

Testimony before the U.S.-China Economic and Security Review Commission
Hearing on “Key Economic Strategies for Leveling the U.S.-China Playing Field:
Trade, Investment, and Technology” *

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Since 2017, global supply chains have come under severe strain from multiple forces: trade tensions between the U.S. and China, the Covid-19 pandemic, and geopolitical conflicts (such as the Russia-Ukraine war). In this testimony, I present an overview of findings from research that has documented recent shifts in the U.S.’ trade and supply chain links with China, while highlighting several key implications of these trends. The testimony draws especially on a paper on this topic that I co-authored with Laura Alfaro (Harvard Business School), which was first presented in August 2023 at the Jackson Hole Economic Policy Symposium convened by the Federal Reserve Bank of Kansas City (Alfaro and Chor 2023). The material in this testimony contains several updates incorporating the latest additional year of data available since that Symposium; this will underscore the rapid and fluid nature of the reallocation of U.S. supply chain activity as this continues to unfold.

This reconfiguration of U.S.-China supply chain relationships is poised to leave a profound mark on domestic economic outcomes. This testimony also synthesizes the findings from a companion body of recent studies, on how the U.S.-China tariffs have already impacted such outcomes as output, employment, and prices in both countries. These insights are important for weighing the tradeoffs – the costs and benefits – of pursuing such policies that seek to reduce the U.S.’ dependence on supply chains linked to China.

1. The “Great Reallocation” in Global Supply Chains

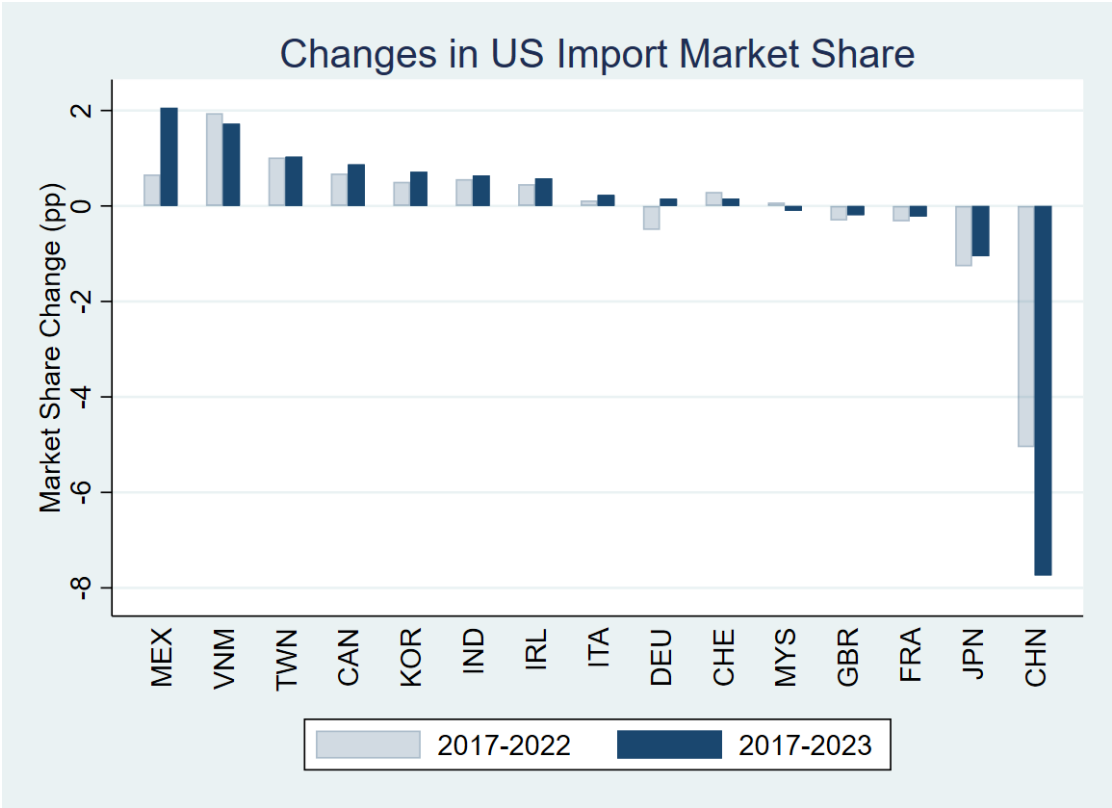
Amid the commentary and debate about whether the world at large is entering a phase of “deglobalization” (e.g., Antràs 2021, Baldwin 2022, Colantone et al. 2022, Aiyar et al. 2023, Goldberg and Reed 2023), it is useful to first register the point that the U.S. remains closely engaged with the rest of the world through international trade. Between 2017-2023, the U.S.’ exports of goods expanded in real terms by 10.0% (or at an average annual pace of 1.6%), while

* I am grateful to Bashudha Dhamala for research assistance. All errors are my own.

its real imports of goods grew by 17.0% (an average annual growth rate of 2.7%). In fact, U.S. goods imports reached a highwater mark in 2022 (\$2.79 trillion, in chained 2017 dollars) on the back of a strong recovery in world trade from the Covid-19 pandemic, before easing off slightly in 2023 (to \$2.74 trillion).¹

More Friendshoring and Nearshoring: However, this aggregate expansion in U.S. imports masks a significant shift in the composition of these imports away from China as a source country. As Figure 1 shows, the share of U.S. imports that originate directly from China fell from 21.6% in 2017 to 16.5% in 2022 (light blue bars). This dipped further to 13.9% in 2023, so that China has overall lost about one-third of its U.S. import market share – or close to 8 percentage points – since 2017 (dark blue bars).

Figure 1: Changes in U.S. Import Market Share



Data Source: U.S. Census Bureau.

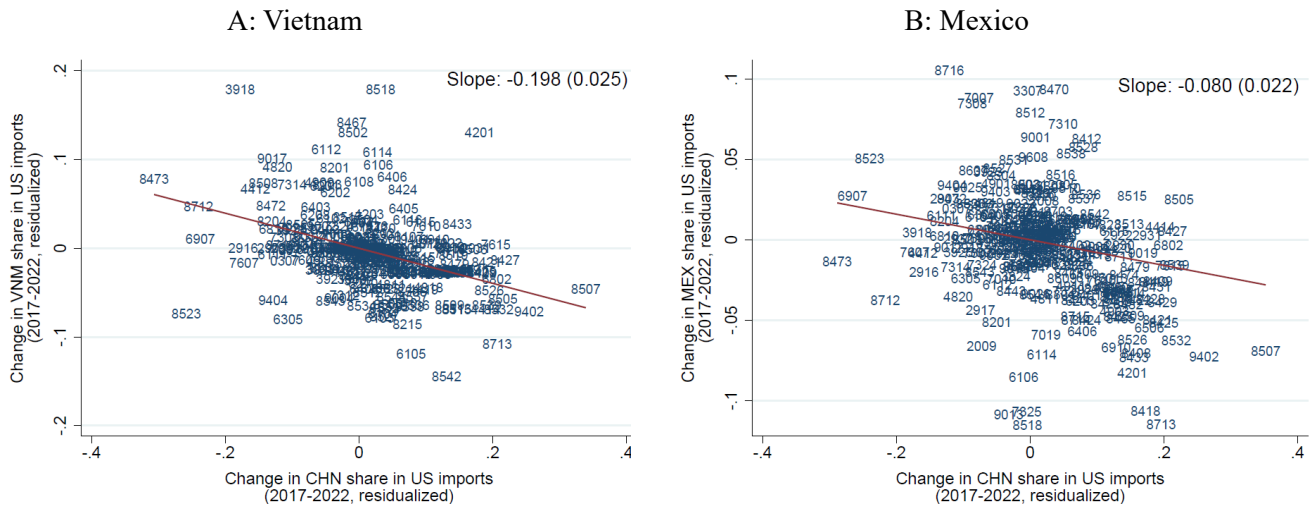
¹ Based on data from the U.S. Census Bureau.

The countries that have gained the most ground amid this reallocation in U.S. import shares have been Vietnam and Mexico, shifts that point to how U.S.-based companies are engaging in more “friendshoring” and “nearshoring” from these locations, in lieu of direct importing from China. Both Vietnam and Mexico have each seen their share in U.S. imports rise around 2 percentage points between 2017-2023. This increase for Mexico has been particularly concentrated in one year – namely, 2023 – so much so that Mexico replaced China last year as the single largest direct source country for U.S. imports (accounting for 15.4% of U.S. imports in 2023). Figure 1 corroborates and reinforces results uncovered by other international trade economists (Bown 2022, Grossman et al. 2023, Freund et al. 2023, Fajgelbaum et al. 2024), who have also documented this sharp and swift decrease in China’s share in U.S. imports since the onset of the U.S.-China tariffs. Placing this in context, this is the most significant reconfiguration in the pattern of U.S. imports in recent decades, as it looks set to undo a good portion of the U.S.’ direct dependence on China as a supply chain partner since China’s entry into the World Trade Organization (WTO) in 2001.

In Alfaro and Chor (2023), we have further shown using more detailed Harmonized System (HS) 4-digit product-level trade data that China’s loss in import share was indeed Vietnam’s and Mexico’s gain. Figure 2 illustrates this negative correlation: Vietnam and Mexico have gained a greater share in U.S. imports (vertical axis, Panels A and B respectively) in HS 4-digit products where China lost more ground (horizontal axis). Figure 2 moreover allows us to identify key products in which Vietnam and Mexico saw particularly large surges in their share of U.S. imports, these being data points that are positioned well above the predicted best-fit lines (in Panels A and B respectively). Both countries experienced significant increases in their import shares in various types of electrical and electronic equipment: in the case of Vietnam, these were microphones (HS 8518), electric generating sets (HS 8502), and telephone sets (HS 8517), while in the case of Mexico, these were discs, tapes and storage devices (HS 8523) and calculating machines (HS 8470). Vietnam also picked up import share in plastic floor coverings (HS 3918) and various forms of apparel (HS 6112, 6114). On the other hand, Mexico’s imports in glass, iron, and steel products (HS 7007, 7308, 7310), as well as in automobiles and automobile parts (HS 87), performed particularly well; the latter is noteworthy as they point to Mexico gaining a bigger role in value chains involved in the manufacture of motor vehicles for the neighboring U.S. market. In additional regression analysis, we have confirmed that this reallocation in import

market shares was induced in part by the U.S. tariffs on China: the shift away from China toward Vietnam and Mexico was indeed more pronounced for products on which the U.S. levied higher tariffs on China starting in 2018 (Table 4, Alfaro and Chor 2023).

Figure 2: Correlations between Import Share from China versus Vietnam and Mexico (2017-2022)



Notes: Illustrated for the top 300 HS4-digit products by 2017 import value from China. The 2017-2022 change in the Vietnam (respectively, Mexico) share in U.S. imports is plotted on the vertical axes, while the 2017-2022 change in the China share in U.S. imports is plotted on the horizontal axis. Each of these share variables is residualized of HS2-digit fixed effects and the 2012-2017 change in the Vietnam (respectively, Mexico) share in U.S. imports.

Tentative signs of reshoring: Apart from engaging in more friendshoring or nearshoring, there are also nascent signs that U.S. companies have responded to the changing supply chain landscape by relocating more stages of production to U.S. shores (“reshoring”).

We shed light on this through descriptive measures that summarize the “upstreamness” of U.S. imports and exports. This builds on a measure of industries’ upstreamness developed by Fally (2011) and Antràs et al. (2012). As the name suggests, the upstreamness of an industry is its positioning relative to final users of finished goods; more specifically, it is the average number of stages that output from that industry will traverse – think of these as additional stages of assembly – before the finished good reaches an end-user (for example, when a consumer buys a smartphone). This can be computed using the information on linkages and transactions across industries contained in the U.S. Input-Output Tables (from the Bureau of Economic Analysis). As

constructed, an upstreamness value of 1 means that the entirety of the output of an industry goes directly to final-users (e.g., goods at the last stage of assembly). On the other hand, higher values of upstreamness mean that multiple stages of production are needed before the item becomes a final good (e.g., raw materials, chemical products, parts and components). By merging these with product-level trade data, one can then compute measures of the upstreamness of a country's exports (respectively, imports) that take into account the composition of these exports (respectively, imports) across traded products.² These measures of export and import upstreamness are informative of where the country is positioned within global supply chains, specifically whether the country tends to be engaged in more upstream or downstream stages of production.

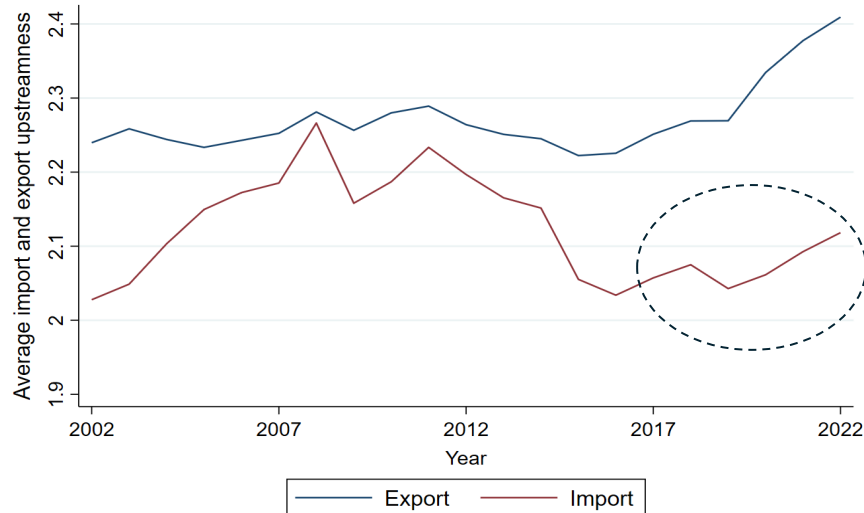
Figure 3 illustrates how the upstreamness of the U.S.' exports and imports have evolved over the past two decades. Throughout this period, the U.S. has been an exporter of relatively upstream products. This is because the U.S.' main exports include: (i) agricultural commodities and natural resources (notably, petroleum); as well as (ii) electronic integrated circuits, machinery, and other goods-in-process that are sent abroad for further processing and assembly. In turn, the U.S. tends to import goods that are relatively finished and ready to be absorbed in final consumption or investment in the U.S. economy (e.g., near-finished motor vehicles, electronic products). That said, in the most recent years of this data, starting around 2017, one can discern an uptick in the upstreamness of U.S. imports (as highlighted in the figure). This suggests that more finishing stages of production are now being performed and completed in the U.S., providing a tentative indication that these stages of supply chain activity are increasingly being reshored.

² More specifically, these measures are calculated as the weighted average across the upstreamness values of each product, in which we use the product's share in the country's total exports (respectively, imports) as weights:

$$U_{US,t}^X = \sum_{p=1}^N \frac{X_{pt}}{X_t} U_p, \quad U_{US,t}^M = \sum_{p=1}^N \frac{M_{pt}}{M_t} U_p.$$

In the above formulae, X_{pt}/X_t is the value of exports of product p expressed as a share of total U.S. exports in year t , M_{pt}/M_t is the corresponding share of product p in the U.S.' total imports in year t , and U_p is the upstreamness value associated with product p . The weights therefore reflect the importance of each product within the export (respectively, import) profile of the U.S.

Figure 3: U.S. Export and Import Upstreamness (2002-2022)



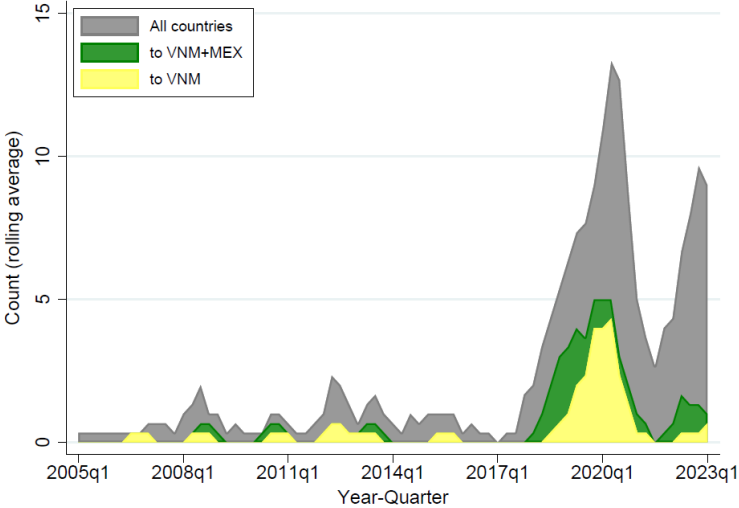
Notes: Based on the methodology in Chor et al. (2021), using UN Comtrade data and the 2012 U.S. Input-Output Tables. Excluding petroleum products delivers a qualitatively similar figure.

An alternative approach to gauge the extent of reshoring would be to examine U.S. employment in various manufacturing industries. The available data from the Bureau of Labor Statistics’ Quarterly Census of Employment and Wages does point to a modest upturn in employment in some key industries: For example, between 2017-2022, U.S. domestic employment in automobiles, electronics, and semiconductors grew at an annual rate of 3.1%, 0.8%, and 1.9% respectively. For electronics and semiconductors, this positive turnaround in jobs coincides with the rollout of the tariffs on China and industrial policies in support of these sectors. On the other hand, the increase in automobiles appears to be more a continuation of a trend that pre-dates these policy actions, as employment in this industry was already growing from 2012-2017 at an annual rate of 4.9% (Alfaro and Chor 2023). In sum, while there are several tentative signs of potential reshoring, more work will be needed to continue monitoring these indicators, to determine how substantial and sustained these trends will be moving forward.

Direct evidence from firms: We complement the above with evidence that corroborates that the above trends reflect purposeful firm-level decisions to shift their import sourcing away from China. Figure 4 uses textual information from transcripts of earnings conference calls

conducted by publicly-listed firms, in which key issues of concern to shareholders and management are raised and discussed; this approach of examining earnings calls transcripts follows Hassan et al. (2019). The occurrence of “friendshoring”, “nearshoring” and “reshoring” in these earnings calls has seen two key spikes in recent years.³ The first coincides with the rise in U.S.-China trade tensions in mid-2017 under the Trump administration through to mid-2020. After a brief lull, there has been a second spike in mentions of these key words in earning calls starting in 2022, suggesting that a significant number of firms are engaging in discussions about their China supply chain strategies in light of the continued use of discretionary tariffs and the public turn toward industrial policy under the Biden administration. Mentions of shifts from China to Vietnam and Mexico specifically have cropped up in these earnings calls, with Vietnam featuring frequently during the first spike and Mexico drawing more attention since 2022.

Figure 4: Friendshoring/Nearshoring/Reshoring in Earnings Calls (2005Q1-2023Q3)



Notes: Friendshoring/Nearshoring/Reshoring in call transcripts in Refinitiv Eikon processed by NL Analytics; counts are three-quarter rolling averages.

2. Two points of caution

The reallocation of U.S. supply chain activity away from China described in the previous section has been motivated by two broad concerns. First, a series of high-profile disruptions and

³ Specifically, to capture text that speaks to a potential shift in sourcing from China to another country (say Vietnam), our measure counts the number of occurrences of: (i) the root form of “reshor*”, “nearshor*”, or “friendshor*” that appear in tandem with “China” and “Vietnam”, and: (ii) the phrase “China to Vietnam”.

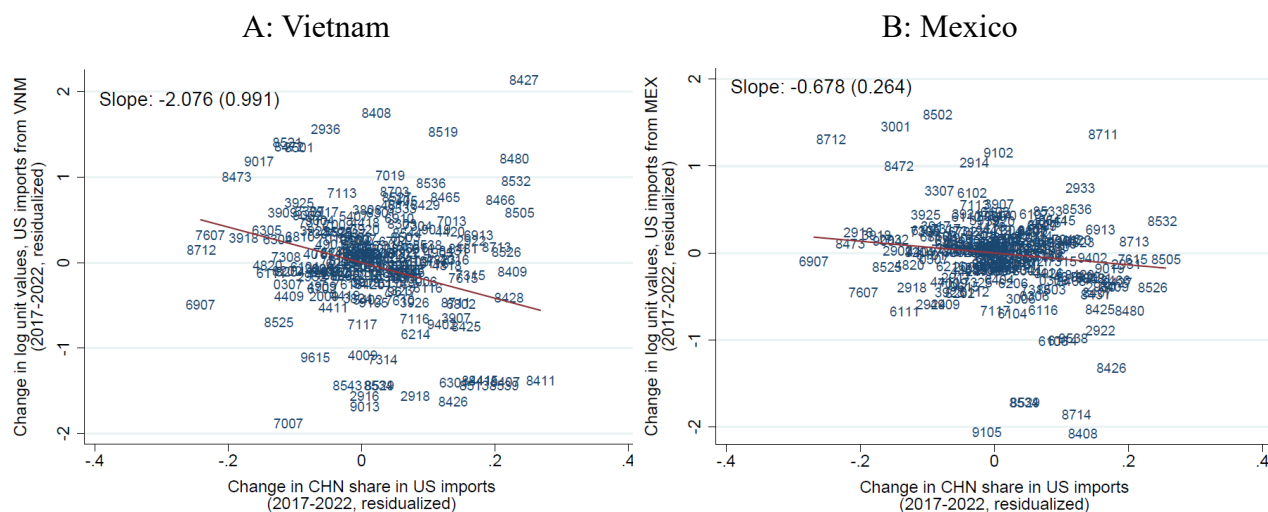
shortages of critical goods – most notably, during the Covid-19 pandemic – has led to more calls for businesses and policymakers to improve supply chain resilience.⁴ Second, U.S.-China trade tensions have brought the deep supply chain relationships between the two countries under close scrutiny, particularly for products deemed to be important for national security, or of technological or strategic value.

While this renewed focus on supply chain resilience and national security is understandable, we would sound out two cautionary notes over the ongoing shifts in favor of friendshoring and nearshoring.

Rising Prices: First, there are already indications that this turn toward alternative import source countries will come with rising prices. That U.S.-based companies are now switching to Vietnam and Mexico suggests that these locations are a second-best alternative from a cost perspective when compared against the original first-choice location, China. Moreover, the recent surge in U.S. demand for goods from Vietnam and Mexico can be expected to pull up wages and industrial land rents in these countries, as manufacturers expand capacity to try to meet the rise in demand from the U.S. Along these lines, Figure 5 shows that such upward pressure on the prices of imports from Vietnam and Mexico is already evident in the trade data: Between 2017-2022, decreases in China’s share in U.S. imports (horizontal axis) have been accompanied by increases in the unit values of these products that are imported from either Vietnam or Mexico (vertical axis, Panel A and Panel B respectively). Bearing in mind that the overall fall in China’s share in U.S. imports between 2017-2022 was 5 percentage points, we estimate in Alfaro and Chor (2023) that this would translate into prices for imports from Vietnam and Mexico that are 9.8% and 3.2% higher respectively.

⁴ This view is aptly captured in the following quote from a speech by Treasury Secretary Janet Yellen: “Favoring the friendshoring of supply chains to a large number of trusted countries, so we can continue to securely extend market access, will lower the risks to our economy as well as to our trusted trade partners” (Yellen 2022).

Figure 5: Correlations between Import Share from China versus Unit Values in Vietnam and Mexico (2017-2022)



Notes: Illustrated for the top 300 HS4-digit products by 2017 import value from China. The 2017-2022 change in log unit values of U.S. imports from Vietnam (respectively, Mexico) is plotted on the vertical axes, while the 2017-2022 change in the China share in U.S. imports is plotted on the horizontal axis. Each of these variables is residualized of HS2-digit fixed effects and the 2012-2017 change in the log unit values of U.S. imports from Vietnam (respectively, Mexico).

Second, the reduction in the share of direct imports from China does not necessarily imply that the U.S. is now less reliant on supply chain partners that are ultimately headquartered in China. This is because Chinese companies have very noticeably upped their degree of engagement in Vietnam’s and Mexico’s economies. In terms of international trade flows, China’s exports to Vietnam were already growing at a fast pace of 10.2% per annum between 2013-2017, yet this increased further to 11.5% between 2017-2023. This trend is even more stark for China’s exports to Mexico: These grew at an annual pace of 5.5% between 2013-2017, and accelerated to 14.6% between 2017-2023.⁵ For many products shipped into Vietnam (respectively, Mexico) from China, there has also been strong growth in these same product categories in Vietnam’s (respectively, Mexico’s) exports to the U.S., raising the concern that what may be going on is just a re-routing of goods that are ultimately made in China. For Vietnam in particular, ongoing work by Edmund Malesky and his co-authors that was presented at a prior hearing of this committee (Iyoha et al. 2024), as well as parallel work by Liu and Wang (2024), is probing this issue to better understand

⁵ Based on UN Comtrade data.

how much of this increase in Vietnam's exports to the U.S. is simply a pure transshipment of goods of Chinese origin that contain minimal Vietnamese value added.

China's recent increased economic engagement with Vietnam and Mexico can be seen too in foreign direct investment (FDI) flows. This is borne out in the FDI statistics reported by national agencies in these respective countries. In Mexico, Chinese firms' FDI in the manufacturing sector grew fivefold from US\$31.6 million in 2017 to US\$151.5 million in 2022. The bulk of this surge in Chinese FDI into Mexico has been concentrated in two industries that are particularly relevant for U.S. supply chains, namely computer and peripheral equipment (NAICS 3341) and motor vehicle parts (NAICS 3363).⁶ While the U.S. still accounts for just over 50% of manufacturing FDI in Mexico, and China's share only stands at slightly over 1% as of 2022, the fast pace at which Chinese FDI has grown means that Chinese firms are poised to be key players in the Mexican manufacturing sector moving forward.

The FDI data available for Vietnam are less detailed, but if anything, the role of China as a source of inward FDI into Vietnam is even more pronounced. Using the Vietnam Annual Enterprise Data, McCaig et al. (2022) report that China's share in the total value of FDI into Vietnam rose from 0.004% in 1999 to 7% in 2017 (see their Figure 4). Data from Vietnam's General Statistics Office confirm that this trend has been sustained in more recent years: China's share by value of all FDI projects granted licenses by Vietnam in 2021 was 7.7%, compared to just 2% for the U.S.⁷

3. Impact on the U.S. economy and on China's economy

Policy measures – most notably, the U.S.-China tariffs – have played a decisive role in triggering this reallocation of U.S. cross-border sourcing away from China. Over the course of 2018-2019, the average U.S. tariff on goods from China rose to about 20.7 percentage points at its peak, affecting 74.7% of China's exports to the US – equivalent to 14.2% of the value of China's total exports to the world – in 2017. In response, China enacted retaliatory tariffs on

⁶ Based on data from the Government of Mexico, Secretary of the Economy, Economic Global Intelligence Unit, July 2023 version, available at: <https://www.gob.mx/se/acciones-y-programas/competitividad-y-normatividad-inversion-extranjera-directa?state=published>.

⁷ See: <https://www.gso.gov.vn/en/px-web/?pxid=E0416&theme=Investment>

goods from the U.S. averaging 16.6 percentage points, covering 66.0% of China's imports from the U.S. (or 5.6% of China's total imports from the world) in 2017.⁸

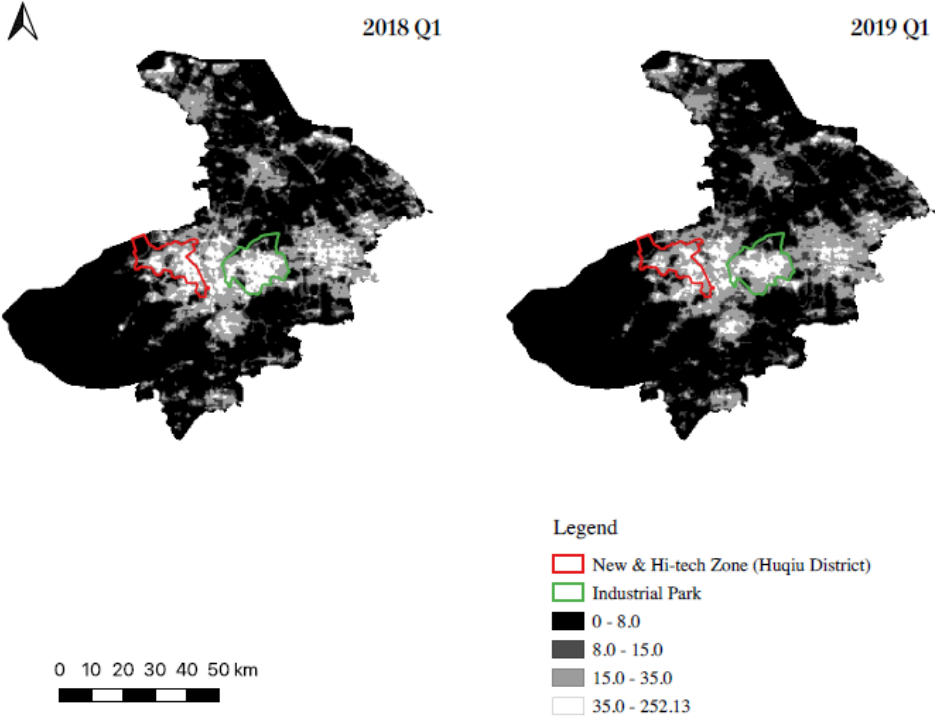
A significant body of research has documented the impact that these policies have had on the U.S. economy. On goods prices, Amity et al. (2019) and Fajgelbaum et al. (2019) estimate from trade data that the U.S. tariffs on China have been passed through almost one-for-one to U.S. import prices. Examining the specific case of washing machines, Flaaen et al. (2020) find that the 2018 safeguard tariffs raised prices in the U.S. by 12 percent relative to a control group of other household appliances, even as washer manufacturers have relocated some of their production to U.S. shores. While some of these import price increases have been absorbed by retailers (Cavallo et al. 2021), one can expect that U.S. consumers too will ultimately bear a portion of this burden. Separately, several papers have studied the impact of the U.S. tariffs on employment outcomes. These have uniformly found that the tariffs on China had minimal impact on employment in industries that received protection, even though the tariffs have often been cited as a measure to support and bolster U.S. manufacturing jobs. Instead, the tariffs levied by China on goods from the U.S. appear to have had some negative impact on U.S. jobs in those industries that bore the brunt of China's tariff retaliation (Flaaen and Peirce 2019, Autor et al. 2024).

Turning to the impact on China, we know as yet much less about how the tariff war has affected economic outcomes there. This is due in large part to China's less transparent data environment: For example, China's statistical offices do not have a practice of releasing information on employment outcomes on a regular basis for detailed industries; there are also ongoing concerns over the reliability of official data during periods when the performance of China's economy might be viewed as a politically sensitive issue. To circumvent these data limitations, my co-author Bingjing Li (Hong Kong University) and I have used satellite readings on night-lights – the intensity of human-generated light emitted from the earth's surface at night – to study whether the U.S.-China tariffs have impacted China's economy. This builds on a recent literature that has proposed the use of such measures – gathered passively by satellites that orbit the earth – as a proxy for economic activity in settings where direct data are difficult to collect (Henderson et al. 2012). The satellite data moreover have a high spatial resolution, so we are able to observe these night-lights for 11km-by-11km grid cells overlaid over a map of China.

⁸ As calculated in Chor and Li (2024), based on tariff data from Bown (2021).

Figure 6 provides an example of what this granular night-lights data can reveal. The figure shows the intensity of night-lights emitted from Suzhou, a large export-oriented prefecture in the coastal province of Jiangsu, comparing the situation in the first quarter of 2018 (prior to the U.S.-China tariffs) against that observed one year later. Relative to the rest of the prefecture, there has been a more pronounced dimming in night lights from two industrial areas – the Huqiu New & Hi-tech Zone and the Suzhou Industrial Park – that have a high concentration of export-oriented factories.⁹ As the U.S. tariffs have likely hurt export orders at Chinese manufacturing firms, this dimming in night-lights could reflect reduced night-time operations in these industrial areas, or lower occupancy in worker dormitories located adjacent to these factories.

Figure 6: Night Lights Intensity in Suzhou in Q1/2018 and Q1/2019



Notes: From the VIIRS-DNB dataset. The highlighted zones are: the Huqiu district, which lies to the west of the Suzhou Industrial Park.

The more systematic regression analysis in Chor and Li (2024) shows that what we illustrate in this figure for Suzhou is manifest across China at large. Using customs data that pre-

⁹ The year-on-year change in mean log night lights was -0.105, -0.085, and -0.067 for the New & Hi-tech Zone, the Industrial Park, and the rest of Suzhou respectively.

date the U.S.-China tariffs, we constructed a measure of each grid location's potential exposure to the U.S. tariffs on Chinese goods, by geolocating firms to grid cells using web-based mapping services (Google Maps and Amap). We find that there was indeed a more severe dimming in night-lights for locations in China with a larger share of exports to the U.S. that were subject to higher tariffs. We further translate these into implied effects for more conventional economic measures, namely GDP per capita and employment. We find a lot of heterogeneity across the geography of China in how much the U.S. tariffs affected economic activity: Close to 70% of China's population resides in grid cells with close to zero direct exposure to the U.S. tariffs. But for the 2.5% of China's population in the most tariff-exposed grids, we infer a decrease in GDP per capita of 2.52% and a decrease in employment of 1.62% over the eight quarters in 2018-2019, relative to unaffected grid locations.

4. Policy Recommendations

In the previous sections, I described the reallocation of U.S. supply chain activity away from China that is rapidly unfolding, and discussed the growing body of evidence on its impact on economic outcomes in both countries. What guidance for policy can we take away from this?

First, there needs to be a clearer recognition and acknowledgement that policy actions to reduce the U.S.' direct dependence on supply chain links to China will incur significant tradeoffs. For the U.S. economy, the U.S.-China tariffs have resulted in rising prices not just on imports from China, but also from alternative source countries such as Vietnam and Mexico; yet this has so far come with minimal attendant benefit to U.S. manufacturing jobs. And although it may be tempting to read the evidence that China's economy has been hurt by the tariff actions as an indication that the U.S. tariffs are "working", they are doing so also at a cost to the U.S. economy. While national security and strategic technology concerns deserve consideration, these need to be weighed against the costs incurred from the broad use of tariff instruments on a swathe of imports from China. An approach that is more focused on establishing a "small yard and high fence" – to quote National Security Advisor Jake Sullivan – would be preferable: defining a clear set of products whose supply chains are to be secured on national security grounds, while otherwise being open to international trade in all other non-sensitive goods.

Second, the rapid growth in imports from Vietnam and Mexico has already raised concerns that Chinese firms are using this as a backdoor route to circumvent the U.S. tariffs on

China. This is likely to trigger more calls for trade restrictions to be applied on goods exported from Vietnam and Mexico to the U.S. There is a need to avoid any such knee-jerk reaction. Vietnam and Mexico have good reason to view the incoming trade and FDI from China somewhat favorably, as this has the potential to bolster their domestic economies as they gain a larger slice of global supply chain activity.¹⁰ Blanket calls for tariff increases on Vietnam and Mexico would risk alienating these countries, when there are instead more measured approaches such as strengthening and enforcing rules of origin, that are aimed precisely at curtailing the pure transshipment of Chinese goods with minimal Vietnamese or Mexican value added. Such collaborative approaches ought to be preferred, especially since building U.S. supply chain resilience will necessarily require strengthening ties with alternative source countries among whom Vietnam and Mexico will surely feature prominently.

¹⁰ A nascent body of work has started to document the effects of the reallocation of supply chain activity through Vietnam and Mexico on these economies; see in particular Mayr-Dorn et al. (2023), Nguyen and Lim (2023), and Rotunno et al. (2023) for Vietnam, and Utar et al. (2023) and Chiquiar and Tobal (2024) for Mexico.

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