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# Relocation from China (with Chinese Characteristics)

CAGE working paper no. 702

February 2024

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WARWICK
THE UNIVERSITY OF WARWICK
UKRI Economic and Social Research Council

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February 29, 2024

**Abstract**

The share of Chinese goods in US imports has fallen sharply since 2018, as production for the US market has shifted from China to other countries. Does this trend represent US-China 'decoupling', or are other US trade partners playing growing roles as intermediaries in ongoing US-China economic relations? Using firm-level and product-level data, we find that Chinese manufacturing investment and Chinese-produced parts have increasingly flowed to third-country 'winners' who have simultaneously increased their US market share. We present evidence that our findings capture expanding indirect relationships linking China and the US rather than broader economic trends within the 'winners' themselves.

*JEL codes:* F14, F21, F23.
*Keywords:* Trade, China, FDI, global supply chains, relocation, decoupling.

We thank seminar and conference participants at the Norwegian School of Economics, the European Trade Study Group conference and the Hong Kong Economic Association Biennial Conference.

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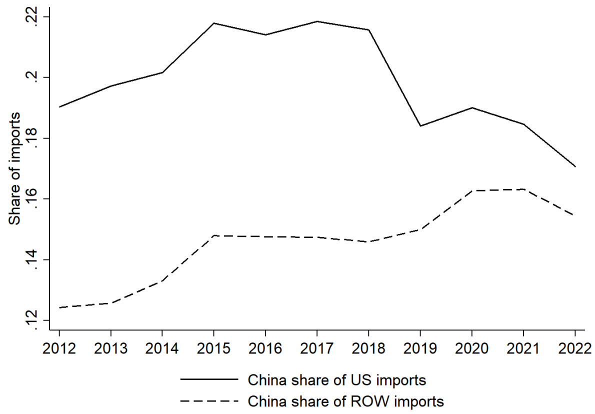
# 1 Introduction

In recent years, there has been a significant rise in political and economic tension between two of the world's largest trade partners. The election of Donald Trump in 2016 ushered in a sharp change in US economic policy towards China, which has largely been maintained by the Biden administration. At the same time, the two countries' geopolitical rivalry has gradually intensified. Surveys of firms and media reports indicate a general rise in uncertainty about the future economic and political relationship between the US and China (e.g. Jett, De Luce and Mackey Frayer 2023; Zhou 2023).

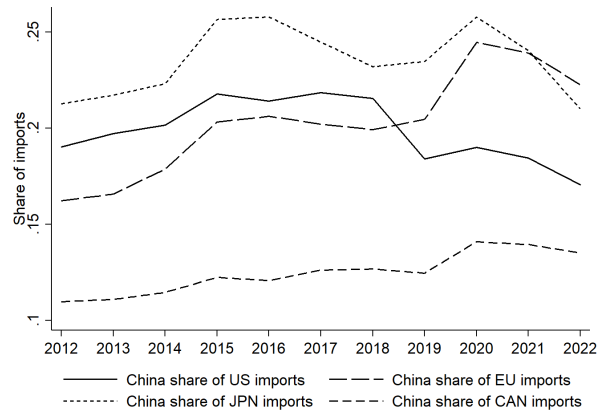
As shown in Figure 1, these events have coincided with a notable change in the composition of US imports. Panel A plots the share of Chinese goods in total US import value by year between 2012 and 2022, and shows that China's importance in US imports took a sharp downturn after 2018. This decline is even more clearly apparent when we account for the changing composition of US demand (such as in the early stages of the pandemic) by holding product-level demand shares fixed at their 2012 levels in Panel B. Figure 1 also shows that this trend break is not a global phenomenon. There has been no similar pattern of decline in China's share in the imports of the rest of the world (Panels A and B) or of other advanced economies (Panels C and D) during this period.

Over the years, economists have gained a deep understanding of the emergence and characteristics of cross-border supply chains in the era of globalization. In contrast, these events provide us with an important opportunity to study how existing supply chains linking two large economies might come apart. The trend pictured in Figure 1 suggests that a nontrivial share of production for the US market has been relocated from China to some of its competitors. A key question is whether this constitutes 'decoupling', in the following sense: where production for the US market has shifted away from China, are Chinese economic actors no longer participating in the production process? Or has relocated production sometimes involved ongoing, but less direct, US-China economic relations?

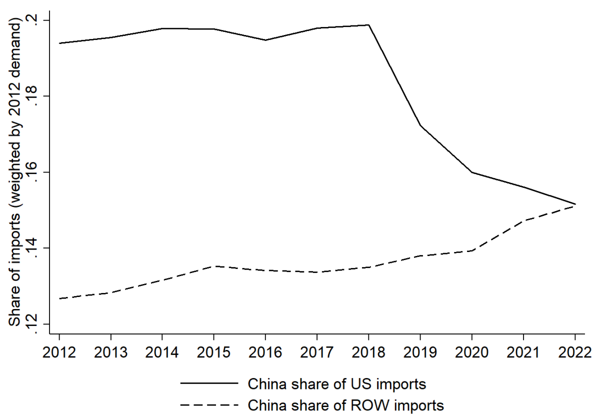
In this paper, we consider two channels through which relocated production for the US market might have retained 'Chinese characteristics'. First, if new trade barriers and increased uncertainty have changed the comparative advantage of third countries (relative to China) as suppliers to the US, then they could also have become attractive destinations for Chinese investment in manufacturing facilities. Some of the relocation of production from China to the 'winners' of greater US market share might therefore have involved capital from Chinese firms themselves. Second, even if some goods for the US market are increasingly manufactured in countries other than China, the lowest-cost supplier of the inputs required



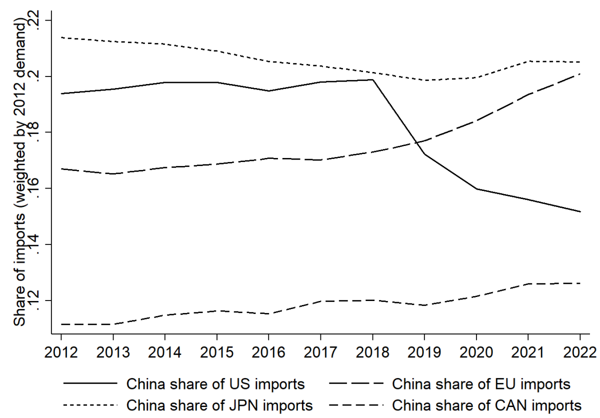

Panel A - Import share of China - US vs. ROW




Panel C - Import share of China - major economies




Panel B - Import share of China - US vs. ROW (weighted by 2012 product-level demand shares)




Panel D - Import share of China - major economies (weighted by 2012 product-level demand shares)

Figure 1: Share of China in imports of US and other economies

This figure displays the share of Chinese goods in the imports of the US and other economies annually from 2012 to 2022. Each line represents China's share of the total value of the imports of a given economy. In Panels A and C, this is calculated from raw import data. In Panels B and D, this is a weighted average of China's import share for each six-digit product, where the weights are the share of each product in total imports of the economy as of 2012. In all panels, the solid line is based on US imports. In Panels A and B, the dashed line is based on total imports of the 124 countries (other than the US and China) for which import data is available for all eleven years. In Panels C and D, the dashed lines are based on imports of the EU, Japan and Canada, as indicated in the legends for those panels. The line for the EU is based on imports from outside the EU of all countries who were members at any time between 2012 to 2022. Data is from UN Comtrade.

in their production might still be a Chinese firm. The apparent shift away from China evident in Figure 1 might therefore fail to reflect the continued presence of Chinese value added in relocated production.

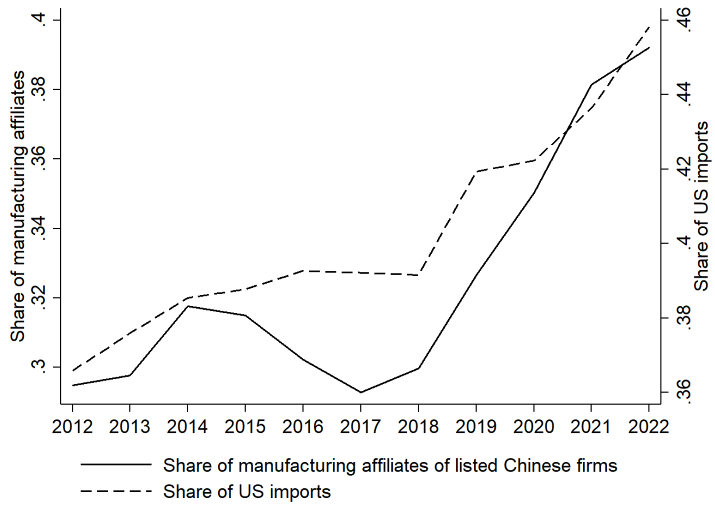
We investigate these possibilities using datasets that aim to capture these two phenomena as precisely as possible, in the absence of comprehensive global information on multi-stage supply chains. To study manufacturing investment, we take advantage of the fact that stock market-listed firms in China produce annual reports in which their foreign affiliates are required to be disclosed. Because these reports also specify the business scope of each affiliate, we can determine whether particular affiliates are engaged in manufacturing production, rather than other activities such as local sales. To study input flows, we use the structure of the Harmonized System (HS) product classification to isolate trade in 153 categories of goods (such as industrial furnaces or vacuum cleaners) for which we can separately observe trade in parts specific to those goods (i.e. 'parts of industrial furnaces' or 'parts of vacuum cleaners').

Using this data, we show that there have been parallel shifts in the relationships of both the US and China with the third-country 'winners' who have recently increased their US market share. We begin by presenting suggestive evidence based on country-level variation. Figure 2 displays aggregate trends for the ten countries with the largest gains in share of total US imports in 2022 as compared to 2018.[1] As shown by the dashed line in this figure (which is reproduced in each panel), this bloc had already seen a gradual rise in US import share before 2019, but made faster gains from 2019 onwards.

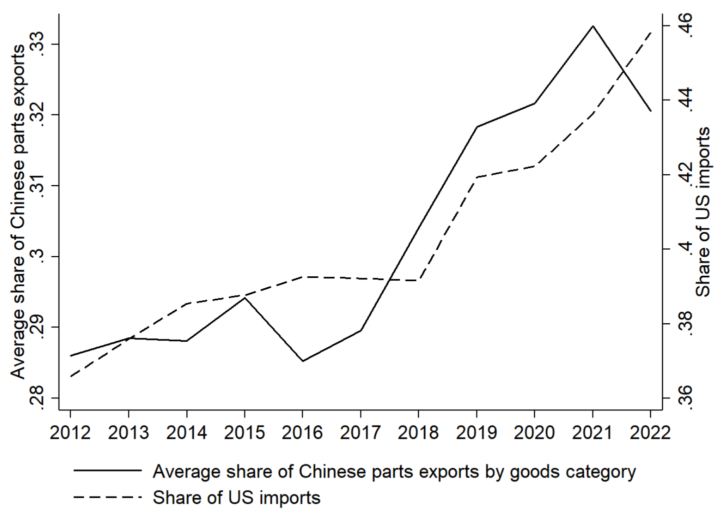
This trend has coincided with an intensification in economic relations between these countries and China. Figure 2 Panel A pictures a sharp rise in the share of Chinese listed firms' foreign manufacturing affiliates that are located in this set of ten countries. Panel B shows that the share of this bloc in Chinese exports of parts (on average across the 153 goods categories discussed above) has also risen steeply. Because we exclude the US itself from these calculations, these trends are not simply mechanical consequences of changes in direct US-China relations, but represent shifts in Chinese economic activity across 'third countries'.

Our main empirical exercises dig deeper into these two findings, using disaggregate data. To investigate trends in manufacturing investment at the firm level, we use Chinese customs data to observe the set of products exported to the US as of 2016 by each listed Chinese

[1] These are Vietnam, Taiwan, Canada, Korea, Thailand, India, Indonesia, Mexico, Ireland and Cambodia; see Table A1.




Panel A - Share of manufacturing affiliates of listed Chinese firms




Panel B - Share of Chinese parts exports on average across goods categories

Figure 2: Trends in Chinese economic relations with top ten 'winner' countries

This figure displays trends in the economic relations of China with the ten countries experiencing the largest increases in share of total US import value between 2018 and 2022. In both panels, the dashed line depicts these countries' share of US import value in each year from 2012 to 2022. In Panel A, the solid line represents these countries' share of the foreign manufacturing affiliates of listed Chinese firms. Affiliates in the US, Hong Kong and Macau are excluded from this calculation. In Panel B, the solid line depicts these countries' share of Chinese export value of parts, on average across 153 categories of goods where parts are distinguished from their downstream uses in the Harmonized System (HS) product classification. Exports to the US, Hong Kong and Macau are excluded from this calculation. Data is from UN Comtrade and the China Stock Market and Accounting Research (CSMAR) database.

firm. We then check whether firms have opened more new manufacturing affiliates in countries where this set of products experienced especially large rises in US import share. To more closely examine the use of Chinese intermediate inputs, we consider whether countries increasing their US import share for certain products have also become larger recipients of Chinese exports of parts specific to these products. For both of these exercises, our regressions include country fixed effects, so that our comparisons are based on differences across products within each 'third country'.

Using this precisely defined variation, we find strong evidence of comovement of both Chinese manufacturing investment and Chinese parts exports with gains in US import share. We interpret these findings as indicating that some of the relocation of US-bound production from China to other countries has involved capital and parts from China itself. However, a possible alternative explanation of the results is that they capture local growth trends within the 'winners', rather than relocation of Chinese production for the US market more specifically.

We end our paper by providing three additional pieces of evidence in favour of our interpretation of the results. First, we do not observe similar patterns of comovement with Chinese investment and parts exports when we reproduce our main empirical exercises for other major importers (the EU, Japan or Canada) rather than the US. Second, using subsample regressions, we find that our main results are entirely driven by cases where China's share in the US market has declined. A third set of regressions indicate that our findings are strongest among firms and goods categories with higher exposure to US tariff rises.

Our study is part of an active literature on the recent evolution of the US-China economic relationship. Much of this literature studies consequences of US and Chinese tariff increases using variation in trade policy across products and time (e.g. Amiti, Redding and Weinstein 2019, Fajgelbaum et al. 2020, Cavallo et al. 2021, and many of the papers cited below). A smaller set of papers considers 'decoupling' of the US and Chinese economies from other angles, including falling technological integration (Crosignani et al. 2023, Han, Jiang and Mei forthcoming) and rising political tension (Rogers, Sun and Sun 2023).

Our paper makes a novel contribution to the literature by investigating US-China 'decoupling' from a multilateral perspective, accounting for the potential role of third countries in intermediating economic relations between the two giants. The most closely related work is that of Freund et al. (2023), who use product-level data on US imports to identify countries recently gaining US market share at the expense of China. They find that these countries also tend to be more deeply integrated into Chinese supply chains, with initially higher intra-industry trade with China, as well as rising imports from China in the same products or industries as their export gains to the US.[2] Our paper delves more deeply into these relationships by carefully disaggregating flows of parts and downstream products within the same goods category, and examining changing Chinese patterns of manufacturing investment using firm-level data.

Several other recent papers consider expansion in US economic relations with third countries in the context of the US-China trade war.[3] Fajgelbaum et al. (forthcoming) take a global approach, examining changes in the product-level exports of fifty large economies, both to the US and to the rest of the world.[4] Utar, Cebreros Zurita and Torres Ruiz (2023) observe faster growth in US exports for Mexican firms specializing in products with higher US tariff hikes on Chinese imports.[5] Mayr-Dorn et al. (2023), Ngoc and Wie (2023a, 2023b) and Rotunno et al. (2023) focus on Vietnam, finding both export gains and improved labour market outcomes in sectors where the US raises tariffs on Chinese goods. Our paper complements these analyses by showing that Chinese investment and parts have tended to flow into 'winner' countries contemporaneously with their gains in US import share.

Some other studies consider the evolution in Chinese exports to third countries due to the trade war, but not the simultaneous changes in those countries' relationships with the US. Jiang et al. (2023) document a product-level relationship between US tariffs and Chinese export growth to non-US destinations, which is larger for products of upstream industries. Jiao et al. (forthcoming) show evidence of increased sales by Chinese firms to export markets other than the US after increases in US tariffs.

# 2 Changes in US import shares

Based on the timing of the trend break pictured in Figure 1, our baseline definition of 'winners' of increased US market share uses long differences between 2018 and 2022.[6] For

[2] Another related contribution is that of Alfaro and Chor (2023), who document that aggregate flows of Chinese goods and manufacturing investment to Vietnam and Mexico increased at the same time as those countries' share of US imports rose.

[3] Flaaen, Hortaçsu and Tintelnot (2020) observe relocation of production of washing machines from China to other countries in response to a pre-trade-war US policy: antidumping tariffs imposed on China in 2016.

[4] Dang, Krishna and Zhao (2023) also explore changes in trade patterns across a large set of countries. Benguria (2023) documents firm-level impacts of the trade war among listed firms in forty countries.

[5] The authors also present a supporting result that is closely related to our own findings: these firms simultaneously increase their imports of intermediate inputs from China.

[6] We also use 2017 as an alternative base year in robustness checks. This was the year before the first wave of US tariffs on China, and is often defined as the final 'pre-treatment' year in the literature on the US-China trade war.

most of our empirical exercises, we employ variation in changes in US import share over this period by country and six-digit product. To calculate these changes, we use data on imports as reported by the US, downloaded from the UN Comtrade database.

Here, we provide some summary statistics at a more aggregate level. Table A1 lists the ten countries with the largest increases in their share of total US imports over this period, as well as the ten countries with the largest declines. Notably, more than half of the countries on the list of 'winners' are in East and Southeast Asia. This includes the top two countries, Vietnam and Taiwan, whose US import shares rose by 2.06 percentage points and 1.04 percentage points respectively. Among the 'losers', China's decline by 4.50 percentage points is by far the largest. The country with the second-largest fall in US import share, Japan, saw a decrease of one percentage point.

Importantly for our empirical exercises, which are based on within-country comparisons, these trends vary substantially across sectors. To demonstrate this, we list the top 1% of US import share gains across industries and countries. Specifically, we calculate 2018-2022 differences in import share for 29 two-digit manufacturing industries, across the 221 countries from which the US imported goods during this period (excluding China). Countries and industries in the top percentile of this measure are reported in Table A2.

This table shows that the largest 'winner' by country-industry is Vietnam's furniture sector, with a 10.89 percentage point rise in its share of US imports (relative to other furniture exporters) between 2018 and 2022. Although twelve other Vietnamese industries also appear on this list, the extent of their gains in US market share vary substantially. Moreover, the list as a whole includes a broad range of countries (28) and industries (27). Other countries with more than three industries represented on the list include Mexico (6), Korea (5), Canada (4), India (4) and Indonesia (4).

# 3 Manufacturing affiliates of Chinese listed firms

## 3.1 Data description

We begin our main analysis by studying the foreign manufacturing affiliates of Chinese firms. We focus on firms listed on the Chinese stock markets, and use data from their annual reports. In these reports, listed firms are required to disclose affiliates in which they have a controlling interest. In the large majority of cases, the business scope of each affiliate is also outlined, allowing us to identify affiliates involved in manufacturing production.

Information from listed firms' annual reports is available in the China Stock Market and Accounting Research (CSMAR) database. Our sample includes manufacturing firms for which we have annual reports in every year from 2016 to 2022. We identify firms in manufacturing sectors by using the reported industry of each firm as of 2016.[7]

The CSMAR database does not provide affiliate identifiers, instead simply transcribing the information on affiliates provided by listed firms in any given year. We panelize the data by tracking the same affiliate across different years, using the reported name and location of each affiliate in each annual report. We also attempt to identify affiliates whose names change by checking for cases where other reported information remains similar or identical. We are interested in investment relationships between China and 'third countries', so we exclude US affiliates from our analysis. We also drop affiliates located in Hong Kong and Macau.[8]

In order to separately identify affiliates engaged in manufacturing production, we use the reported (Chinese-language) business scope of each affiliate and search for certain keywords: 'industry', 'manufacturing', 'production', 'processing' and 'assembly'. Affiliates with a business scope containing one or more of these keywords in any year from 2016 to 2022 are labelled as manufacturing affiliates. Affiliates with a nonmissing business scope variable in at least one year, but for which the above keywords do not appear, are classified as 'non-manufacturing affiliates'. The most commonly observed business scope descriptions for these affiliates are 'trade', 'sales', 'investment' and 'business'.

We also use Chinese customs data to identify the set of products exported from China to the US by each firm as of 2016.[9] Since we are interested in firms' investments in foreign affiliates – i.e. the evolution of the segment of each firm's business group that is based abroad – we account for the exports of each listed firm's full domestic business group. This includes subsidiaries, joint ventures and associated companies within mainland China, as outlined in the listed firm's 2016 annual report. We match this full list of companies to the 2016 customs data and calculate their total US exports for each product.[10]

As we discuss below, our baseline sample only includes listed manufacturing firms for

[7] As of 2016, these listed firms reported assets corresponding to approximately 20% of the total asset value of manufacturing firms participating in the China-wide Annual Survey of Industrial Enterprises, based on data from CSMAR and the China Statistical Yearbook.

[8] Because the US does not trade with North Korea, we exclude one North Korean affiliate.

[9] This is the last year of customs data that is available to us, similarly to other recent studies of China-US economic relations such as Benguria et al. (2022) and Chor and Li (2023).

[10] We match these firms across datasets using exact firm names. Some other papers use fuzzy matching to link listed firms to Chinese customs data (e.g. Benguria et al. 2022, Huang et al. 2023). Because such algorithms may pick up subsidiaries with similar names rather than listed firms themselves, we prefer exact matching for our approach using the full domestic business group.

which we observe at least one new foreign manufacturing affiliate after 2018. There are 304 such firms in the CSMAR dataset, with 663 new manufacturing affiliates during this period, of which we match 250 firms with 527 new manufacturing affiliates to the 2016 customs data. For both firms and affiliates, this corresponds to a match rate of approximately 80%.[11] Table A3 provides additional summary statistics for this sample.

## 3.2 Empirical strategy and results

Our goal here is to assess whether listed Chinese firms have tended to open new manufacturing affiliates in countries experiencing gains in US import share for a particular set of products: the specific products exported by the firm to the US at baseline.[12] As discussed above, we define third-country 'winners' using long differences in US import shares between 2018 and 2022. Our baseline measure of foreign investment by Chinese firms thus employs the same timeframe; specifically, we consider the cumulative entry of foreign affiliates for each firm after 2018 and up to 2022.[13] We analyze the placement of each firm's foreign affiliates net of country-level trends and total firm-level affiliate entry, by adding country and firm fixed effects to our regressions.

In order to calculate a country-specific 'change in US import share' variable based on each firm's product mix, we begin by taking the difference between the 2022 and 2018 US import shares of each country for each six-digit product. We then take a weighted sum according to the share of each product in the total 2016 US exports of a given listed firm and its related companies. In other words, for firm $f$ and country $c$ (denoting products by $p$):

$$\Delta USImportShare_{fc} = \sum_{p} \frac{ExportstoUS_{pf,2016}}{ExportstoUS_{f,2016}} \left( \frac{USImports_{pc,2022}}{USImports_{p,2022}} - \frac{USImports_{pc,2018}}{USImports_{p,2018}} \right) \quad (1)$$

This variable identifies the countries gaining more or less US market share in the products in which each listed firm specialized (in terms of its own trade with the US) as of 2016.

Because our left-hand side variable is a count of each firm's new affiliates in a given country, we employ a Poisson specification. Regressions using this functional form drop categories where the dependent variable is uniformly equal to zero and thus perfectly predicted

[11] If we match listed firms only, rather than all firms in the domestic business group, 181 listed firms with 358 manufacturing affiliates are successfully matched. Our main results remain similar when we implement our empirical strategy using this alternative approach (see Table A5 Panel A).

[12] We focus on entry of new affiliates, rather than growth of existing affiliates, because our dataset only includes affiliate-specific accounting data for a small share of affiliates.

[13] Our main results remain very similar if we use 2017 rather than 2018 as our base year for these variables, as shown in Table A5 Panel B.

by the relevant fixed effects. So the comparisons we make only include firms opening at least one new manufacturing affiliate between 2019 and 2022, and countries with at least one new manufacturing affiliate during the same period. The question we address is therefore as follows: among firms and countries with new manufacturing affiliates, have firms with a given product mix opened more affiliates in countries with larger increases in US import share for those products?

Our baseline estimating equation is as follows:

$$NewAffiliates_{fc} = exp(\beta \Delta USImportShare_{fc} + \delta_f + \gamma_c) \times \epsilon_{fc} \tag{2}$$

Here, $NewAffiliates_{fc}$ represents cumulative entry of manufacturing affiliates after 2018 by firm $f$ in country $c$, $\Delta USImportShare_{fc}$ is the change in the country's share of US import value in 2022 relative to 2018 for the firm-specific product mix, and $\delta_f$ and $\gamma_c$ are firm and country fixed effects respectively. Standard errors are estimated using two-way clustering by firm and country.

The estimated coefficient of interest from this specification is displayed in column (1) of Table 1. According to this result, a firm with a given product mix opened approximately 8.6% more new manufacturing affiliates in countries that increased their US import share for this set of products by one percentage point, as compared to countries with no gain.[14] This result is statistically significant with a p-value of 0.008.

We next add a control variable capturing the cross-sectional distribution of manufacturing affiliates as of 2017. This allows us to compare firms with the same number of affiliates in a given country before the intensification of US-China economic tensions.[15] As shown in column (2), our main result changes little with the inclusion of this control.

Our data on non-manufacturing affiliates allows us to check whether this pattern is unique to affiliates engaged in manufacturing production. We are specifically interested in relocation of production for the US market from China to other countries, but an alternative possibility is that the observed 'winners' of increased US market share simply experienced generally higher economic growth during this period. Although we account for country-level trends by using country fixed effects, our findings might capture local growth trends in particular regions specializing in certain subsets of products.

In this case, we might expect firms to open more affiliates in these places in general, in-

[14] This interpretation is based on the calculation $(e^{8.237 \times 0.01} - 1) \times 100 = 8.6\%$.

[15] We use the 2017 distribution of affiliates so that we can attempt robustness checks with 2017 as our base year (Table A5 Panel B) without changing this control variable. Our results remain similar if we instead control for the number of affiliates in 2018.

Table 1: Number of new affiliates by firm and country

| | Manufacturing affiliates | | Non-manufacturing affiliates | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Δ US import share | 8.237 | 8.103 | -1.516 | -1.442 |
| | (3.127) | (3.340) | (1.775) | (1.945) |
| Number of affiliates in 2017 | | 0.334 | | 0.203 |
| | | (0.090) | | (0.080) |
| Firm FEs | Yes | Yes | Yes | Yes |
| Country FEs | Yes | Yes | Yes | Yes |
| Firms | 250 | 250 | 352 | 352 |
| Countries | 67 | 67 | 91 | 91 |
| Observations | 16,750 | 16,750 | 32,032 | 32,032 |

This table considers the relationship between product-level changes in the US import share of a country between 2018 and 2022 and the number of new affiliates of Chinese listed firms in that country. Observations vary by Chinese listed firm and partner country. Each firm is associated with the mix of six-digit products that the firm's mainland Chinese business group (the firm itself, subsidiaries, related firms and joint ventures) exported to the US in 2016, weighted using the share of each product in the group's total 2016 exports to the US. Subsidiaries, related firms or joint ventures appearing in more than one business group are excluded from this calculation. The dependent variable is the number of new affiliates in a given country that are reported by the listed firm between 2019 and 2022. In columns (1) and (2), this includes only manufacturing affiliates, and in columns (3) and (4), this includes only non-manufacturing affiliates. The variable 'Δ US import share' is the change in the country's share of US import value between 2018 and 2022 for the mix of products exported to the US in 2016 by the firm's domestic business group. The variable 'number of affiliates in 2017' is the number of the firm's manufacturing affiliates (column (2)) or non-manufacturing affiliates (column (4)) in a given country as reported in the firm's 2017 annual report. All specifications include firm and country fixed effects. All regressions are estimated using Poisson pseudo-maximum likelihood. Standard errors (in parentheses) are estimated using two-way clustering by firm and country.

cluding affiliates engaged in non-manufacturing activities such as sales. However, as shown in columns (3) and (4) of Table 1, we observe no such pattern. Here, we replace our dependent variable with the cumulative entry of new non-manufacturing affiliates from 2019 to 2022.[16] The estimated coefficients are much smaller in magnitude, of a different sign and not statistically significant. We provide further evidence against a 'local growth' interpretation of our main results in Section 5.

We also attempt specifications with a dummy variable identifying 'top winners' on the right-hand side in place of $\Delta USImportShare_{fc}$. We set this variable equal to one for the country with the largest increase in US import share for each firm's product mix (Table A6 Panel A), or alternatively for the top three countries by this measure for each firm (Table

[16]See Table A3 for relevant summary statistics.

A6 Panel B). We find that listed firms opened 113% more manufacturing affiliates in the location experiencing the greatest rise in US market share for the firm's product mix (and 106% more in the top three locations), as compared to the other countries in the sample.

Finally, we consider the regional heterogeneity underlying our findings. Panel A of Table A7 reproduces our main analysis for East and Southeast Asian countries only, while in Panel B, we instead remove these countries from the sample. The point estimates for manufacturing affiliates in East and Southeast Asia are slightly larger than those for the full sample in Table 1, while the corresponding estimates for the rest of our sample are much closer to zero. When we further subdivide the 'rest of world' subsample to include only non-high-income countries such as Mexico and India (Panel C), we again observe point estimates similar to those in Table 1; only Chinese manufacturing investment in high-income countries does not follow this pattern (Panel D).[17]

# 4 Chinese exports of parts

## 4.1 Data description

We now consider whether exports of Chinese intermediate inputs are increasingly directed towards countries gaining US import share in products using those inputs. To do this, we use data identifying international trade flows of specific categories of goods and their parts. This exercise is facilitated by the structure of the Harmonized System (HS) classification of traded products, which separately classifies various types of parts in terms of their downstream uses.

For example, the four-digit product code 8508 is made up of a set of six-digit codes relating to vacuum cleaners. Three of these codes relate to different types of vacuum cleaners, while the final code (850870) is for 'Parts of vacuum cleaners'. We therefore treat goods classified under this last code as inputs for goods classified under the other three. We repeat this exercise for all cases where manufactured parts are separately defined, at the six-digit level, from the downstream products in which they are used.

This procedure gives us a sample including 153 categories of goods.[18] In general, these are complex products that involve a potentially large range of parts. Across two-digit HS codes, non-electrical machinery accounts for 69 of the goods categories we study (45%),

[17]Note that because of the small number of countries in some of these subsamples, we do not have the statistical power to draw conclusions beyond suggestive evidence from point estimates.

[18]For 45 of the 153 categories, the HS classification groups 'parts' together with some other related products (usually 'accessories') within the same six-digit product code. Our main results remain very similar, though are less precisely estimated, when we drop these categories (see Table A8 Panel A).

while electrical machinery accounts for 29 categories (19%) and instruments account for 24 categories (16%).[19] Despite their relative concentration within the HS classification, the products we study constitute an important part of world trade. As of 2017, the goods categories in our sample accounted for 50.7% of total US import value and 59.7% of the total value of Chinese exports.

Information on trade in these products is available from the UN Comtrade dataset. From this data, we use the export value of parts as reported by China and the import value of downstream goods as reported by the US. For each of the goods categories we study, we calculate the total value of trade for all of the six-digit products constituting that category (separately for parts and downstream goods). This is disaggregated by partner country.[20]

## 4.2 Empirical strategy and results

As in the previous section, we use long differences in US import shares between 2018 and 2022 to identify 'winners'.[21] These are calculated for each country and goods category, based on US imports of downstream products. We also define an analogous measure by country and goods category for Chinese exports of parts. Because we are again interested in reallocation of Chinese economic activity across 'third countries', we exclude the US from the Chinese export measure, along with Hong Kong and Macau. In contrast, we retain China in our calculation of US import shares, so that measured gains for 'third countries' are larger when US imports from China fall further.

Our baseline regression specification relates the 2018-2022 change in the share of each 'third country' in China's exports of parts to the contemporaneous change in the share of the same country in US imports of the downstream goods using those parts. These comparisons are made across 209 countries and the 153 goods categories discussed above. The specification is as follows:

$$\Delta ChinaExportShare_{gc} = \beta \Delta USImportShare_{gc} + \delta_g + \gamma_c + \epsilon_{gc} \quad (3)$$

[19] Our dataset also covers products within the two-digit HS codes for apparel, footwear, headgear, umbrellas, articles of iron and steel, metal tools, other metal products, railway products, other vehicles, aircraft, clocks and watches, musical instruments, furniture and miscellaneous manufactures. We exclude weapons and nuclear reactors from our dataset because these are sensitive products for which reporting of trade value may be incomplete.

[20] We exclude North Korea, and several small countries with which either the US or China does not separately report trade. See Table A4 for relevant summary statistics.

[21] We again confirm the robustness of our main results to using 2017 rather than 2018 as our base year; see Table A8 Panel B.

Table 2: Share of Chinese parts exports by goods category and country

| | All goods categories (1) | Excluding smallest 5% (2) | Excluding smallest 10% (3) | Excluding smallest 25% (4) |
|---|---|---|---|---|
| Δ US import share | 0.118 | 0.156 | 0.165 | 0.141 |
| | (0.069) | (0.082) | (0.101) | (0.063) |
| Goods category FEs | Yes | Yes | Yes | Yes |
| Country FEs | Yes | Yes | Yes | Yes |
| Goods categories | 153 | 145 | 137 | 114 |
| Countries | 209 | 209 | 209 | 209 |
| Observations | 31,977 | 30,305 | 28,633 | 23,826 |

This table considers the relationship between the change in the US import share of a country for downstream products in a specific goods category and the change in that country's share of exports from China of parts used in products in that goods category. Observations vary by goods category and country. The dependent variable is the change in the country's share of Chinese export value of the parts in a specific goods category between 2018 and 2022. China's exports to the US, Hong Kong and Macau are excluded from the calculation of this share. The variable 'Δ US import share' is the change in the country's share of US import value of the downstream products in a specific goods category between 2018 and 2022. The sample in column (1) includes all goods categories for which parts and downstream products are separately observable in the Harmonized System product classification. The samples in columns (2), (3) and (4) exclude the smallest 5%, 10% and 25% of goods categories, respectively, according to total US imports of downstream products in each goods category as of 2017. All specifications include goods category and country fixed effects. All regressions are estimated using ordinary least squares. Standard errors (in parentheses) are estimated using two-way clustering by goods category and country.

Here, $\Delta ChinaExportShare_{gc}$ is the change between 2018 and 2022 in the share of country $c$ in Chinese exports of parts in goods category $g$. The regressor $\Delta USImportShare_{gc}$ is the change from 2018 to 2022 in the country's share of US import value of downstream goods using these parts. Goods category and country fixed effects are represented by $\delta_g$ and $\gamma_c$ respectively. We use ordinary least squares for this regression, and standard errors are estimated using two-way clustering by goods category and country.

Column (1) of Table 2 displays our baseline finding. We estimate that the rise in the share of a country in Chinese exports of parts for a particular goods category was 0.118 percentage points larger if its increase in US import share for that category of goods was higher by one percentage point. This result is statistically significant with a p-value of 0.091.

Although our dataset linking parts to downstream products covers a substantial share of world trade, the distribution of trade value across these goods categories is highly skewed. Indeed, the top five categories (covering especially important goods such as office machines and motor vehicles) accounted for more than 50% of the total US downstream import value captured by our data as of 2017, while the bottom quartile of categories accounted for less than 0.3%. We attempt regressions that exclude the smallest goods categories (while still retaining sufficient variation for estimation), by sequentially dropping the bottom 5%, 10% and 25% of categories according to 2017 downstream US import value. The results, displayed in columns (2) to (4) of Table 2, are robust to these sample restrictions.

In Table A9, we replace $\Delta USImportShare_{gc}$ with a dummy variable that is equal to one for the country (Panel A) or three countries (Panel B) with the largest rise in downstream US import share for each goods category. Our point estimates suggest that the increase in the average share of Chinese parts exports of the three 'top winners' was larger than that of other countries by approximately 0.8 percentage points. In comparison, the average value of $\Delta USImportShare_{gc}$ for these countries is approximately 4.5 percentage points.

Finally, in Table A10, we consider regional heterogeneity in the observed comovement between US imports of downstream goods and Chinese exports of parts. We find especially strong evidence of this relationship within East and Southeast Asia. We also observe smaller but statistically significant point estimates when we restrict our sample to non-high-income countries outside this region. The results for the subsample of high-income countries outside East and Southeast Asia are quite imprecisely estimated, and not statistically significant.

# 5 Relevance to US-China relations

In the previous two sections, we have documented the parallel evolution of the economic relations of the US and China with 'third countries' recently gaining US import share. We now conduct three additional exercises that provide further evidence of the relevance of these trends to the bilateral US-China economic relationship. As discussed in Section 3, an alternative explanation of our main results is that we have simply captured localized economic growth among the 'winners', rather than relocation of Chinese production for the US market more specifically.

If this were the case, we might expect to see similar patterns of Chinese manufacturing investment and parts exports for 'winners' of higher market share in other advanced economies. We therefore reproduce our main empirical exercises using data for the EU, Japan or Canada, rather than the US. Table 3 Panel A shows results of running the regressions of Table 1 columns (1) and (3), and Table 2 columns (1) and (4), using these three alternative versions of each specification. None of these exercises yields a similar pattern to our findings for the US.

Table 3: Results for other major economies and heterogeneity analysis

Panel A - Results for other major economies

| | Manufacturing affiliates (1) | Non-manufacturing affiliates (2) | All goods categories (3) | Excluding smallest 25% (4) |
|---|---|---|---|---|
| Δ EU import share | -0.436 | -0.125 | -0.024 | -0.026 |
| | (0.404) | (0.305) | (0.014) | (0.012) |
| Observations | 12,561 | 24,840 | 28,458 | 21,204 |
| Δ Japan import share | -0.871 | 0.443 | 0.009 | -0.010 |
| | (0.384) | (3.340) | (0.014) | (0.023) |
| Observations | 12,411 | 25,010 | 30,906 | 23,028 |
| Δ Canada import share | 0.423 | -0.921 | 0.016 | 0.030 |
| | (1.308) | (0.455) | (0.015) | (0.060) |
| Observations | 10,443 | 23,042 | 31,059 | 23,142 |

Panel B - Heterogeneity by Chinese gain or loss in US import share

| | Manufacturing affiliates | | Share of parts exports | |
|---|---|---|---|---|
| | China loss (1) | China gain (2) | China loss (3) | China gain (4) |
| Δ US import share | 9.728 | -4.883 | 0.169 | 0.001 |
| | (2.491) | (3.083) | (0.099) | (0.039) |
| Observations | 12,915 | 1,350 | 21,736 | 10,241 |

Panel C - Heterogeneity by exposure to rises in US tariffs on Chinese goods

| | Manufacturing affiliates | | Share of parts exports | |
|---|---|---|---|---|
| | Above-median exposure (1) | Below-median exposure (2) | Above-median exposure (3) | Below-median exposure (4) |
| Δ US import share | 12.013 | 0.309 | 0.139 | 0.106 |
| | (4.027) | (3.830) | (0.065) | (0.088) |
| Observations | 6,000 | 6,875 | 15,884 | 16,093 |

This table reproduces specifications in Tables 1 and 2 with certain variations. Panel A is based on the specifications of Table 1 columns (1) and (3) and Table 2 columns (1) and (4). In Panel A, each column presents the results of three different regressions, where the variable 'Δ (economy) import share' in each regression is calculated using imports for the specified economy (rather than the US). Also, in columns (1) and (2) of Panel A, the firm-specific product mix is based on exports to the specified economy (rather than the US) by the firm's domestic business group in 2016. In Panels B and C, columns (1) and (2) reproduce Table 1 column (1) for two different subsamples, and columns (3) and (4) reproduce Table 2 column (1) for two different subsamples. The construction of these subsamples is explained in the main text of Section 5.

We next show that our main findings are entirely driven by cases where China's share of US imports has declined during the period studied. In Panel B columns (1) and (2), we present results from running our baseline specification in Table 1 for two subsamples of firms. We first take the set of products exported to the US by each firm in 2016 (weighted by export value) as in Section 3, and then calculate whether the China-wide trend in US import share for this product mix was negative or positive between 2018 and 2022.[22] Column (1) includes only firms with a product mix for which China lost US market share, while Column (2) includes all other firms.

Similarly, in columns (3) and (4) of Panel B, we run the baseline specification from Table 2 for two subsets of goods categories. These are defined according to whether China lost (column (3)) or gained (column (4)) US market share in the downstream products in each category between 2018 and 2022. For both our affiliates and parts results, we observe positive and statistically significant estimates only for the subsamples where China experienced losses in US market share.

In Panel C, we instead divide firms and goods categories into subsamples based on a simple measure of exposure to US trade policy. This exercise uses data from Bown (2021) on rises in US tariffs on Chinese products in 2018 and 2019. For listed firms, we construct a measure weighting product-level tariff increases according to the firm's 2016 exports to the US of each product, divided by the firm's total 2016 export value. We also define an analogous measure for each goods category, using China's 2017 exports to the US of the downstream products within each category. So denoting firms or goods categories by $i$, products by $p$ and the baseline year by $t_0$, we calculate:

$$TariffExposure_i = \sum_p \frac{ExportstoUS_{pi,t_0}}{TotalExports_{i,t_0}} \Delta USTariff_p \quad (4)$$

Columns (1) and (2) of Panel C present results of running the baseline regression from Table 1 separately for firms with above-median and below-median values of this measure. Only the first of these estimates is statistically significant and of a similar magnitude to the baseline result. The corresponding exercise for goods categories may be found in columns (3) and (4). In this case, the point estimate for above-median categories is larger, but this difference is not significant.

[22] Because we do not have firm-level trade data after 2016, we cannot conduct this exercise using firm-specific trends.

# 6 Conclusion

In this study, we have explored how global supply chains might evolve when tensions between major participants rise. Specifically, we have examined the role of third countries in the changing economic relationship between the US and China, in the context of a dramatic recent drop in China's share of US imports. We have found that as 'winner' countries' share of US imports has grown, so has their importance as destinations of manufacturing investment and intermediate inputs from China. This is evidence that relocation of production for the US market has not always removed Chinese economic actors from the production process.

Our findings indicate that as political and economic tensions between the US and China have increased, one of the ways in which their supply chains have changed is through new indirect relationships. Of course, this paper can only provide a snapshot of the evolution of US-China economic relations as of the early 2020s. From this point on, the relationship could still take several possible directions. One possibility is a further decline in value added sourced from inside China, but a continued role for Chinese capital, as Chinese firms move additional stages of the value chain abroad. Another possibility is a more dramatic shift towards 'decoupling' in which even indirect economic relations become infeasible. Further research will play an important role in our understanding of such events.

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Table A1: Top ten and bottom ten countries by 2018-2022 change in US import share

| Top ten countries | | Bottom ten countries | |
|---|---|---|---|
| Country | Δ Aggregate US import share (pp) | Country | Δ Aggregate US import share (pp) |
| Vietnam | 2.06 | China | -4.50 |
| Taiwan | 1.04 | Japan | -1.00 |
| Canada | 0.77 | Venezuela | -0.50 |
| Korea | 0.67 | Germany | -0.46 |
| Thailand | 0.60 | United Kingdom | -0.44 |
| India | 0.54 | Russia | -0.38 |
| Indonesia | 0.27 | France | -0.30 |
| Mexico | 0.24 | Saudi Arabia | -0.23 |
| Ireland | 0.24 | Israel | -0.20 |
| Cambodia | 0.24 | Iraq | -0.16 |

This table displays the change in the share of total US import value between 2018 and 2022 of the ten countries with the largest increases in this variable and the ten countries with the largest decreases in this variable. Changes in US import share are denoted in percentage points.

Table A2: Top 1% 'winner' increases in 2018-2022 US import share within industry

| Country | Industry | Δ Share | Country | Industry | Δ Share | Country | Industry | Δ Share |
|---|---|---|---|---|---|---|---|---|
| Australia | Metal products | 2.94 | Korea | Chemicals | 4.66 | Thailand | Chemical fibers | 2.71 |
| Belgium | Pharmaceuticals | 2.60 | | Automobiles | 3.10 | | Electrical equipment | 1.77 |
| Bangladesh | Apparel | 5.04 | | Iron and steel | 1.79 | | Electronics | 1.71 |
| | Textiles | 1.58 | | Non-ferrous metal | 1.79 | Turkey | Chemical fibers | 3.03 |
| Brazil | Wood products | 1.73 | | Electrical equipment | 1.70 | | Non-metal products | 2.74 |
| Cambodia | Leather/footwear | 4.22 | Malaysia | Furniture | 1.45 | UK | Recycling | 3.50 |
| Canada | Transport equipment | 2.24 | Mexico | Beverages | 10.56 | Vietnam | Furniture | 10.89 |
| | Iron and steel | 1.98 | | Oil refining | 3.96 | | Electronics | 8.00 |
| | Oil refining | 1.85 | | Iron and steel | 3.72 | | Leather/footwear | 6.00 |
| | Food processing | 1.72 | | Automobiles | 3.20 | | Chemical fibers | 5.07 |
| Dom. Rep. | Tobacco | 4.84 | | Transport equipment | 3.10 | | Apparel | 4.15 |
| Germany | Chemical fibers | 1.56 | | Recycling | 2.29 | | Rubber/plastic | 3.03 |
| India | Non-metal products | 2.50 | Netherlands | Oil refining | 1.58 | | Printing | 2.91 |
| | Iron and steel | 2.12 | Nicaragua | Tobacco | 5.26 | | Stationery/recreation | 2.77 |
| | Apparel | 1.62 | Saudi Arabia | Oil refining | 3.46 | | Textiles | 2.44 |
| | Printing | 1.46 | South Africa | Non-ferrous metals | 2.23 | | Electrical equipment | 2.29 |
| Indonesia | Chemical fibers | 3.49 | Spain | Recycling | 1.50 | | Wood products | 2.22 |
| | Leather/footwear | 3.01 | Sweden | Paper products | 1.83 | | Non-metal products | 2.14 |
| | Food processing | 2.21 | Switzerland | Metal products | 9.19 | | General machinery | 1.70 |
| | Furniture | 1.73 | | Instruments | 2.83 | | | |
| Iraq | Oil refining | 2.61 | | Non-ferrous metals | 1.44 | | | |
| Ireland | Chemicals | 1.96 | Taiwan | Electronics | 5.44 | | | |
| Italy | Printing | 2.01 | | Transport equipment | 1.91 | | | |
| | Leather/footwear | 1.61 | | General machinery | 1.40 | | | |

This table lists the top 1% of gains in US import share between 2018 and 2022 at the country-industry level, for countries other than China. This includes 29 two-digit manufacturing industries, based on the 2012 Chinese industrial classification, and 223 countries for which total US imports were not equal to zero during this period. For each country, industry and year, shares are calculated relative to total industry-level US imports in that year. Changes in US import share are denoted in percentage points.

Table A3: Summary statistics for Table 1

Panel A - Manufacturing affiliates in sample for Table 1 columns (1) and (2)

| | Mean | SD | p25 | p50 | p75 | Max | Total |
|---|---|---|---|---|---|---|---|
| By firm (250 firms): | | | | | | | |
| New manufacturing affiliates | 2.11 | 2.35 | 1 | 1 | 2 | 16 | 527 |
| Manufacturing affiliates in 2017 | 1.53 | 3.49 | 0 | 1 | 2 | 33 | 382 |
| By country (67 countries): | | | | | | | |
| New manufacturing affiliates | 7.87 | 13.35 | 1 | 3 | 9 | 85 | 527 |
| Manufacturing affiliates in 2017 | 5.70 | 8.66 | 1 | 3 | 6 | 49 | 382 |
| By firm-country (16,750 observations): | | | | | | | |
| New manufacturing affiliates | 0.03 | 0.24 | 0 | 0 | 0 | 8 | 527 |
| Manufacturing affiliates in 2017 | 0.02 | 0.22 | 0 | 0 | 0 | 11 | 382 |

Panel B - Non-manufacturing affiliates in sample for Table 1 columns (3) and (4)

| | Mean | SD | p25 | p50 | p75 | Max | Total |
|---|---|---|---|---|---|---|---|
| By firm (352 firms): | | | | | | | |
| New non-manufacturing affiliates | 3.33 | 5.66 | 1 | 1.5 | 3 | 57 | 1172 |
| Non-manufacturing affiliates in 2017 | 2.66 | 5.98 | 0 | 1 | 3 | 53 | 938 |
| By country (91 countries): | | | | | | | |
| New non-manufacturing affiliates | 12.88 | 21.33 | 1 | 5 | 14 | 146 | 1172 |
| Non-manufacturing affiliates in 2017 | 10.30 | 18.89 | 1 | 3 | 12 | 97 | 938 |
| By firm-country (32,032 observations): | | | | | | | |
| New non-manufacturing affiliates | 0.03 | 0.34 | 0 | 0 | 0 | 28 | 1172 |
| Non-manufacturing affiliates in 2017 | 0.03 | 0.32 | 0 | 0 | 0 | 25 | 938 |

Panel C - Changes in US import shares in samples for Table 1

| | Mean | SD | p1 | p5 | p50 | p95 | p99 |
|---|---|---|---|---|---|---|---|
| $\Delta$ US import share ($\times$100, pp): | | | | | | | |
| Manufacturing affiliates sample | 0.11 | 1.56 | -2.73 | -0.46 | 0.00 | 1.20 | 5.18 |
| Non-manufacturing affiliates sample | 0.08 | 1.55 | -2.56 | -0.34 | 0.00 | 0.76 | 4.37 |

This table provides summary statistics for the samples used in Table 1. The sample of Table 1 columns (1) and (2) includes all firms and countries for which we observe at least one new manufacturing affiliate between 2019 and 2022 ('Manufacturing affiliates sample'). The sample of Table 1 columns (3) and (4) includes all firms and countries for which we observe at least one new non-manufacturing affiliate between 2019 and 2022 ('Non-manufacturing affiliates sample'). Panel A of this table relates to the 'Manufacturing affiliates sample' and Panel B relates to the 'Non-manufacturing affiliates sample'. Panel C provides summary statistics for both samples, across all firm-country observations in each sample. Changes in US import shares are denoted in percentage points.

Table A4: Summary statistics for Table 2

| | Mean | SD | p1 | p5 | p50 | p95 | p99 |
|---|---|---|---|---|---|---|---|
| Δ US downstream import share (×100, pp): | | | | | | | |
| All goods categories | 0.02 | 1.22 | -1.38 | -0.05 | 0.00 | 0.12 | 2.19 |
| Excluding smallest 5% | 0.02 | 1.12 | -1.28 | -0.05 | 0.00 | 0.12 | 2.13 |
| Excluding smallest 10% | 0.02 | 1.04 | -1.21 | -0.04 | 0.00 | 0.12 | 1.89 |
| Excluding smallest 25% | 0.03 | 0.83 | -0.96 | -0.04 | 0.00 | 0.12 | 1.67 |
| Δ China parts export share (×100, pp): | | | | | | | |
| All goods categories | -0.00 | 1.42 | -3.07 | -0.39 | 0.00 | 0.51 | 2.88 |
| Excluding smallest 5% | -0.00 | 1.42 | -3.05 | -0.39 | 0.00 | 0.50 | 2.85 |
| Excluding smallest 10% | -0.00 | 1.38 | -2.99 | -0.39 | 0.00 | 0.49 | 2.77 |
| Excluding smallest 25% | -0.00 | 1.11 | -2.62 | -0.37 | 0.00 | 0.47 | 2.48 |

This table provides summary statistics for the samples used in Table 2, across all goods category-country observations in each sample. Changes in US import shares for downstream goods and Chinese export shares for parts are denoted in percentage points.

Table A5: Number of new affiliates by firm and country – alternative measure and base year

| | Manufacturing affiliates | | Non-manufacturing affiliates | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Panel A - Firm-specific product mix based on listed firms only | | | | |
| $\Delta$ US import share | 10.452 | 10.185 | 0.952 | 1.467 |
| | (3.252) | (3.229) | (1.477) | (1.527) |
| Number of affiliates in 2017 | | 0.306 | | 0.628 |
| | | (0.079) | | (0.119) |
| Firms | 181 | 181 | 352 | 352 |
| Countries | 52 | 52 | 91 | 91 |
| Observations | 9,412 | 9,412 | 18,634 | 18,634 |
| Panel B - Variables defined using 2017 base year | | | | |
| $\Delta$ US import share | 8.125 | 8.100 | 0.899 | 0.851 |
| | (2.700) | (2.743) | (1.342) | (1.472) |
| Number of affiliates in 2017 | | 0.299 | | 0.207 |
| | | (0.111) | | (0.078) |
| Firms | 295 | 295 | 400 | 400 |
| Countries | 78 | 78 | 96 | 96 |
| Observations | 23,010 | 23,010 | 38,400 | 38,400 |

This table reproduces the specifications in Table 1 with certain variations. In Panel A, each firm is associated with the mix of six-digit products that the listed firm itself (rather than the firm's full mainland Chinese business group as in Table 1) exported to the US in 2016, weighted using the share of each product in the firm's total 2016 exports to the US. In Panel B, the dependent variable is the number of new affiliates in a given country that are reported by the listed firm between 2018 and 2022 (rather than between 2019 and 2022 as in Table 1). Also in Panel B, the variable '$\Delta$ US import share' is the change in the country's share of US import value between 2017 and 2022 (rather than between 2018 and 2022 as in Table 1) for the (weighted) mix of products exported to the US in 2016 by the firm's domestic business group.

Table A6: Number of new affiliates by firm and country – 'top winners' regressions

| | Manufacturing affiliates | | Non-manufacturing affiliates | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Panel A - Top 'winner' country by firm-specific product mix | | | | |
| Top winner dummy | 0.758 | 0.778 | -0.079 | -0.001 |
| | (0.290) | (0.292) | (0.268) | (0.303) |
| Number of affiliates in 2017 | | 0.341 | | 0.203 |
| | | (0.092) | | (0.079) |
| Firms | 250 | 250 | 352 | 352 |
| Countries | 67 | 67 | 91 | 91 |
| Observations | 16,750 | 16,750 | 32,032 | 32,032 |
| Panel B - Top three 'winner' countries by firm-specific product mix | | | | |
| Top three winners dummy | 0.721 | 0.695 | 0.055 | 0.104 |
| | (0.311) | (0.302) | (0.177) | (0.192) |
| Number of affiliates in 2017 | | 0.326 | | 0.204 |
| | | (0.077) | | (0.079) |
| Firms | 250 | 250 | 352 | 352 |
| Countries | 67 | 67 | 91 | 91 |
| Observations | 16,750 | 16,750 | 32,032 | 32,032 |

This table reproduces the specifications in Table 1 with alternative regressors. In Panel A, the variable 'Top winner dummy' is equal to one for the country with the largest increase in US import share between 2018 and 2022 for the firm's product mix (as defined in Table 1), and zero otherwise. In Panel B, the variable 'Top three winners dummy' is equal to one for the three countries with the largest increases in US import share between 2018 and 2022 for the firm's product mix (as defined in Table 1), and zero otherwise.

Table A7: Number of new affiliates by firm and country – heterogeneity by region

| | Manufacturing affiliates | | Non-manufacturing affiliates | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Panel A - Countries in East and Southeast Asia | | | | |
| Δ US import share | 11.250 | 12.346 | -0.344 | -0.250 |
| | (3.272) | (3.302) | (3.060) | (3.007) |
| | {0.131} | {0.144} | {0.921} | {0.943} |
| Number of affiliates in 2017 | | 0.648 | | 0.133 |
| | | (0.262) | | (0.051) |
| | | {0.041} | | {0.400} |
| Firms | 149 | 149 | 199 | 199 |
| Countries | 12 | 12 | 12 | 12 |
| Observations | 1,788 | 1,788 | 2,388 | 2,388 |
| Panel B - Countries outside East and Southeast Asia | | | | |
| Δ US import share | 0.799 | -0.031 | -2.318 | -2.305 |
| | (5.029) | (5.011) | (1.489) | (1.523) |
| Number of affiliates in 2017 | | 0.251 | | 0.246 |
| | | (0.038) | | (0.089) |
| Firms | 142 | 142 | 253 | 253 |
| Countries | 55 | 55 | 79 | 79 |
| Observations | 7,810 | 7,810 | 19,987 | 19,987 |

Continued on next page.

Table A7: Number of new affiliates by firm and country – heterogeneity by region (continued from previous page)

| | Manufacturing affiliates | | Non-manufacturing affiliates | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Panel C - Non-high-income countries outside East and Southeast Asia | | | | |
| Δ US import share | 9.855 | 8.769 | -2.175 | -2.053 |
| | (4.904) | (5.422) | (1.634) | (1.682) |
| | {0.255} | {0.379} | {0.427} | {0.454} |
| Number of affiliates in 2017 | | 0.308 | | 0.250 |
| | | (0.174) | | (0.407) |
| | | {0.364} | | {0.539} |
| Firms | 71 | 71 | 95 | 95 |
| Countries | 26 | 26 | 40 | 40 |
| Observations | 1,846 | 1,846 | 3,800 | 3,800 |
| Panel D - High-income countries outside East and Southeast Asia | | | | |
| Δ US import share | -2.255 | -3.321 | -2.858 | -3.014 |
| | (6.199) | (5.838) | (2.090) | (2.196) |
| | {0.821} | {0.725} | {0.281} | {0.279} |
| Number of affiliates in 2017 | | 0.220 | | 0.256 |
| | | (0.035) | | (0.079) |
| | | {0.099} | | {0.000} |
| Firms | 91 | 91 | 211 | 211 |
| Countries | 29 | 29 | 39 | 39 |
| Observations | 2,639 | 2,639 | 8,229 | 8,229 |

This table (continued from the previous page) reproduces the specifications in Table 1 for different subsamples of countries. Panel A includes countries in East and Southeast Asia, Panel B includes all other sample countries, and Panels C and D divide the sample of Panel B into countries defined as non-high-income (Panel C) and high-income (Panel D) by the World Bank in its 2017 fiscal year. The p-values in Panels A, C and D (in curly brackets) are calculated using the wild bootstrap approach of Cameron, Gelbach and Miller (2008) due to the small number of clusters, employing the boottest Stata package of Roodman et al. (2019).

Table A8: Share of Chinese parts exports by goods category and country – alternative measure and base year

| | All categories (1) | Excluding smallest 5% (2) | Excluding smallest 10% (3) | Excluding smallest 25% (4) |
|---|---|---|---|---|
| Panel A - Excluding categories where parts are grouped with other products | | | | |
| Δ US import share | 0.113 | 0.155 | 0.170 | 0.124 |
| | (0.085) | (0.106) | (0.119) | (0.065) |
| Goods categories | 108 | 102 | 96 | 79 |
| Countries | 209 | 209 | 209 | 209 |
| Observations | 22,572 | 21,318 | 20,064 | 16,511 |
| Panel B - Variables defined using 2017 base year | | | | |
| Δ US import share | 0.065 | 0.091 | 0.113 | 0.162 |
| | (0.039) | (0.042) | (0.049) | (0.049) |
| Goods categories | 153 | 145 | 137 | 114 |
| Countries | 209 | 209 | 209 | 209 |
| Observations | 31,977 | 30,305 | 28,633 | 23,826 |

This table reproduces the specifications in Table 2 with certain variations. In Panel A, we exclude 45 goods categories for which the HS classification groups parts together with some other related products within the same six-digit product code. In Panel B, the dependent variable is the change in the country's share of Chinese export value of the parts in a specific goods category between 2017 and 2022 (rather than between 2018 and 2022 as in Table 2). Also in Panel B, the variable 'Δ US import share' is the change in the country's share of US import value of the downstream products in a specific goods category between 2017 and 2022 (rather than between 2018 and 2022 as in Table 2).

Table A9: Share of Chinese parts exports by goods category and country – 'top winners' regressions

| | All categories (1) | Excluding smallest 5% (2) | Excluding smallest 10% (3) | Excluding smallest 25% (4) |
|---|---|---|---|---|
| Panel A - Top 'winner' country by goods category | | | | |
| Top winner dummy | 0.008 | 0.008 | 0.008 | 0.011 |
| | (0.008) | (0.008) | (0.009) | (0.009) |
| Goods categories | 153 | 145 | 137 | 114 |
| Countries | 209 | 209 | 209 | 209 |
| Observations | 31,977 | 30,305 | 28,633 | 23,826 |
| Panel B - Top three 'winner' countries by goods category | | | | |
| Top three winners dummy | 0.008 | 0.008 | 0.007 | 0.009 |
| | (0.003) | (0.003) | (0.003) | (0.003) |
| Goods categories | 153 | 145 | 137 | 114 |
| Countries | 209 | 209 | 209 | 209 |
| Observations | 31,977 | 30,305 | 28,633 | 23,826 |

This table reproduces the specifications in Table 2 with alternative regressors. In Panel A, the variable 'Top winner dummy' is equal to one for the country with the largest increase in US import share between 2018 and 2022 for the downstream products in the goods category, and zero otherwise. In Panel B, the variable 'Top three winners dummy' is equal to one for the three countries with the largest increases in US import share between 2018 and 2022 for the downstream products in the goods category, and zero otherwise.

Table A10: Share of Chinese parts exports by goods category and country – heterogeneity by region

| | All categories (1) | Excluding smallest 5% (2) | Excluding smallest 10% (3) | Excluding smallest 25% (4) |
|---|---|---|---|---|
| Panel A - Countries in East and Southeast Asia | | | | |
| Δ US import share | 0.184 | 0.192 | 0.187 | 0.211 |
| | (0.057) | (0.058) | (0.072) | (0.088) |
| | {0.052} | {0.044} | {0.057} | {0.033} |
| Goods categories | 153 | 145 | 137 | 114 |
| Countries | 15 | 15 | 15 | 15 |
| Observations | 2,295 | 2,175 | 2,055 | 1,710 |
| Panel B - Countries outside East and Southeast Asia | | | | |
| Δ US import share | 0.090 | 0.138 | 0.157 | 0.058 |
| | (0.096) | (0.129) | (0.154) | (0.064) |
| Goods categories | 153 | 145 | 137 | 114 |
| Countries | 194 | 194 | 194 | 194 |
| Observations | 29,682 | 28,130 | 26,578 | 22,116 |
| Panel C - Non-high-income countries outside East and Southeast Asia | | | | |
| Δ US import share | 0.045 | 0.095 | 0.099 | 0.146 |
| | (0.018) | (0.045) | (0.047) | (0.029) |
| Goods categories | 153 | 145 | 137 | 114 |
| Countries | 126 | 126 | 126 | 126 |
| Observations | 19,278 | 18,270 | 17,262 | 14,364 |
| Panel D - High-income countries outside East and Southeast Asia | | | | |
| Δ US import share | 0.098 | 0.144 | 0.165 | 0.019 |
| | (0.115) | (0.149) | (0.179) | (0.070) |
| Goods categories | 153 | 145 | 137 | 114 |
| Countries | 68 | 68 | 68 | 68 |
| Observations | 10,404 | 9,860 | 9,316 | 7,752 |

This table reproduces the specifications in Table 2 for different subsamples of countries. Panel A includes countries in East and Southeast Asia, Panel B includes all other sample countries, and Panels C and D divide the sample of Panel B into countries defined as non-high-income (Panel C) and high-income (Panel D) by the World Bank in its 2017 fiscal year. The p-values in Panel A (in curly brackets) are calculated using the wild bootstrap approach of Cameron, Gelbach and Miller (2008) due to the small number of clusters, employing the boottest Stata package of Roodman et al. (2019).