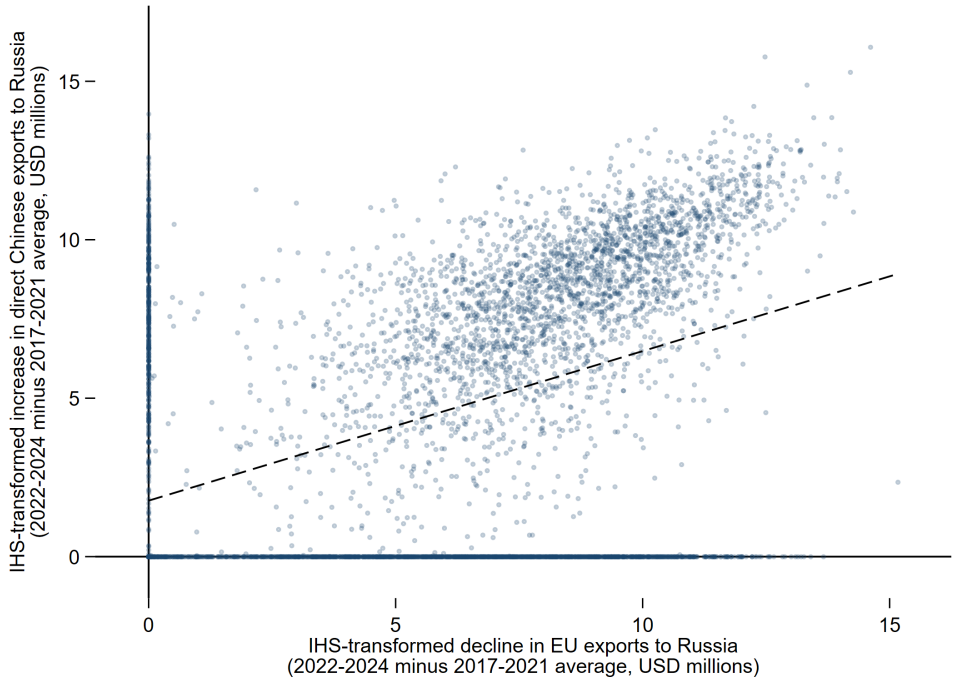
from aggregate trade totals to the HS6 product level.

4.2 Product-level results

Figures 2 and 3 illustrate the product-level relationship between post-2022 EU export losses to Russia and China-side export gains. Figure 2 plots direct Chinese export changes against EU export losses at the HS6 level, while Figure 3 replaces the vertical axis with the broader China-plus-transit outcome. In both figures, the axes use an inverse-hyperbolic-sine (IHS) transformation, which spreads out observations near zero while retaining the full sample. The purpose is to show whether the same HS6 product lines that experienced larger EU losses also tended to be the product lines with larger China-side gains.

Figures 2 and 3 show a positive association: HS6 product lines with larger post-2022 EU export losses to Russia also tended to record larger China-side gains. The scatterplots display substantial dispersion, but the overall slope is positive in both cases and is steeper when the outcome is broadened to China-plus-transit flows. Economically, that matters because the broader China-plus-transit outcome points to a stronger Russia-bound adjustment in the same product lines in which EU supply weakened most.

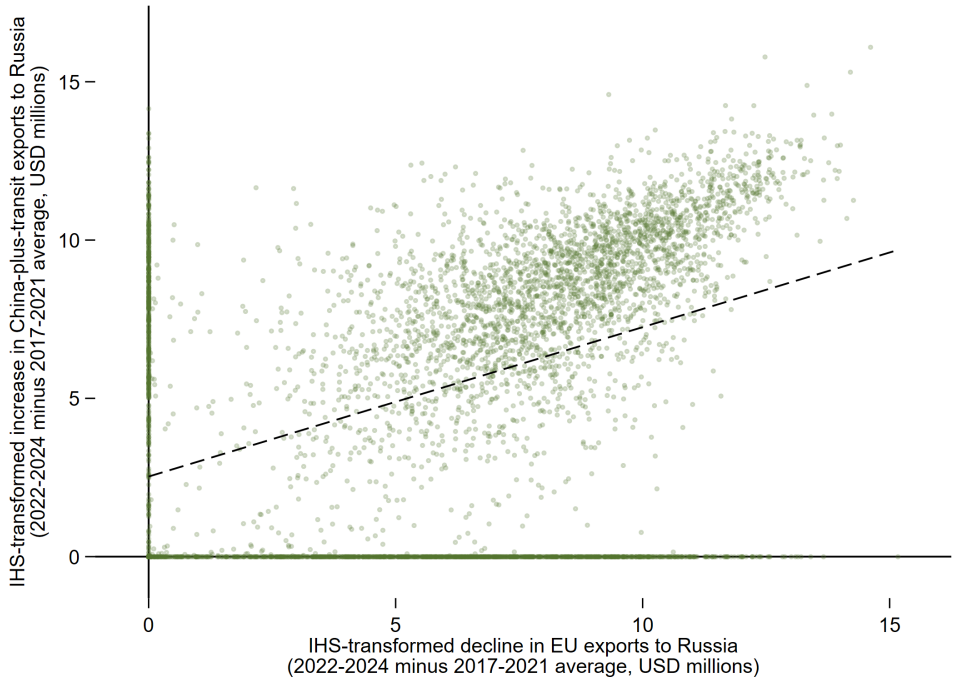
Figure 2: HS6-level relationship between post-2022 EU losses and gains in direct Chinese exports to Russia.



Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: Each point is an HS6 product. The axes plot inverse-hyperbolic-sine (IHS)-transformed changes in average annual trade values, measured in USD millions as 2022–2024 averages minus 2017–2021 averages. The dashed line is an unweighted OLS fit, and the horizontal and vertical reference lines mark zero change.

Figure 3: HS6-level relationship between post-2022 EU losses and gains in China-plus-transit flows to Russia.



Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: Each point is an HS6 product. The axes plot inverse-hyperbolic-sine (IHS)-transformed changes in average annual trade values, measured in USD millions as 2022–2024 averages minus 2017–2021 averages. The dashed line is an unweighted OLS fit, and the horizontal and vertical reference lines mark zero change. China-plus-transit denotes broader rerouting via selected intermediary economies.

Table 2 provides a descriptive ranked-product illustration of offset patterns across leading HS6 product lines. The products are ranked by absolute trade-value changes, not by the relative offset ratio. Specifically, the ranking uses the dollar amount of EU export losses that could be matched by China-plus-transit gains: the smaller of two values in each product, the EU loss and the China-plus-transit gain.[3] The leading products are concentrated in economically important industrial and transport-related categories, including vehicles, vehicle parts, valves, tyres, braking systems, and related machinery products. Some lines show gains that exceed the corresponding EU losses, while others show only partial offset, underscoring that post-2022 adjustment was uneven across products. The economic magnitudes are large: among the listed products, six of the 10 offset ratios exceed one, and in several transport-related products the broader China-plus-transit gain is two to five times as large as the

[3]For example, if EU exports fall by USD 100 million and China-plus-transit exports rise by USD 60 million, the matched amount is USD 60 million. If EU exports fall by USD 100 million and China-plus-transit exports rise by USD 180 million, the matched amount is capped at USD 100 million.

Table 2: Top 10 HS6 products ranked by matched absolute trade-value changes, USD millions.

Rank	HS6	Product	EU loss	China gain	China-plus-transit gain	Offset ratio
1	870323	Passenger cars (1500-3000cc)	1108.6	4802.9	4883.3	4.40
2	870120	Road tractors for semi-trailers	737.5	2177.4	2224.2	3.02
3	848180	Taps, cocks, and valves	505.6	521.7	591.3	1.17
4	382499	Chemical products n.e.c.	350.9	519.6	572.7	1.63
5	870423	Heavy diesel goods vehicles	306.4	1453.6	1462.1	4.77
6	870899	Vehicle parts n.e.c.	434.4	225.1	278.0	0.64
7	870830	Brakes and brake parts	272.1	190.3	259.2	0.95
8	401120	Tyres for buses and lorries	250.8	252.0	258.5	1.03
9	841370	Centrifugal pumps for liquids	268.5	185.2	225.7	0.84
10	847989	Machinery with individual functions n.e.c.	602.7	188.6	222.1	0.37

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: Values compare average annual trade in 2017–2021 with average annual trade in 2022–2024. Products are ranked by matched absolute trade-value changes, defined as the smaller of the post-2022 China-plus-transit gain and the corresponding post-2022 EU loss within the same HS6 product line. The ranking is therefore based on absolute USD amounts, not on the offset ratio. The offset ratio is defined as the ratio of the post-2022 China-plus-transit gain to the corresponding post-2022 EU loss within the same HS6 product line.

corresponding EU loss. These large ratios should nevertheless be interpreted with caution. They may reflect not only replacement of lost EU exports, but also substitution away from other sanctioning suppliers, shifts in Russian demand, price changes, and broader rerouting through intermediary economies.

Table 3 reports the main reduced-form estimates. The main specification uses pre-war EU dependence as a predetermined exposure measure. It tests whether post-2022 China-side gains were larger in products that had relied more heavily on EU suppliers before the sanctions. Empirically, the key regressor is the interaction between this pre-war EU-dependence measure and the post-2022 indicator, estimated with product and year fixed effects, pre-war import weights, and clustering at the HS6 level. This specification is more closely aligned with the substantive question than a purely contemporaneous comparison between EU losses and China-side gains. The coefficient on post-2022 $\times$ pre-war EU dependence is 0.94 when the outcome is log(1 + China exports to Russia) and 1.50 when the outcome is log(1 + China-plus-transit exports to Russia). These estimates are consistent with larger post-2022 China-side gains in HS6 product lines in which Russia had relied more heavily on EU suppliers before the sanctions. The larger coefficient for the broader outcome is consistent with a larger Russia-bound adjustment once transit-linked flows are included, though it does not isolate the origin or mechanism of those flows. Column (3) points in the same direction: China's exports to Russia rose more in these products than its exports of the same products to the rest of the world.

In economic terms, these coefficients imply meaningful cross-product differences in post-

2022 adjustment. In column (1), a 10-percentage-point increase in pre-war EU dependence is associated with about 0.094 log points higher post-2022 Chinese exports to Russia, which corresponds to roughly a 10 percent higher outcome. In column (2), the corresponding figure is 0.150 log points, or about 16 percent.

Table 3: Exposure-based estimates of product-level import reorientation.

	1	2	3
Outcome	China to Russia	China-plus-transit to Russia	China to Russia relative to ROW
post x pre-war EU dependence	0.9406***	1.5015***	0.6096*
	(0.3329)	(0.2978)	(0.3509)
t-stat	2.826	5.042	1.737
Observations	41,484	41,484	42,077
HS6 products	5,260	5,260	5,260

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: The table reports reduced-form estimates from HS6-year regressions for 2017–2024. Outcome labels are shorthand for log(1 + China to Russia), log(1 + China-plus-transit to Russia), and log(1 + China to Russia) − log(1 + China to rest of world (ROW)), respectively. The main regressor is the interaction between a post-2022 indicator and pre-war EU dependence, defined as the EU share in Russia's imports of a given HS6 product over 2017–2021. All specifications include HS6 and year fixed effects, use pre-war Russian import size as weights, and report standard errors clustered at the HS6 level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Earlier studies have shown that post-2022 sanctions were associated with trade diversion and rerouting toward non-sanctioning economies (Chupilkin, Javorcik, Peeva, & Plekhanov, 2025; Chupilkin, Javorcik, & Plekhanov, 2025; Egorov et al., 2025a). The present results sharpen that picture by suggesting that the adjustment was structured at the product level: direct Chinese gains were larger in the HS6 products where Russia had depended more heavily on EU suppliers before the sanctions, and the broader China-plus-transit outcome points to additional Russia-bound adjustment in those same products.

Appendix Table A3 reports robustness checks for the same exposure-based reduced-form design. Appendix Figures A1 and A2 report event-study versions of that design and should be read as timing evidence and diagnostic checks rather than as formal treated-versus-untreated event studies. For the broader China-plus-transit outcome, the pre-2022 coefficients are relatively stable and the post-2022 coefficients turn positive and remain elevated. For direct China-to-Russia exports, the pre-trend patterns are less clean and the post-2022 coefficients are less precisely estimated, so Figure A1 should be read as supportive timing evidence only, not as a central identification result.

Supporting log-log specifications, reported in Appendix Table A1, also point in the same direction. Taken together, the descriptive and reduced-form evidence support the same conclusion: post-2022 direct Chinese gains were concentrated in many of the same product lines in which EU exports to Russia declined, and the broader adjustment in those lines was larger when transit-linked flows were included.

4.3 Transit and rerouting

Transit appears to be an important part of post-2022 adjustment. Once direct EU exports to Russia contracted sharply, Russian imports could respond not only through direct sourcing from alternative suppliers, but also through intermediary economies that expanded their own exports to Russia while increasing imports from major external suppliers.

Table 4: Average annual trade through selected transit economies before and after 2022, USD billions.

Sample	EU to transit pre-war	EU to transit post-2022	China to transit pre-war	China to transit post-2022	Transit to Russia pre-war	Transit to Russia post-2022
All products	118.0	151.5	311.6	343.6	12.2	25.0
Sanction-relevant goods	10.1	13.1	91.2	110.2	0.48	2.23

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: Entries are average annual trade values over 2017–2021 and 2022–2024. The selected transit economies are Hong Kong, Armenia, Kazakhstan, Kyrgyzstan, and Türkiye. Sanction-relevant goods are the HS6 products mapped to the EU common high-priority and economically critical lists used in the paper.

The aggregate transit evidence is consistent with a substantial expansion of intermediary channels after 2022. As Table 4 shows, average annual EU exports to the five selected transit economies rise from about 118.0 to 151.5 billion USD, Chinese exports to those same economies rise from 311.6 to 343.6 billion USD, and the transit economies' exports to Russia increase from 12.2 to 25.0 billion USD. In annual average terms, transit-country exports to Russia therefore increase by about 12.8 billion USD overall, while EU and Chinese exports to those same economies rise by about 33.5 and 32.0 billion USD, respectively. The same pattern is visible, in sharper form, in sanction-relevant goods. These movements are difficult to reconcile with an interpretation based solely on direct bilateral substitution. At the same time, they do not by themselves identify rerouting into Russia, since they may also reflect stockbuilding in transit hubs, local demand shifts, price effects, or reporting changes. The evidence is therefore best read as consistent with an expanded role for third-country channels.

A feature of Table 4 is that EU exports to the selected transit economies rise more strongly in proportional terms than Chinese exports to those same destinations after 2022. Across all products, EU exports to transit increase by about 28 percent, compared with roughly

10 percent for China. In sanction-relevant goods, the proportional increases are about 30 percent for the EU and 21 percent for China. This pattern is consistent with the idea that, unlike China, EU-based supply relationships faced sanctions-related frictions in direct trade with Russia and therefore had stronger incentives to shift toward indirect channels.

The broader combination of rising EU exports to transit economies, rising Chinese exports to those same economies, and rising transit-country exports to Russia is consistent with recent evidence on rerouting through the Caucasus and Central Asia after 2022 (Chupilkin, Javorcik, & Plekhanov, 2025; Egorov et al., 2025a). The paper tracks EU exports to transit economies, Chinese exports to those same economies, and transit-economy exports to Russia separately. Taken together, the evidence suggests that post-2022 rerouting operated through multiple routes and involved goods sourced from China, the EU, and other economies.

The stronger role of transit in sanction-relevant goods is especially important. In the full sample, transit-country exports to Russia roughly double after 2022. In sanction-relevant goods, they rise from about 0.5 to 2.2 billion USD, an increase of roughly 1.75 billion USD and almost a fivefold change in proportional terms. Upstream flows into the transit economies also increase in this segment, reinforcing the view that indirect channels became more important in the sanction-sensitive part of trade, even if the bilateral data do not identify which of these additional flows were subsequently re-exported to Russia. Once attention shifts from aggregate trade to the goods most relevant for sanctions enforcement, intermediary channels therefore become more central to understanding how Russian imports adjusted after the sanctions shock.

The transit evidence nevertheless has clear limits. The data do not reveal the physical origin of goods shipped through intermediary economies, nor do they distinguish cleanly between re-exports, additional local processing, and more complex supply-chain restructuring. What the evidence does show is that post-2022 Russian import adjustment cannot be understood solely through direct bilateral trade and is consistent with a larger role for selected intermediary channels.

4.4 Sanction-relevant goods

Although sanction-relevant goods already appear above as part of the broader results, they deserve separate treatment because this is the subset in which the distinction between direct substitution and broader rerouting is most policy-relevant. Restricting attention to the official EU lists of common high-priority and economically critical goods sharpens the main comparison because these products are especially relevant for enforcement and strategic supply concerns. As described above, the resulting enforcement-relevant subset contains 73 HS6 product categories. Appendix Table A5 lists those HS6 products, their source-list classification, and their pre-war EU export values to Russia. This subset should nevertheless be read as an enforcement-relevant, retrospective classification based on a time-invariant

concordance, not as the full universe of goods legally prohibited in every year of the sample.

Table 5 summarizes the sanction-relevant comparison and decomposes the EU shortfall into direct Chinese gains, transit-country gains, and the remaining uncovered gap. The pre-war to post-2022 shift is stark: EU exports to Russia fall to about one-sixth of their pre-war level, while direct Chinese exports, China-plus-transit, and especially transit-country exports to Russia increase. Direct EU exports do not fall to zero, however, because the sanction-relevant subset is broader than a set of goods that would necessarily be fully prohibited in every HS6 line and year.

Table 5: Decomposition of the EU shortfall in sanction-relevant goods.

Component	Value (bn USD)	Share of EU shortfall (%)
EU exports to Russia, 2017–2021 average	10.250	
EU exports to Russia, 2022–2024 average	1.703	
EU shortfall	8.547	100.0
Direct China gain	2.375	27.8
Transit to Russia gain	1.756	20.6
China-plus-transit gain	4.131	48.3
Remaining uncovered gap	4.416	51.7

Source: Author's calculations based on BACI bilateral trade data (CEPII) and the author's concordance for EU common high-priority and economically critical goods.
Note: The table uses average annual values in 2017–2021 and 2022–2024 for sanction-relevant goods only. The first two rows report the corresponding pre-war and post-2022 averages of direct EU exports to Russia. The EU shortfall is the decline in direct EU exports to Russia between those two periods. Direct China gain is the corresponding increase in direct Chinese exports to Russia, Transit to Russia gain is the increase in exports from the selected transit economies to Russia, and China-plus-transit gain is the sum of those two components. Shares are reported relative to the EU shortfall.

The decomposition shows that direct Chinese gains account for about USD 2.4 billion, or 27.8 percent of the EU shortfall. Transit-country exports to Russia account for another USD 1.8 billion, or 20.6 percent. Taken together, China-plus-transit offsets about USD 4.1 billion, or 48.3 percent, leaving a remaining uncovered gap of about USD 4.4 billion. The implication is that almost half of the lost direct EU supply in these goods is matched by direct Chinese and transit-linked gains, but slightly more than half remains uncovered even after those broader channels are included.

Moreover, this pattern is consistent with earlier work showing that non-sanctioning economies compensated part, but not all, of Russia's lost access to sanctioned and strategic goods (Egorov et al., 2025a; Emlinger & Lefebvre, 2025). The contribution here is to separate more clearly between direct Chinese gains and broader transit-linked adjustment within the sanction-relevant subset. The sanction-relevant results also clarify why the distinction between direct substitution and rerouting matters analytically. In the full sample, one could still tell a relatively simple story in which post-2022 Russian imports shifted away from the EU and toward China, with transit playing a supporting role. In sanction-relevant goods, that summary becomes less adequate. Here, direct Chinese gains are positive but limited

relative to the scale of the EU collapse, while transit-country exports rise much more strongly.

Because the main results are based on trade values, Appendix Table A4 reports complementary unit-value comparisons for the same broad set of Russia-bound flows. The table reports average values per ton for EU, Chinese, and transit-country exports to Russia, separately for the full sample and for sanction-relevant goods. In the full sample, EU-to-Russia unit values rise from 5.6 to 7.5 thousand USD per ton, Chinese unit values are broadly stable to slightly lower, and transit-country unit values rise from 0.25 to 0.68 thousand USD per ton. The contrast is sharper in sanction-relevant goods: EU and Chinese unit values decline, while transit-country unit values increase from 4.4 to 11.9 thousand USD per ton. These differences suggest that changes in trade values may partly reflect price changes or changes in product composition within HS6 categories, especially for transit-country exports to Russia. The unit-value evidence should therefore be read as a descriptive check on the value-based results, not as a separate identification of rerouting, since BACI quantities are not available or comparable for every HS6 flow.

4.5 Reallocation beyond Russia

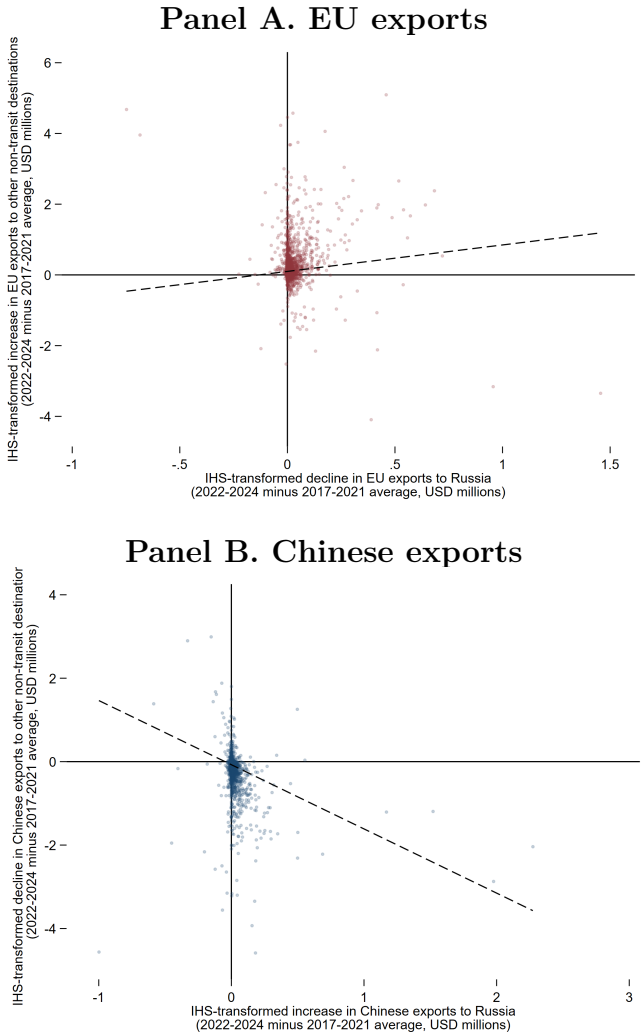
A related question is whether post-2022 adjustment toward Russia was accompanied by changes in exports to other non-transit destinations. This matters because Chinese gains in Russia may reflect either an expansion of total Chinese exports in the relevant products or a reallocation of exports away from other markets toward Russia. Similarly, the collapse in EU exports to Russia may have been partly absorbed by stronger EU exports of the same products to other destinations.

Appendix Table A2 gives concrete examples of large product-level reallocation patterns. The products in the table are not selected randomly. For China, the table selects large HS6 cases in which exports to Russia increased while exports of the same product to other non-transit destinations declined. For the EU, it selects large HS6 cases in which exports to Russia declined while exports of the same product to other non-transit destinations increased. The table is therefore designed to show prominent examples of this type of reallocation, not to summarize the average pattern across all products.

The selected products are economically meaningful. On the China side, the examples include television reception apparatus, furskin apparel, parts of electrical apparatus, leather footwear, and radio navigational aid apparatus. In these cases, larger Chinese exports to Russia coincide with lower exports of the same products to other non-transit destinations. On the EU side, the examples are concentrated in transport equipment, machinery, and data-processing products, including road tractors, vehicle body parts, gear boxes, machinery with individual functions, and automatic data-processing units. These are product lines in which the loss of the Russian market coincides with sizeable increases in EU exports to other non-transit destinations.

The table deliberately highlights large sign-consistent examples, so the next step is to examine whether similar patterns hold more generally. Figure 4 plots the product-level relationship across the full HS6 distribution.

Figure 4: Product-level reallocation beyond Russia.



Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: Each point is an HS6 product. The axes plot inverse-hyperbolic-sine (IHS)-transformed changes in average annual trade values, measured in USD millions as 2022–2024 averages minus 2017–2021 averages. In Panel A, positive values indicate larger EU export declines to Russia on the horizontal axis and larger EU export increases to other non-transit destinations on the vertical axis. In Panel B, positive values indicate larger Chinese export increases to Russia on the horizontal axis and larger Chinese export declines to other non-transit destinations on the vertical axis. In both panels, the upper-right quadrant is the sign-consistent reallocation quadrant. Other non-transit destinations exclude Russia and the selected transit economies. The dashed line is an unweighted OLS fit; reference lines mark zero change.

In both panels, the upper-right quadrant is the sign-consistent reallocation quadrant. In Panel A, positive horizontal values mean larger EU export declines to Russia, while positive vertical values mean larger EU export increases to other non-transit destinations. A positive association therefore indicates that products with larger EU losses in Russia

also tended to expand more in other markets. In Panel B, positive horizontal values mean larger Chinese export increases to Russia, while positive vertical values mean larger Chinese export declines to other non-transit destinations. Points below the horizontal zero line in Panel B therefore indicate products where Chinese exports rose both to Russia and to other non-transit destinations, not reallocation away from other markets. Read this way, the figure suggests a clearer outward-redirection pattern for the EU than for China. For the EU, Panel A is consistent with partial outward redirection: in several HS6 product lines, larger post-2022 export declines to Russia coincide with larger increases in exports of the same products to other non-transit destinations. This suggests that the broader EU export sector in those products was partly able to absorb the loss of the Russian market by expanding sales elsewhere. The China panel contains some sign-consistent cases, as Table A2 illustrates, but the broader cloud and fitted line do not support a general zero-sum interpretation in which Chinese exports to Russia systematically displaced exports to other markets.

5 Conclusion

This paper asked whether post-2022 Chinese export gains to Russia were concentrated in the same HS6 product lines in which EU exports to Russia declined. Using annual BACI bilateral trade data for 2017–2024, it finds a structured pattern of post-2022 import reorientation rather than full one-for-one replacement. Product lines with greater pre-war dependence on EU suppliers saw larger post-2022 China-side gains, and this relationship is stronger when transit-linked flows are included. The evidence therefore points to a structured pattern of adjustment across HS6 products rather than merely an aggregate increase in China–Russia trade. At the same time, the results do not justify a one-for-one replacement interpretation. The broader China-plus-transit results are best understood as evidence of rerouting through intermediary economies, and the selected transit-country group should not be read as a full accounting of all rerouting into Russia.

Direct Chinese gains offset 27.8 percent of the EU shortfall in sanction-relevant goods, while China-plus-transit together offsets 48.3 percent, leaving a substantial uncovered gap. The transit evidence adds an additional qualification to a simple China-replacement story. Exports from the selected transit economies to Russia rise sharply after 2022, and EU exports to those same transit economies increase more strongly in proportional terms than Chinese exports do. This pattern is consistent with the idea that sanctions-related frictions created stronger incentives for indirect EU-linked channels than for Chinese exports, even though the bilateral data cannot show which of those additional flows ultimately reached Russia. At the same time, the EU-side reallocation evidence suggests that the loss of the Russian market was not only a negative shock to EU exporters; in some product lines it was accompanied by increased sales to other non-transit destinations.

The broader lesson is that bilateral China–Russia trade alone understates how sanctions-

era import adjustment can operate across products and channels when intermediary routes are active. In that sense, the paper's contribution is not simply to document stronger China–Russia trade after 2022. It is to show that post-2022 adjustment was concentrated in products with greater pre-war EU exposure, that a non-trivial part of the broader Russia-bound response appears to have operated through intermediary economies, and that some EU product lines show evidence of outward redirection toward other markets. The evidence is therefore consistent with partial direct substitution by China, broader rerouting through transit economies, and partial EU reallocation away from Russia, not full replacement of lost EU exports.

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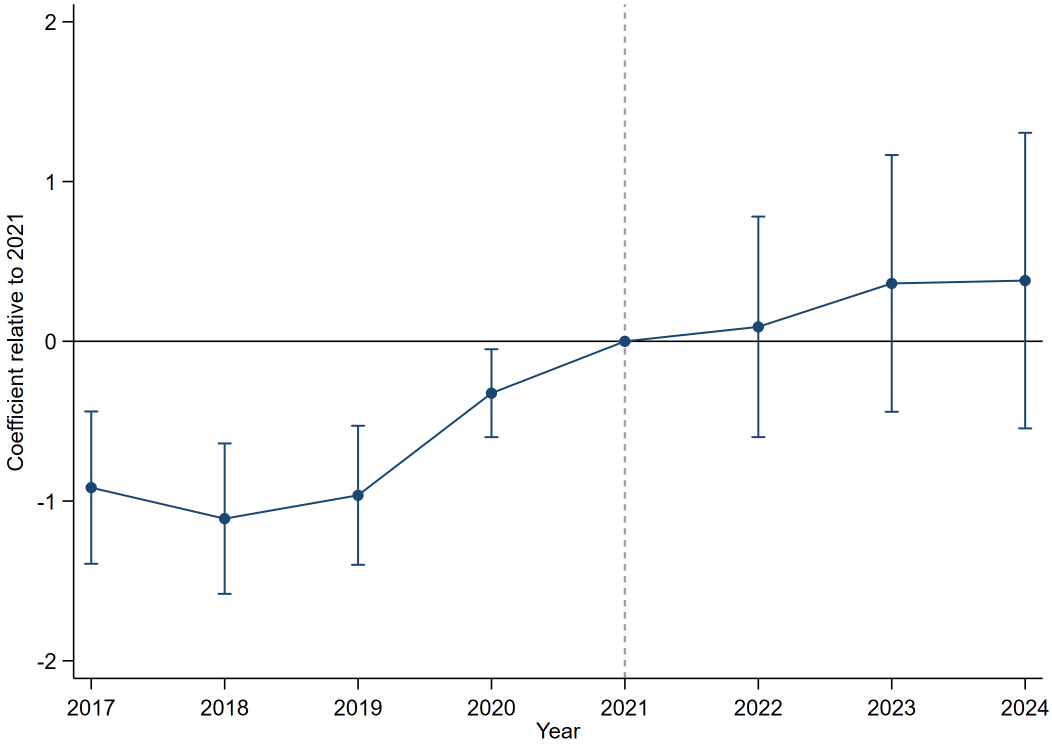
Appendix

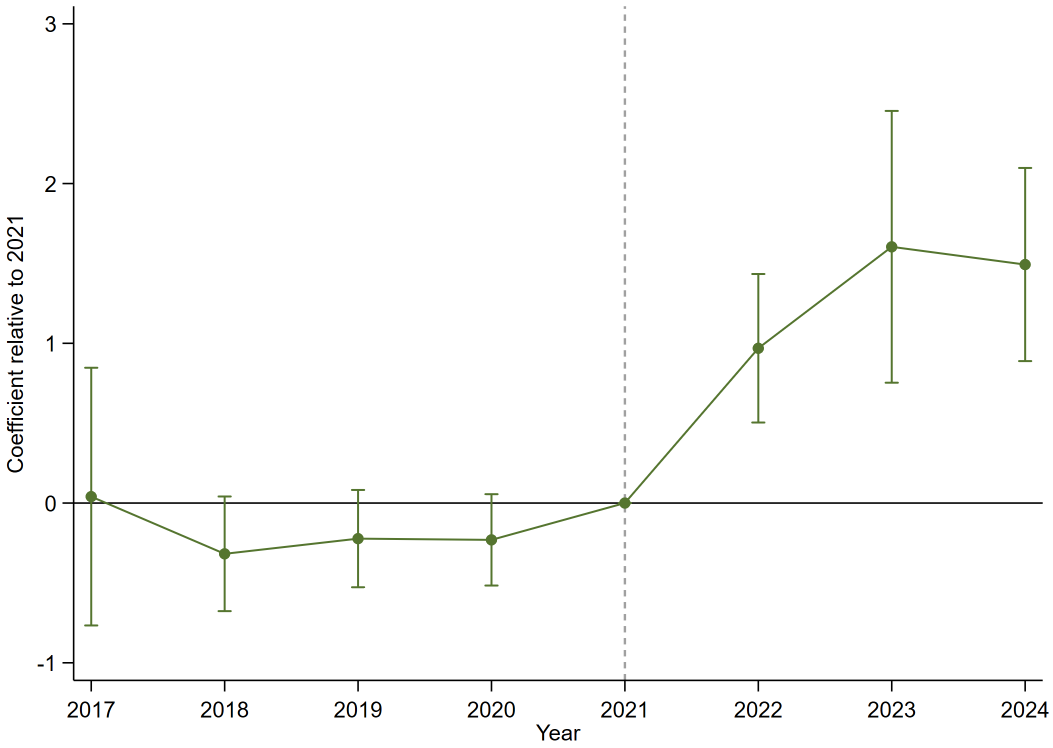
Figure A1: Event-study coefficients for direct Chinese exports to Russia.



Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: The figure reports coefficients from an event-study version of the exposure-based specification in which pre-war EU dependence is interacted with year indicators, with 2021 omitted as the base year. The outcome is log(1 + China to Russia exports) at the HS6 product-by-year level. All specifications include HS6 fixed effects and year fixed effects, are weighted by pre-war Russian import size, and use standard errors clustered at the HS6 level. Vertical bars show 95 percent confidence intervals. The 2021 point is shown at zero only as a visual reference because 2021 is the omitted base year. The figure is intended as a timing and pre-trend diagnostic within the reduced-form design rather than as a stand-alone causal event-study.

Figure A2: Event-study coefficients for China-plus-transit flows to Russia.



Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.

Note: The figure reports coefficients from an event-study version of the exposure-based specification in which pre-war EU dependence is interacted with year indicators, with 2021 omitted as the base year. The outcome is log(1 + China-plus-transit exports to Russia) at the HS6 product-by-year level, where China-plus-transit combines direct Chinese exports to Russia with exports from the selected transit economies to Russia. All specifications include HS6 fixed effects and year fixed effects, are weighted by pre-war Russian import size, and use standard errors clustered at the HS6 level. Vertical bars show 95 percent confidence intervals. The 2021 point is shown at zero only as a visual reference because 2021 is the omitted base year. The figure is intended as a timing and pre-trend diagnostic within the reduced-form design rather than as a stand-alone causal event-study.

Appendix Tables

Table A1: Log-log association estimates for China-side export gains and EU export losses.

Outcome	Specification	Observations	Elasticity	Std. error	t-statistic	R-squared
China only	Pooled	12,947	0.0988	0.0054	18.337	0.0253
China only	Year FE	12,947	0.0865	0.0058	15.016	0.0171
China-plus-transit	Pooled	13,870	0.0756	0.0049	15.518	0.0171
China-plus-transit	Year FE	13,870	0.0690	0.0052	13.298	0.0126

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.
Note: The table reports log-log association estimates linking percentage changes in China-side exports to Russia to percentage changes in EU export losses to Russia. "Pooled" denotes specifications without year fixed effects, while "Year FE" adds year fixed effects. Sample sizes are smaller than in Table 3 because the log-log specifications require strictly positive trade values in the compared flows.

Table A2: Illustrative HS6 products showing product-level reallocation beyond Russia, USD millions.

Panel	HS6	Product	Russia change	Other non-transit change
China	852872	Television reception apparatus	+517.5	-1,613.8
China	430310	Furskin apparel and accessories	+347.6	-155.5
China	854390	Parts of electrical apparatus n.e.c.	+143.5	-111.1
China	640391	Leather footwear covering the ankle	+70.5	-150.7
China	852691	Radio navigational aid apparatus	+61.6	-88.4
EU	870120	Road tractors for semi-trailers	-737.5	+5,361.4
EU	870829	Vehicle body parts and accessories	-685.8	+3,556.0
EU	847989	Machines with individual functions n.e.c.	-602.7	+2,566.6
EU	870840	Gear boxes and parts	-587.2	+1,253.5
EU	847150	Automatic data processing units	-565.9	+3,078.2

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.
Note: "Other non-transit change" measures the change in exports of the same HS6 product to destinations outside Russia and outside the selected transit economies. The listed products are illustrative examples of sign-consistent product-level reallocation patterns in the descriptive reallocation dataset.

Table A3: Robustness checks for the exposure-based reduced-form estimates.

Statistic	(1) China to Russia all products	(2) China-plus-transit all products	(3) China to Russia sanction-relevant goods	(4) China-plus-transit sanction-relevant goods
Coefficient on post × pre-war EU dependence	1.1696	1.7204	3.0160	2.4712
Clustered standard error	0.0868	0.0874	0.8950	0.8728
t-statistic	13.482	19.674	3.370	2.831
Observations	41,484	41,484	584	584
Sample / weighting	All products, unweighted	All products, unweighted	Sanction-relevant goods, weighted	Sanction-relevant goods, weighted

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.
Note: The table reports robustness checks for the exposure-based reduced-form design in Table 3. Outcomes are log(1 + exports to Russia) for the flow indicated in each column heading. Columns (1) and (2) repeat the main all-product specifications without pre-war import weights, so each HS6-year observation receives equal weight. Columns (3) and (4) restrict the sample to sanction-relevant goods and retain weighting by pre-war Russian import size, so larger pre-war Russian import markets receive greater influence in the estimates. All specifications include HS6 and year fixed effects and cluster standard errors at the HS6 level.

Table A4: Unit-value summary for key Russia-bound trade flows.

Sample	Flow	Covered HS6	Pre-war unit value	Post-2022 unit value
Full sample	EU to Russia	5,040	5.551	7.543
Full sample	China to Russia	4,583	5.001	4.575
Full sample	Transit to Russia	4,955	0.246	0.683
Sanction-relevant goods	EU to Russia	73	16.266	14.861
Sanction-relevant goods	China to Russia	73	15.165	10.793
Sanction-relevant goods	Transit to Russia	73	4.354	11.939

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data.
Note: Values are reported in thousand USD per ton and only where BACI quantities are positive and comparable. "Covered HS6" reports the number of HS6 product lines with usable quantity data for the indicated flow and sample. Unit values are computed after aggregating trade values and quantities within each flow-by-period cell.

Table A5: Sanction-relevant HS6 product categories and source classification.

HS6	Product	CHP	CHP tier classification	Economically critical	Pre-war EU exports to Russia (USD mn)
841989	Machinery, plant and laboratory equipment: for treating materials by change of temperature, other than for making hot drinks or cooking or heating food	No		Yes	830.5
848180	Taps, cocks, valves and similar appliances: for pipes, boiler shells, tanks, vats or the like, including thermostatically controlled valves	No		Yes	798.0
847989	Machines and mechanical appliances: having individual functions, n.e.c. or included in this chapter	No		Yes	707.6
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	Yes	3A	No	606.1
853710	Boards, panels, consoles, desks and other bases: for electric control or the distribution of electricity, (other than switching apparatus of heading no. 8517), for a voltage not exceeding 1000 volts	No		Yes	600.4
870899	Vehicle parts and accessories: n.e.c. in heading no. 8708	No		Yes	513.1
851762	Communication apparatus (excluding telephone sets or base stations): machines for the reception, conversion and transmission or regeneration of voice, images or other data, including switching and routing apparatus	Yes	2	No	322.1
871639	Trailers and semi-trailers: (other than tanker type)	No		Yes	316.1
850440	Electrical static converters	Yes	3A	No	309.8
842139	Machinery: for filtering or purifying gases, other than intake air filters for internal combustion engines	No		Yes	277.6
842890	Lifting, handling, loading or unloading machinery: n.e.c. in heading no. 8425, 8426, 8427 or 8428	No		Yes	218.5
730890	Iron or steel: structures and parts thereof, n.e.c. in heading 7308	No		Yes	215.0
871690	Trailers, semi-trailers and other vehicles not mechanically propelled: parts thereof for heading no. 8716	No		Yes	206.8
842199	Machinery: parts for filtering or purifying liquids or gases	No		Yes	203.2
847720	Machinery: extruders, for working rubber or plastics or for the manufacture of products from these materials	No		Yes	186.0
854231	Electronic integrated circuits: processors and controllers, whether or not combined with memories, converters, logic circuits, amplifiers, clock and timing circuits, or other circuits	Yes	1	No	184.2
841990	Machinery, plant and laboratory equipment: parts of equipment for treating materials by a process involving a change of temperature	No		Yes	184.0
850220	Electric generating sets: with spark-ignition internal combustion piston engines	No		Yes	174.5
853890	Electrical apparatus: parts suitable for use solely or principally with the apparatus of heading no. 8535, 8536 or 8537	No		Yes	170.8
847982	Machines: for mixing, kneading, crushing, grinding, screening, sifting, homogenising, emulsifying or stirring	No		Yes	163.3

Continued on next page

Table A5 continued

HS6	Product	CHP	CHP tier classification	Economically critical	Pre-war EU exports to Russia (USD mn)
853690	Electrical apparatus: n.e.c. in heading no. 8536, for switching or protecting electrical circuits, for a voltage not exceeding 1000 volts	Yes	3A	No	157.4
841950	Heat exchange units: not used for domestic purposes	No		Yes	157.1
840991	Engines: parts, suitable for use solely or principally with spark-ignition internal combustion piston engines (for other than aircraft)	No		Yes	153.6
842839	Elevators and conveyors: continuous-action, for goods or materials, n.e.c. in item no. 8428.20, 8428.31, 8428.32 or 8428.33	No		Yes	146.0
852990	Reception and transmission apparatus: for use with the apparatus of heading no. 8525 to 8528, excluding aerials and aerial reflectors	Yes	3A	No	144.1
850710	Electric accumulators: lead-acid, of a kind used for starting piston engines, including separators, whether or not rectangular (including square)	No		Yes	138.6
841350	Pumps: reciprocating positive displacement pumps, n.e.c. in heading no. 8413, for liquids	No		Yes	135.1
842123	Machinery: filtering or purifying machinery, oil or petrol filters for internal combustion engines	No		Yes	134.5
842833	Elevators and conveyors: continuous-action, for goods or materials, belt type, n.e.c. in item no. 8428.20 or 8428.31	No		Yes	134.3
847910	Machinery and mechanical appliances: for public works, building or the like	No		Yes	130.4
841221	Engines: hydraulic power engines and motors, linear acting (cylinders)	No		Yes	117.3
853669	Electrical apparatus: plugs and sockets, for a voltage not exceeding 1000 volts	Yes	3A	No	106.7
842129	Machinery: for filtering or purifying liquids, n.e.c. in item no. 8421.2	No		Yes	105.3
845710	Machining centres: for working metal	Yes	4B	No	103.7
848210	Ball bearings	Yes	3B	No	95.0
901420	Navigational instruments and appliances: for aeronautical or space navigation (excluding compasses)	Yes	3B	No	93.2
852691	Radio navigational aid apparatus	Yes	2	No	90.4
854239	Electronic integrated circuits: n.e.c. in heading no. 8542	Yes	1	No	88.4
847780	Machinery: for working rubber or plastics or for the manufacture of products from these materials, n.e.c. in this chapter	No		Yes	81.8
842430	Mechanical appliances: steam or sand blasting machines and similar jet projecting machines	No		Yes	80.6
902750	Instruments and apparatus: using optical radiations (UV, visible, IR), (other than spectrometers, spectrophotometers and spectrographs)	Yes	4A	No	80.4
845811	Lathes: for removing metal, horizontal, numerically controlled	Yes	4B	No	68.6
847180	Units of automatic data processing machines: n.e.c. in item no. 8471.50, 8471.60 or 8471.70	Yes	4A	No	52.9
890400	Tugs and pusher craft	No		Yes	50.1
848220	Bearings: tapered roller bearings, including cone and tapered roller assemblies	Yes	3B	No	47.4

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Table A5 continued

HS6	Product	CHP	CHP tier classification	Economically critical	Pre-war EU exports to Russia (USD mn)
846693	Parts & accessories suited for use solely/principally with machines of headings 8456-8465: n.e.c. in heading no. 8466	Yes	4B	No	46.6
851769	Communication apparatus (excluding telephone sets or base stations): machines for the transmission or reception of voice, images or other data (including wired/wireless networks), n.e.c. in item no. 8517.6	Yes	3A	No	36.7
848250	Bearings: cylindrical roller bearings n.e.c. in heading no. 8482	Yes	3B	No	33.0
845891	Lathes: for removing metal, numerically controlled, other than horizontal lathes	Yes	4B	No	29.5
848230	Bearings: spherical roller bearings	Yes	3B	No	27.5
854232	Electronic integrated circuits: memories	Yes	1	No	27.1
854129	Electrical apparatus: transistors, (other than photosensitive), with a dissipation rate of 1W or more	Yes	3A	No	26.9
852910	Reception and transmission apparatus: aerials and aerial reflectors of all kinds and parts suitable for use therewith	Yes	3A	No	20.4
848620	Machines and apparatus of a kind used solely or principally for the manufacture of semiconductor devices or of electronic integrated circuits	Yes	4A	No	19.0
901480	Navigational instruments and appliances: for navigation other than aeronautical or space navigation (excluding direction finding compasses)	Yes	3B	No	18.5
845961	Machine-tools: for milling by removing metal, (not knee-type), numerically controlled	Yes	4B	No	13.8
854320	Electrical machines and apparatus: signal generators	Yes	4A	No	13.5
854233	Electronic integrated circuits: amplifiers	Yes	1	No	10.5
901380	Optical devices, appliances and instruments: n.e.c. in heading no. 9013 (including liquid crystal devices)	Yes	3B	No	9.5
853224	Electrical capacitors: fixed, ceramic dielectric, multilayer	Yes	2	No	8.4
854110	Electrical apparatus: diodes, other than photosensitive or light-emitting diodes (LED)	Yes	3A	No	8.0
903039	Instruments and apparatus: for measuring or checking voltage, current, resistance or power, with a recording device (excluding multimeters)	Yes	4A	No	8.0
903020	Oscilloscopes and oscillographs	Yes	4A	No	6.4
848640	Machines and apparatus of a kind used solely or principally for the manufacture or repair of masks and reticles, assembling semiconductor devices or electronic integrated circuits, or for lifting, handling, loading or unloading items of heading 8486	Yes	4A	No	6.0
853221	Electrical capacitors: fixed, tantalum	Yes	2	No	5.5
848610	Machines and apparatus of a kind used solely or principally for the manufacture of semiconductor boules or wafers	Yes	4A	No	5.4
854130	Electrical apparatus: thyristors, diacs and triacs, other than photosensitive devices	Yes	3A	No	4.8
854160	Crystals: mounted piezo-electric	Yes	3A	No	4.7

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Table A5 continued

HS6	Product	CHP	CHP tier classification	Economically critical	Pre-war EU exports to Russia (USD mn)
901310	Optical appliances and instruments: telescopic sights for fitting to arms: periscopes: telescopes designed to form parts of machines, appliances, instruments or apparatus of this chapter	Yes	3B	No	4.6
853400	Circuits: printed	Yes	4A	No	4.3
903032	Multimeters: for measuring or checking voltage, current, resistance or power, with a recording device	Yes	4A	No	4.3
903082	Instruments and apparatus: for measuring or checking semiconductor wafers or devices	Yes	4A	No	3.8
854121	Electrical apparatus: transistors, (other than photosensitive), with a dissipation rate of less than 1W	Yes	3A	No	1.9

Source: Author's calculations based on BACI bilateral trade data (CEPII), constructed from United Nations Comtrade data, combined with the EU common high-priority and economically critical goods lists.

Note: The table lists the 73 HS6 product categories in the paper's sanction-relevant subset. CHP denotes the EU common high-priority list. CHP tier classification reports the published Common High Priority tier for products included on that list; lower tier numbers indicate higher enforcement priority, with Tier 1 denoting the highest-priority items. Economically critical indicates inclusion in the EU economically critical goods list. Pre-war EU exports to Russia are reported as average annual direct EU27 exports to Russia in 2017–2021, in USD millions.