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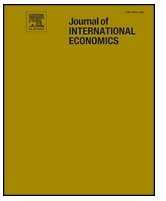

Is US trade policy reshaping global supply chains?☆

Caroline Freund [a,*], Aaditya Mattoo [b], Alen Mulabdic [b], Michele Ruta [c]

[a] UC San Diego, USA
[b] World Bank, USA
[c] IMF, USA

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ABSTRACT

This paper examines the reshaping of supply chains using detailed US 10-digit import data between 2017 and 2022. The results show that while US-China decoupling in bilateral trade is real, supply chains remain intertwined with China. Over the period, China's share of US imports fell from 22 % to 16 % as a result of US tariffs. US imports from China are being replaced with imports from large, developing countries with revealed comparative advantage in a product. In strategic industries, countries replacing China tend to be deeply integrated in China's supply chains and are experiencing faster import growth from China. Put differently, to displace China on the export side, countries must embrace China's supply chains. There is no consistent evidence of reshoring but evidence of nearshoring to border nations. Despite the significant reshaping, China remained the top supplier of directly imported goods to the US in 2022.

1. Introduction

The rhetoric surrounding trade is at odds with actual trade dynamics. In the wake of US-China tensions, reshoring, nearshoring and deglobalization dominate the news. But goods trade was at an all-time high in 2022, after years of slow growth. US imports in 2022 were close to 40 % above pre-COVID levels, suggesting that deglobalization and reshoring were not yet significant.

While trade is thriving, cracks in US-China trade are emerging. In 2018 and 2019, the US imposed tariffs on over 60 % of imports from China, mostly at the 25 % level. In 2022, US imports from China in tariffed goods were 14 % lower than in 2017 while imports from the rest of the world were 48 % higher for those same products (Fig. 1).[1] As a result, China's share in US imports fell from 22 to 16 % between 2017 and 2022 and is now back at the level it was in 2007, before the global financial crisis.

The sizable reduction in China's share of US imports and increase in total US imports implies that importers are turning to new sources of supply. For example, between 2017 and 2022 the US share of imports from China of sewing machines fell by 23 percentage

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* Corresponding author.
E-mail address: clfreund@ucsd.edu (C. Freund).

[1] The percentage changes in Fig. 1 are calculated using product codes that are present in both the Harmonized Tariff Schedule (HTS) 2017 and 2022 classifications. For products where the code changed from 2017 to 2022, disaggregating growth between 2017 and 2022 for tariffed and non-tariffed is not possible.

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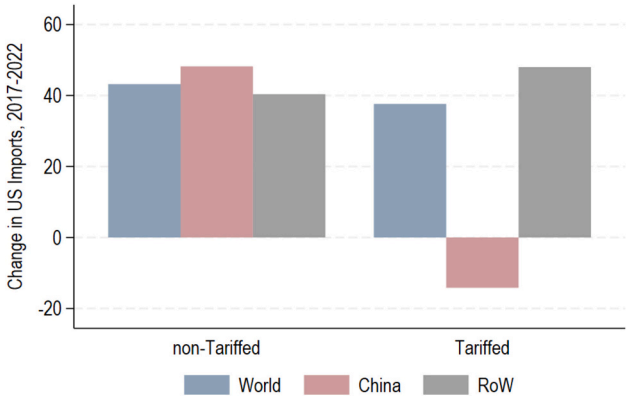

Fig. 1. Percentage changes in US imports, tariffed and non-tariffed goods, 2017–2022.
(Source: US International Trade Commission, US Customs, and author's calculations.)

points, while the share from Vietnam increased by 17 percentage points. Similarly, US import shares from China of advanced technology products like laser printers and ADP input/output units fell by 23 and 40 percentage points, while the import shares of these products from Mexico and Vietnam increased by 14 and 35 percentage points, respectively.

This paper explores whether the reshuffling of supply chains observed in the data is the result of US trade policy interventions and the extent to which the changes are taking the form of reshoring, nearshoring, and/or friendshoring. Using highly disaggregated trade data, we examine how US tariffs on imports from China are impacting trade patterns. The analysis relies on a simple identification strategy. First, we examine differences between trade in tariffed and non-tariffed goods, controlling for product and market characteristics. Second, we explore the characteristics of countries that are taking China's place in the US market, with a focus on strategic sectors, which are the industries in which US policymakers are most concerned about dependence on imports from China.

We find that the tariffs reduced import growth from China and stimulated import growth from other countries. Total imports in tariffed products, however, grew at rates only marginally lower than those of other goods, offering little evidence that the US re-shored production. When we focus on strategic industries, we find that the impact of US tariffs on imports from China is higher. But again, overall exports of tariffed products grew at rates similar to those of other goods.

An important question relates to which countries picked up the slack as US imports moved away from China. We perform a difference-in-differences analysis, comparing shifts in trade patterns of products where the import share of China fell markedly with the shifts in other products, while controlling for exporter and product-specific time-varying shocks. We find that developing countries and countries with a revealed comparative advantage in a product were the primary beneficiaries of import relocation away from China. In strategic industries, there is evidence that importers sought suppliers in bordering countries, but they did not look to other relatively proximate suppliers and, if anything, sought more distant suppliers. In other industries, large countries tended to replace China, suggesting that scale was important.

We also find evidence that the reshaping of US imports away from China may not have reduced dependence on China as much as import numbers suggest because countries that were more deeply engaged in Chinese supply chains experienced the most rapid export growth to the US. In particular, countries that saw faster export growth to the US in specific products had more intense intra-industry trade with China. Specifically, our estimated coefficients imply that an increase in the bilateral intra-industry trade index with China from the 25th to the 75th percentile is associated with higher export growth to the US market of around 2.6 percentage points for tariffed products and 4.2 percentage points for tariffed products in strategic industries. There is also evidence of increased integration with China and potential transshipment as exports expand in strategic industries. In particular, growth in imports of goods at both the 2-digit and 6-digit level from China is positively correlated with growth in exports of goods at the related 10-digit levels to the US. In other words, as countries were expanding exports to the US in strategic industries, they were increasing imports from China in these same products and industries, implying that Chinese value added was increasingly coming to the US via other trade partners.

This paper relates to the recent literature on the economic effects of the US-China trade war.[2] Several studies (Amiti et al., 2019; Fajgelbaum et al., 2020; Cavallo et al., 2021; Flaaen et al., 2020) analyze the impact of the tariffs on US import prices, finding that US consumers and importers have borne the brunt of the tariffs through higher prices. This literature also finds that the tariffs reduced US export growth (Handley et al., 2020), lowered employment (Flaaen and Pierce, 2019) and had a negative effect on aggregate real income in both the US and in China (Amiti et al., 2019; Fajgelbaum et al., 2020). Closer to our work is the paper by Fajgelbaum et al. (2024) that studies the impact of the US-China trade war on exports by third countries and finds large variation in the impact, depending on whether a country's exports are complements or substitutes for US or China's products and the slope of its supply curve. Differently from these studies, our paper contributes to this literature by focusing explicitly on how the direct and indirect supply chain linkages with China influence the impact of US tariffs on US imports from specific sources. Subsequent work by Alfaro and Chor (2023)

[2] See Fajgelbaum and Khandelwal (2022) for a review of the literature.

also shows that US sourcing has been reallocated away from China and towards other locations, notably Mexico and Vietnam, which increasingly source from China.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 studies the impact of the trade war on the reconfiguration of supply chains. Section 4 takes a closer look at where production moved after the shock. Section 5 concludes.

2. Data

From a national security perspective, decoupling is arguably the most important in high-tech and security industries, which we refer to as strategic industries. To identify them, we use the set of industries in the US Census Bureau's "recognized high-technology fields" which are: biotechnology, life sciences, opto-electronics, information and communications, electronics, flexible manufacturing, advanced materials, aerospace, weapons, and nuclear technology. Within these fields, each year's Census identifies a set of Advanced Technology Products (ATP), which represent the frontier technology in that field. We identify the 2-digit HS sectors which correspond to the ATP products and use this concordance to assign 2-digit HS codes to the high-tech fields, yielding our set of 11 strategic industries (see Appendix Table 1 for a list of the industry codes). This set of industries (with the exception of arms) completely overlaps with the set of ten high-tech industries identified for development in China's "Made in China 2025" (MIC2025) plan, consistent with them being a focus of the great power competition.[3] The strategic industries are thus meant to capture those where US policymakers consider independence from China to be most important from a strategic and national security perspective.

We use 10-digit import data at the country level from US Customs for 2017 and 2022. There are more than 17,891 products and 157 countries.[4] Tariff data are from Bown (2023). Information regarding country and country-pair characteristics has been obtained from various sources. The Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) GeoDist database (Mayer and Zignago, 2011) provides information on bilateral distance in kilometers and an indicator variable that captures if two countries share a border. Data on population and GDP per capita are from the World Bank's World Development Indicators (WDI). UN voting alignment with the US are from Voeten (2004). Measures of revealed comparative advantage (RCA) and intra-industry trade with China have been computed using trade data from UN Comtrade. A summary of the main variables is presented in Appendix Table 2.

Prima facie evidence on the reshuffling of the top trade partners from 2017 to 2022 is presented in Fig. 2. China's share fell by 5.3 percentage points (ppts). The countries with the biggest gains in market share were Vietnam (1.9 ppt), Taiwan, China (1ppt), Canada (0.8 ppt), Mexico (0.6 ppt), India (0.6 ppt), and Korea (0.5 ppt). These six countries more than account for China's 5.3 percentage point decline. Their combined gain does not, however, mean that these countries are the main or only beneficiaries, as they may be increasing their market share in products that China does not export or for reasons unrelated to the tariffs on imports from China. These changes in the US market share also overlook small countries that may have gained significantly in niche products, but whose overall market share is small. The strategic industries (lower chart) show a similar decline, though the beneficiary countries are different, with countries like South Korea and Thailand playing a more significant role than Canada and India. The next section examines the decline in China's exports to the US and the reshaping of trade in more detail.

3. US tariffs and changes in US imports

We use a difference-in-differences approach to examine: (i) whether US imports from China have grown less rapidly than imports from other countries; (ii) if so, whether tariffs help explain slower import growth from China; and (iii) whether overall import growth in the US was affected by tariffs.

We first investigate whether US imports from China behaved differently from the imports from other countries and how tariffs affected that change. Specifically, we rely on the following specifications:

$$\Delta lnM_{ik}^{US} = \beta_0 I(CHN) + \beta_1 I(tariff_k) + \beta_2 I(tariff_k) \times I(CHN) + \varepsilon_{ik} \tag{1}$$

$$\Delta lnM_{ik}^{US} = \alpha_i + \sigma_k + \beta\, I(tariff_k) \times I(CHN) + \varepsilon_{ik}. \tag{2}$$

In specification (1) ΔlnM_{ik}^{US} is the growth of US imports from country i of HTS 10-digit product k between 2017 and 2022. Import growth is used as the dependent variable—instead of the percentage point change in the US import share—because a country's import share would increase proportionately with its initial market share even if imports from China declined and were not replaced by other sources.[5] $I(CHN)$ is a dummy variable for China. $I(tariff_k)$ is an indicator variable taking value 1 if the 10-digit product was on the tariff list targeting China between 2017 and 2022. The coefficient on $I(CHN)$, β_0, reflects how imports from China grew relative to other

[3] The ten sectors highlighted in MIC2025 are: New information technology; High-end numerically controlled machine tools and robots; Aerospace equipment; Ocean engineering equipment and high-end vessels; High-end rail transportation equipment; Energy-saving cars and new energy cars; Electrical equipment; Farming machines; New materials, such as polymers; Bio-medicine and high-end medical equipment. For the regressions, we compare "strategic industries" and "other industries".

[4] As common in the literature, we exclude countries with population less than 1 million.

[5] For example, assume China accounts for 50 % of US imports in a product and Mexico accounts for the other 50 %. If China's imports drop to zero, Mexico's import share will increase by 50 percentage points even if there is no change in imports from Mexico. In this case, the increase in market share would not reflect a shift to sourcing from Mexico, rather it would mean consumption of the product declined or production shifted to the US.

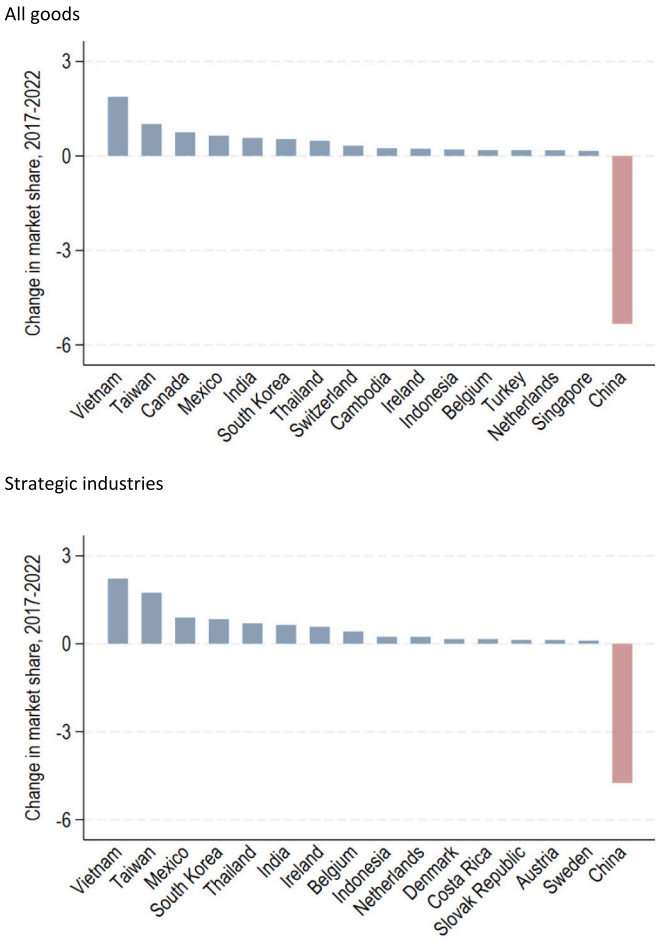

Fig. 2. 2017 and 2022 US import share by top ten countries.
(Source: US Customs and author's calculations.)

countries, and we expect it to be negative. The coefficient on the China tariff, β_1, shows whether tariffs have a positive or negative effect on imports more broadly. The coefficient on the interaction term, β_2, captures how tariffed products imported from China are affected relative to other products. We expect β_2 to be negative.

Specification (2) includes α_i *and* σ_k, which are respectively exporter- and product-fixed effects to control for source country or product characteristics that might affect import growth in the US market. We expect the coefficient of interest, β, to be negative if the tariff reduced US import growth from China as compared with US import growth from other countries.

We next investigate whether overall imports grew more slowly in tariffed products to look for evidence of potential reshoring, using the following specifications:

$$\Delta lnM_k^{US} = K + \beta\, I(tariff_k) + \varepsilon_k \tag{3}$$

$$\Delta lnM_{k \mid k \in tariff\ list}^{US} = K + \beta\, I(\Delta\ China\ share_{k2017-22} > median) + \varepsilon_k \tag{4}$$

In eqs. (3) and (4), the dependent variable ΔlnM_k^{US} is the total import growth in a product. In eq. (4), we also focus on the group of tariffed products and examine whether import growth was slower in products China retreated from most swiftly. In this case, the independent variable is a dummy for the absolute value of the decrease in US market share of China between 2017 and 2022 being greater than the absolute value of the median decline of products subject to tariffs.[6]

Table 1 reports the results. The upper panel shows results using bilateral import growth as the dependent variable, with standard errors clustered at the country level. Columns (1)–(3) show results for eq. (1). Column (1) reports results including only an indicator

[6] The change in China's share is calculated using products that are present in both the HTS 2017 and 2022 classifications. In 2022, out of 18,550 HTS 10-digit products, 2198 are new, while 1522 products disappeared between 2017 and 2022. These products account for about 18 % of total US imports in both years.

variable taking the value 1 for tariffed goods, Column (2) only a dummy variable for China, and Column (3) both these variables as well as an interaction between the tariff indicator and the China dummy. The coefficient on the tariff indicator in Column (1) is close to zero and not statistically significant, suggesting that imports of tariffed products did not grow significantly more slowly than imports of non-tariffed products on average. The China dummy of −0.4 in Column (2) implies that US imports from China grew on average 36 % (exp (−0.4)) slower than imports from the rest of the world. Column (3) shows that the slower growth in imports from China is entirely due to the slower growth of imports subject to tariffs. The coefficient of −0.5 on the interaction between the tariff indicator and the China dummy in Column (3), implies that US imports of Chinese goods subject to tariffs grew 40 % (exp(−0.5)) slower than imports from other partners.

Columns (4)–(6) show the results for the interaction effect, including product and country fixed effects (eq. 2) for all products and disaggregated by strategic and other industries. Results for this more stringent specification confirm that the slower growth in imports from China is due to the slower growth of imports subject to tariffs (column (4)) and not something specific about China or the products that China tends to export. The larger coefficient in column (5) than in column (6) indicates that tariffs had a stronger effect on imports in strategic sectors as compared to non-strategic ones. One potential explanation for the greater impact of the tariff in the strategic sectors is that the tariff variable may also be picking up the effect of other non-tariff policies employed by the US in these sectors to support strategic independence from China.

Columns (7)–(9) of Table 1 show the difference-in-differences results for aggregate imports (specification (3)). There is some evidence that aggregate import growth was slower in the tariffed products, but the economic effect is small. Total US import growth was 39 % between 2017 and 2022 for the set of products in the regression (that had codes that existed in both periods). Overall import growth of the subset of tariffed goods was 38 % as compared with 43 % for non-tariffed goods, a 5 percentage point difference. The −0.055 coefficient from the regression on all trade suggests trade grew about 5.4 % (exp −0.055 = 0.946) more slowly in tariffed goods as compared to other goods. Given the 43 % growth of non-tariffed goods, tariffs are estimated to account for a 2.3 (0.054* 43) percentage point difference in aggregate growth rates at the product level due to the tariffs. This decline is small considering the 40 % slower growth in imports from China of the tariffed goods. If the tariffs had led to large scale reshoring, we would expect substantially lower aggregate growth in tariffed products, given China's average market share of US imports of 27 % in the tariffed goods.

Columns (10)–(12) in Table 1 show the results for specification (4). The focus here is on the set of tariffed products to see if import growth was slower in those products that China exited more rapidly—where the decline in China's share of US imports was above the median (3.58 percentage points). These results do not reveal a significant effect on total import growth in the products where China's share declined most rapidly. If anything, overall US imports increased in products where China reduced its share relative to tariffed products where it did not, suggesting that where possible other foreign suppliers are bridging the gap. This evidence is consistent with the findings in Fajgelbaum et al. (2024) who find that the US-China trade war allowed third countries to gain scale and efficiency and expand exports.

4. US tariffs and the reconfiguration of supply chains

In this section, we investigate the main countries the US is relying on to replace China. For this exercise, we focus our discussion on eq. (5) below, which considers those tariffed products that China exited most rapidly, to identify the market share gainers because China will not be replaced if it is not exiting.

$$\Delta lnM_{ik}^{US} = \alpha_i + \sigma_k + \beta[I(\Delta China\ share_{2017-22} > median) \times (characteristic_i)\,] + \varepsilon_{ik} \tag{5}$$

The dependent variable is US import growth from country i in product k, *characteristic* is an exporter country characteristic, such as population, income, or distance from the US. The purpose is to explore, in the tariffed-products or in the products where China's share declined markedly, what characteristics define the countries that displaced China. Country- and product-fixed effects control for average exporter growth and average product growth to isolate which countries benefit specifically from tariffs (or drops in China's shares) relative to other products and to other exporters.

In addition to income, size, distance, and other determinants of supply chain participation (see World Bank, 2020), we also include independent variables to reflect economic and political linkages with China or the US. Revealed comparative advantage in a product would be important if the most competitive alternative suppliers are gaining market share. A positive effect of UN voting aligned with the US would suggest US imports favor friendly trade partners. We also include a host of other variables including, regional trade agreement with US, regional trade agreement with China, historical estimates of value-added trade with China, export similarity with China, but they were never significant.[7] Finally, the initial intra-industry trade index (Grubel and Lloyd, 1975) is included to reflect whether supply chain integration with China matters (calculated using 2017 data).

One advantage of the Grubel-Lloyd index (GLI), as compared to value-added measures of supply chain linkages, is that it can be precisely measured using bilateral trade data. In the specification below, GLI is calculated as $1 - \frac{|X-M|}{X+M}$, at the 4-digit level (1237 sectors). A value of one for a given country and China in a sector implies that total bilateral trade (exports + imports) is balanced (exports = imports), while a value of zero implies that the country either only exports to or only imports from China. Secondly, the GLI at the industry level is a good measure of supply chain linkages because it reflects the amount of back-and-forth trade among parts,

[7] Data on Free Trade Agreements (FTAs) is from Mario Larch's Regional Trade Agreements Database based on Egger and Larch (2008). Results shown in Freund et al. (2023).

Table 1
Import growth.

	(1)	(2)	(3)	(4)	(5)	(6)
	Bilateral Imports					
	All	All	All	All	Strategic	Other
I(tariff list)	−0.007		0.023			
	(0.033)		(0.019)			
I(China)		−0.444***	0.007			
		(0.040)	(0.046)			
I(China) x I(tariff list)			−0.503***	−0.530***	−0.610***	−0.445***
			(0.019)	(0.023)	(0.036)	(0.036)
Observations	204,910	204,910	204,910	203,335	69,731	133,599
R-squared	0.000	0.003	0.004	0.137	0.130	0.143
Product FE	NO	NO	NO	YES	YES	YES
Country	NO	NO	NO	YES	YES	YES

	(7)	(8)	(9)	(10)	(11)	(12)
	Total Imports					
	All	Strategic	Other	All	Strategic	Other
				I(tariff list)		
I(tariff list)	−0.055*	−0.067	−0.051			
	(0.031)	(0.048)	(0.041)			
I(ΔChina share 17–22 < median)				0.004	0.058*	−0.019
				(0.018)	(0.030)	(0.022)
Observations	16,357	4699	11,658	12,732	3779	8953
R-squared	0.000	0.000	0.000	0.000	0.001	0.000

Note: In columns (1)–(6) the dependent variable is 10-digit product level bilateral import growth from 2017 to 2022, between US and its trade partners. In columns (7)–(12) the dependent variable is 10-digit product level total import growth from 2017 to 2022. Tariff list is a dummy variable equal to one for products on the list of China tariffs. I(Δ China share > median) indicates a dummy for products where the loss in China's share of the US market from 2017 to 2022 was above the median (fell more than 3.58 percentage points). The sample is limited to countries with a population over 1 million. For columns (1)–(6), robust standard errors, clustered at the country level, are in parentheses. For columns (7)–(12), robust standard errors are in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

components, and final goods and hence vertical integration, a point first made by Balassa (1978).[8] Focusing on initial one-way dependence, by using a measure like China's shares in a country's imports, does not capture imports for exporting nor does it capture the scope for shifting the final stage of production to avoid tariffs.[9] Moreover, a high import share could reflect domestic consumption.

Table 2 presents the results. It effectively tests which country or country-industry characteristics are most closely associated with export growth in those products where China lost significant market share. Standard errors are clustered by country and four-digit industry. The first column of Table 2 reports the results including the standard gravity measures—country size and geographical characteristics—interacted with the indicator variable for the products from which China exited more extensively. Income per capita is negative and significant, implying that lower-income countries are more likely to replace China.

In columns (2) and (3), we repeat the exercise separating the strategic and other industries and identify important differences among the two groups. For strategic industries, distance is positive and significant, implying that countries further from the US benefit relatively more—which may reflect the benefits of proximity to China. Indeed, if we replace distance from the US with distance from China, the coefficient is negative and significant, though when both distance variables are included, only distance from US is significant (shown below). However, contiguity with the US is also positive, implying that exports from both distant countries and bordering countries benefit from the US' reduced dependence on China. For other goods, country size is positive and significant and per capita income is negative and significant, implying that larger, developing countries are more likely to replace China.

Including all additional controls (columns (4)–(6)), we find the strongest predictor across all goods is revealed comparative

[8] GLI has been used in previous work as well to capture the effects of supply linkages in response to a shock (see for examples, Fukasaku, 1992, Brakman and Marrewijk, 2019, UNCTAD, 2020).

[9] Measures of foreign value added in exports, such as those in the OECD's TIVA Database, rely on restrictive assumptions on the proportion of total imports used for export production.

Table 2
Who gains when China exits?

	(1)	(2)	(3)	(4)	(5)	(6)
	Gravity			All variables		
	All	Strategic	Other	All	Strategic	Other
I(ΔChina share> median) x …						
… x (log of Pop.)	0.018	0.004	0.028**	0.018	−0.004	0.029**
	(0.011)	(0.017)	(0.013)	(0.011)	(0.020)	(0.013)
… x (log of GDPpc)	−0.050**	0.020	−0.065**	−0.036	−0.045	−0.029
	(0.021)	(0.039)	(0.025)	(0.027)	(0.044)	(0.032)
… x I(Border)	0.105	0.434***	0.017	0.115	0.439***	0.050
	(0.085)	(0.148)	(0.105)	(0.096)	(0.145)	(0.116)
… x (log of distance)	0.074	0.294***	0.016	0.060	0.263**	0.036
	(0.058)	(0.102)	(0.073)	(0.076)	(0.110)	(0.092)
… x (log of distance from China)				0.010	−0.036	0.043
				(0.032)	(0.060)	(0.036)
… x I(RCA > 1)				0.080***	0.098**	0.067**
				(0.022)	(0.039)	(0.028)
… x (UN voting)				0.023	−0.020	0.035
				(0.028)	(0.031)	(0.031)
… x (Intra-industry trade w/China)				0.084*	0.135*	0.026
				(0.049)	(0.076)	(0.065)
I(RCA > 1)				−0.083***	−0.104***	−0.079***
				(0.020)	(0.031)	(0.023)
Intra-industry trade w/China				−0.024	−0.105**	0.028
				(0.038)	(0.050)	(0.043)
Observations	140,276	47,513	92,760	134,797	46,208	88,586
R-squared	0.134	0.124	0.141	0.133	0.124	0.141
Country FE	YES	YES	YES	YES	YES	YES
Product FE	YES	YES	YES	YES	YES	YES

Note: The dependent variable is 10-digit product level import growth from 2017 to 2022, between US and its trade partners, China excluded. The sample is limited to products on the list of China tariffs and to countries with a population over 1mln. I(Δ China share > median) indicates a dummy for products where the loss in China's share of the US market from 2017 to 2022 was above the median (fell more than 3.58 percentage points). For columns (1)–(3), robust standard errors, clustered at the country level, are in parentheses. For columns (4)–(6), robust standard errors, clustered at the country and HS 4-digit level, are in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.

advantage.[10] There is little evidence of friendshoring, countries where the UN vote is aligned with the US do not tend to see higher export growth in products China exited. Finally, we find that imports from countries that were initially closely integrated with China in the sector, as reflected by intra-industry trade with China, experienced relatively faster growth. Again, significant differences emerge between strategic products (shown in column (5)) and other goods (in column (6)), confirming that trade in these two sets of products is in part driven by different determinants: linkages to China's supply chains and a border with the US in the first case, and country size in the latter. The results highlight the tension between the US desire for decoupling, especially in strategic sectors, and past Chinese investment in these same industries, which has created extensive linkages to China, making decoupling from Chinese supply chains challenging.[11] In other goods, China can be more easily replaced by other relatively large producers, with a comparative advantage in the product.

To put the results on supply chains in economic context, shifting from the 25th to the 75th percentile in depth of linkages to China, for strategic products, leads to higher growth of roughly 4.2 percentage points (Table 2, column 5). To provide an example, we focus on broadcasting equipment (HS 8525), an important sector in US-China trade relations that in 2017 accounted for over 10 % of US imports from China. This sector includes products such as media streaming stick devices and internet set top boxes (HTS 8525.50.10) that are imported by large companies like Roku and Amazon. For this sector, a shift in trade integration with China from the 50th percentile (India's level) to the 90th percentile (Vietnam's level) is associated with a 11.8 % increase in export growth to the US.

In addition to initial characteristics, alternative suppliers' integration with China could change as their exports to the US expand. Table 3 explores whether growing imports from China in a product or industry are associated with expanded exports to the US, while controlling for the variables presented in Table 2.

[10] The controls reported are those that are sometimes significant when included with only the gravity variables. See Freund et al., 2023 for more robustness tests.

[11] Using firm level data, Handley et al. (2023) show that US imports fall less from China in the presence of a tariff when imports are highly concentrated—i.e. there are fewer alternative suppliers. Relatedly, our results imply that industries with extensive supply-chain linkages to China have Chinese content that is more difficult to replace in the short run.

Table 3
Dynamic supply chain effects.

	(1)	(2)	(3)
	All	Strategic	Other
I(Δ China share> median) x …			
… x (Growth China Imports HS6)	0.009	0.044**	−0.003
	(0.009)	(0.018)	(0.011)
… x (Growth China Imports HS4)	−0.005	−0.021	0.010
	(0.019)	(0.034)	(0.023)
… x (Growth China Imports HS2)	0.018	0.087*	0.007
	(0.036)	(0.052)	(0.046)
… x (Intra-industry trade w/China)	0.092*	0.154*	0.027
	(0.047)	(0.079)	(0.061)
Growth China Imports HS6	−0.004	−0.005	−0.003
	(0.006)	(0.009)	(0.008)
Growth China Imports HS4	−0.008	0.005	−0.015
	(0.012)	(0.019)	(0.015)
Growth China Imports HS2	−0.026	−0.022	−0.020
	(0.024)	(0.040)	(0.032)
Intra-industry trade w/China	−0.053	−0.110**	−0.015
	(0.040)	(0.054)	(0.051)
Observations	118,448	43,373	75,070
R-squared	0.135	0.123	0.145
Country FE	YES	YES	YES
Product FE	YES	YES	YES

Note: The dependent variable is 10-digit product level import growth from 2017 to 2022, between US and its trade partners, China excluded. The sample is limited to products on the list of China tariffs and to countries with a population over 1mln. I(Δ China share > median indicates a dummy for products where the loss in China's share of the US market from 2017 to 2022 was above the median (fell more than 3.58 percentage points). The regressions include controls, not reported in the table, for the log of population, log of GDP per capita, log of distance, a border dummy, a dummy for revealed comparative advantage, interacted with a dummy for I(Δ China share > median). Robust standard errors, clustered at the country and HS 6-digit level, are in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

For all goods (column 1), exports to the US are not significantly correlated with growing imports from China. For strategic industries (column 2), there is evidence that increased imports from China are correlated with increased exports to the US, at both the 2-digit and 6-digit levels. The importance of growth in imports from China at the 2-digit level is consistent with supply chain linkages to China intensifying as countries expand exports to the US in strategic industries. Six-digit import growth is also highly significant, consistent with transshipment or limited additional value added before goods being shipped to the US. From an economic perspective, this potential transshipment effect is relatively small. The coefficient of 0.04 implies that a 10 percentage points increase in imports from China is associated with 0.4 percentage points higher exports to the US. In contrast, growth in 2-digit imports has an effect that is twice as large, albeit less robustly significant. These results imply that the countries that are expanding strategic-industry exports to the US, are also increasing imports from China in these industries and products. For other goods (column 3), growth in imports from China is not important.

5. Conclusion

This paper uses detailed trade data from 2017 to 2022 to study how US trade policy is impacting global supply chains. Despite the tariffs imposed by the US administration in 2018–19, US openness to the world, as measured by aggregate US imports, has not yet declined. Even so, we find that US tariffs on imports from China have induced significant direct decoupling, with China's share of US imports falling by more than 5 percentage points relative to its level in 2017.

This decoupling has led to a reallocation of imports. Specific countries have benefitted—especially large developing countries, either on the border with the US or far from the US, and countries with revealed comparative advantage in a product. For strategic sectors, countries more deeply engaged in supply chains with China, and those increasing imports from China, have also benefitted the most.

This evidence highlights the current tension between efficiency and decoupling. China remains an attractive source of manufacturing imports, given its comparative advantage and scope for scale economies, as well as the sunk costs firms have incurred in establishing subsidiaries or relationships in that country. Therefore, deep decoupling may not be feasible, at least in the near term. Moreover, measures to limit direct trade may initially strengthen indirect linkages between the US and China through the industrial supply chains of their trade partners, especially in strategic industries, where China is heavily invested.

Over time, targeted policies combined with industrial development in other countries could change the calculus. The indirect linkages may eventually be strained by the US imposition of more restrictive rules of origin, such as those recently introduced on aluminum and steel imports from Mexico. Furthermore, industrial production in partner developing countries may deepen over time to

include more stages of production. The medium- and long-term effects of decoupling, therefore, remain an open question.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Appendix Table 1
Strategic Industries, Broad 2-digit categories.

- 28 inorganic chemicals; organic and inorganic compounds of precious metals; of rare earth metals, of radio-active elements and of isotopes
- 29 organic chemicals
- 30 pharmaceutical products
- 38 chemical products n.e.c
- 84 nuclear reactors, boilers, machinery and mechanical appliances; parts thereof
- 85 electrical machinery and equipment and parts thereof; sound recorders and reproducers; television image and sound recorders and reproducers, parts and accessories of such articles
- 87 vehicles; other than railway or tramway rolling stock, and parts and accessories thereof
- 88 aircraft, spacecraft and parts thereof
- 90 optical, photographic, cinematographic, measuring, checking, medical or surgical instruments and apparatus; parts and accessories
- 93 arms and ammunition; parts and accessories thereof
- 98 special classification provisions

Appendix Table 2
Summary statistics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	N	mean	sd	min	max	p50	p25	p75
I(All)	4,27,664	1.000	0.000	1.000	1.000	1.000	1.000	1.000
I(Strategic Industry)	4,27,664	0.320	0.467	0.000	1.000	0.000	0.000	1.000
I(Other Industry)	4,27,664	0.680	0.467	0.000	1.000	1.000	0.000	1.000
Export growth	2,01,009	0.370	1.795	-10.800	12.710	0.335	-0.558	1.283
I(tariff list)	4,27,664	0.915	0.278	0.000	1.000	1.000	1.000	1.000
log of Pop.	4,16,285	17.060	1.625	9.290	21.030	17.390	15.990	18.080
log of GDPpc	4,13,036	10.150	0.830	6.621	11.720	10.430	9.580	10.790
UN voting USA	4,03,355	2.128	0.903	0.152	4.260	1.874	1.453	3.023
I(RCA>1)	3,59,686	0.334	0.472	0.000	1.000	0.000	0.000	1.000
I(Border)	3,50,426	0.076	0.265	0.000	1.000	0.000	0.000	0.000
log of distance USA	4,25,463	9.007	0.479	7.640	9.727	9.022	8.911	9.406
log of distance CHN	4,25,463	8.812	0.640	7.025	9.858	8.984	8.614	9.169
Intra-industry trade w/China	3,99,294	0.194	0.275	0.000	1.000	0.041	0.000	0.304

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