Global Supply Chains

The Looming Great Reallocation

Alfaro (HBS) and Chor (Dartmouth)

Bank Financing of Global Supply Chains

Alfaro (HBS), Brussevich (IMF), Minoiu (Fed Atlanta), and Presbitero (IMF)

Laura Alfaro

Harvard Business School

NBER & CEPR

Global Supply Chains (GVCs)
In the Spotlight

- **Optimism of 1990s-2000s:** Falling transportation costs & policy barriers + technological change

  – **Supply chains…** improve **efficiency**, by allowing firms to perform stages/procure inputs in different locations

    ➢ Opportunities for growth and development (WB, 2020)

- **Concerns of 2010s-20s:** Natural disasters, climate change, pandemic, war (Invasion Ukraine, terrorist attack against Israel), national security

  – **Supply chains…** expose firms and countries to **disruption risks**

    ➢ Backlash in developed nations (Colantone et al., 2022; Alfaro, Chen and Chor, 2023) ➔ rise in trade barriers

    o "Favoring the friendshoring of supply chains … will lower the risks to our economy" (Yellen, 2022)

- **Alfaro and Chor (2023):** Broad-ranging look at the **evolution of US supply chains** from 1990s to 2022 (focus on post-2017; available data)

  – Partners, products, modes, value chain position, economic activity; for signs of friend/near/reshoring

Global Supply Chains (GVCs)
Preview

✓ **Not Deglobalization (yet)**: Trade flows have rebounded, US imports at all-time high in 2022 (Antràs, 2020; Baldwin, 2021)

✓ **A "Great Reallocation"**: GVC reconfiguration (2017-2022).

  o Decrease in China's product-level import shares → Increase in import shares from "friends." including: Vietnam (low cost), Mexico (nearshoring / regional GVCs)

  • **Alfaro, Brussevich, Minoiu, Presbitero (2024):** How did firms deal with fixed reallocating costs so quickly? Role of financing constraints + Specialized lending.

✓ **Caution:**   i. Rising costs: Evidence of **rising unit values** from Vietnam and Mexico → Diversification is Costly

  ➢ Banks and Financing can help

  ii. **May not** ultimately **reduce dependence** on China

US Supply Chain Patterns
## A Longer-Run Perspective (1990s-2017)
Alfaro and Chor (2023)

- **Partners:** Shift in import sourcing from High-Income (Japan & Canada) ➔ Low-Wage (China & Mexico)
  - Though regional patterns persist: NAFTA, EU, Asia Pacific
- **Mode:** High-Income countries remained engaged via FDI (to circumvent policy barriers, rising costs at home)

- **Products**: Measure of value chain positioning to final goods (c.f., Chor et al. 2021)
  - Exporter of upstream products; importer of final goods
  - Role energy independence
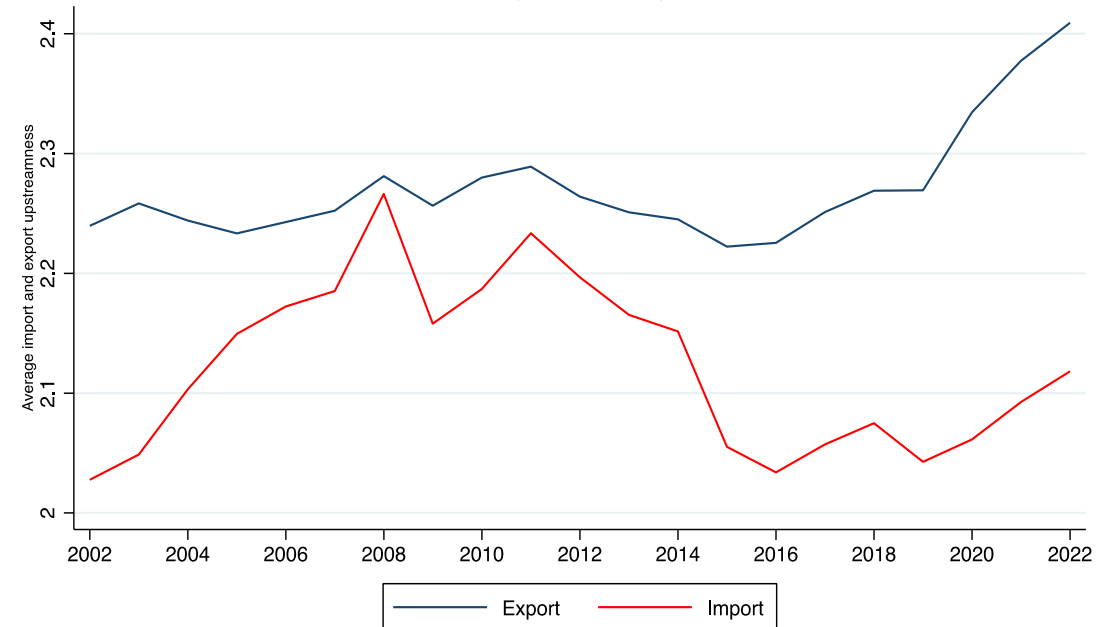 - Also: **Recent ↑ in US import upstreamness**

Imports and Foreign MNE Sales, Shares in US Totals (1995 and 2000)
Source: BEA, Census
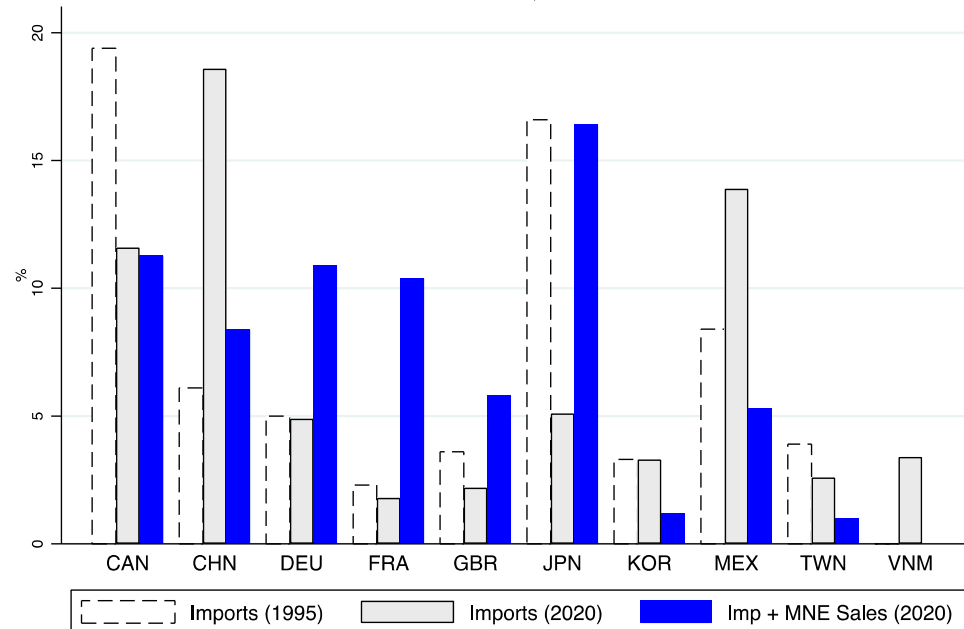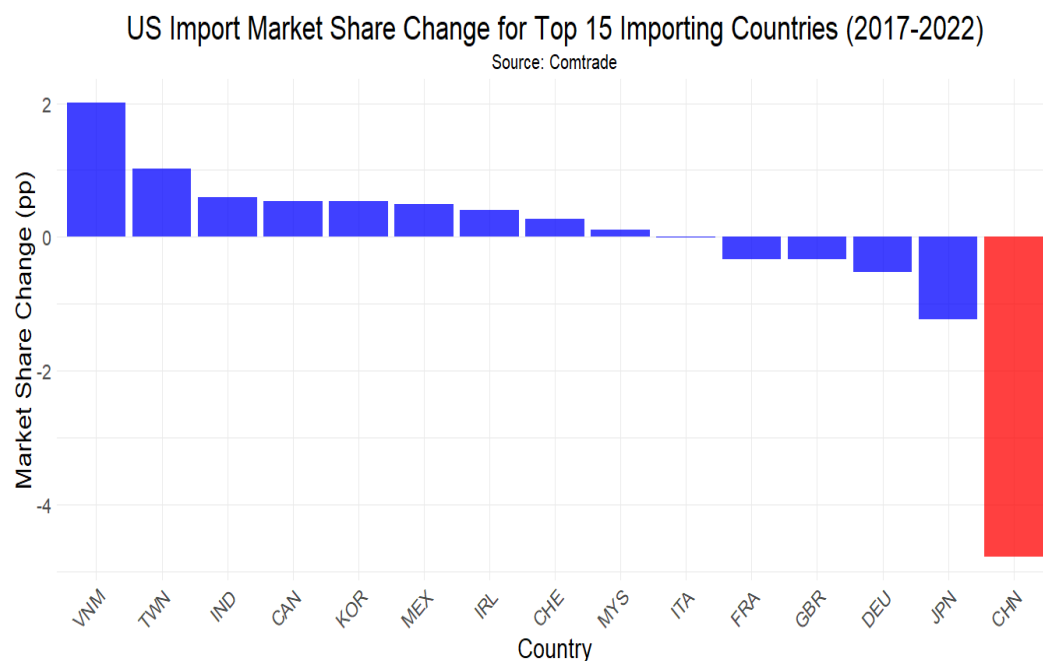

US Export and Import Upstreamness
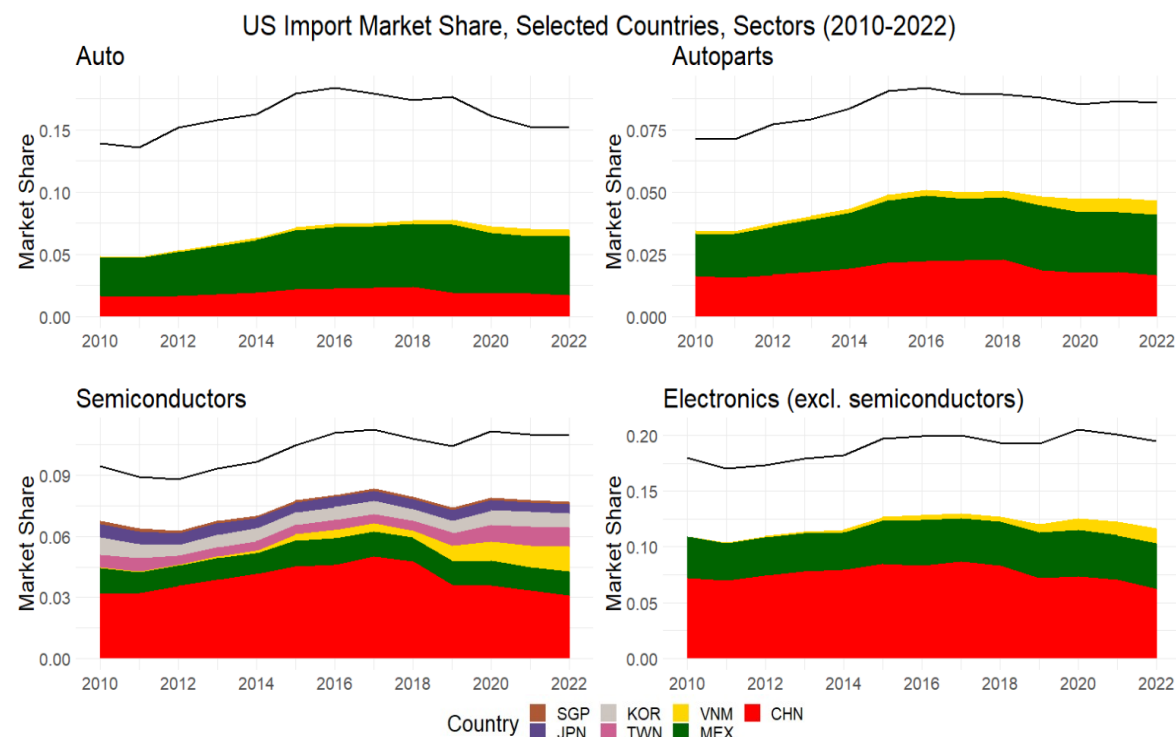Source: US Census, BEA 2012 IO Tables, Chor et al. 2021

The Great Reallocation: 2017-2022
Alfaro and Chor (2023)

- US imports grew 6.7% (non-petroleum real imports: 4.2%)

- **Imports from China grew** 1.2%

- **BUT… lost 5pp market share** to among other "friends": Vietnam, Mexico (Freund et al., 2023)

- In sectors central to policy debate: autos, auto parts, semiconductors, electronics

US Import Market Share Change for Top 15 Importing Countries (2017-2022)

US Import Market Share, Selected Countries, Sectors (2010-2022)

Import Market Share from "Friends"

Product-level Regressions (HS4): $\Delta y_{p,22\text{-}17} = \beta_1 \Delta CHNsh_{p,22\text{-}17} + \beta_2 \Delta y_{p,17\text{-}12} + D_{p0} + \varepsilon_p$

Dependent variable:	Δ US product-level import share from c (2017-2022)						
Import sources, c:	VNM	MEX	CAN	IND, THA, MYS, IDN	KOR, TWN, SGP	IRL, CHE	ROW
ΔCHN import share (2017-2022)	-0.198*** [0.025]	-0.079*** [0.020]	-0.012** [0.005]	-0.136*** [0.044]	-0.440*** [0.134]	-0.011* [0.006]	-0.101 [0.062]
Lag Δ in c's import share (2012-2017)	0.768 [0.529]	-0.118 [0.220]	0.001 [0.069]	0.106 [0.161]	0.188 [0.126]	0.073 [0.053]	-0.453*** [0.087]
Observations	1,149	1,149	1,149	1,149	1,149	1,149	1,149
R-squared	0.529	0.296	0.220	0.301	0.561	0.136	0.458
HS2 fixed effects?	Y	Y	Y	Y	Y	Y	Y
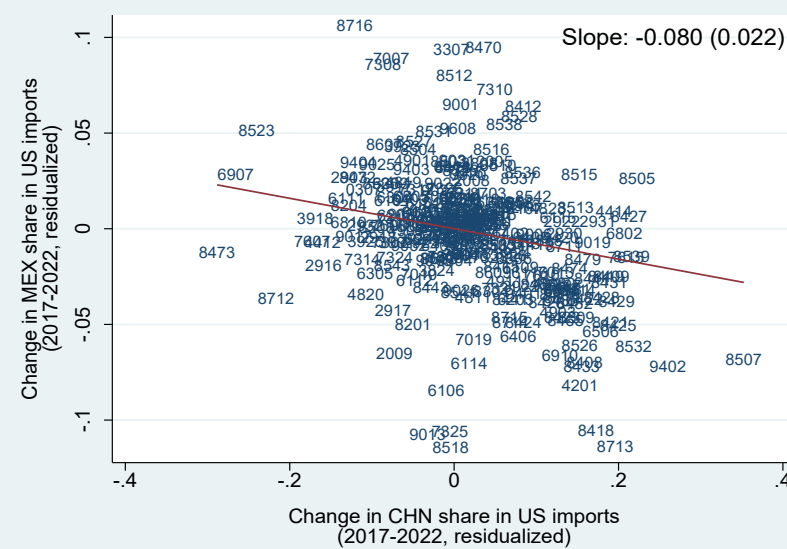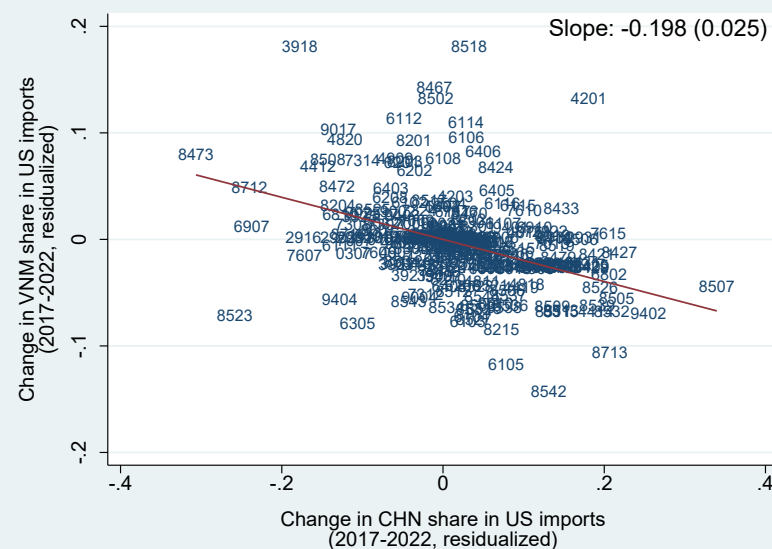
Product-level decreases in China's import share:

- **Increase in** import market share from "friends"

Source: Alfaro and Chor (2023)

Import Market Share from "Friends": Heterogeneous Responses
## Alfaro and Chor (2023)

- Vietnam: Gains particularly in electrical and electronic equipment (e.g., microphones, electric generating sets, telephone sets). Also: plastic floor coverings and apparel.

  - Broadly speaking: In more upstream, or lower labor share products.

- Mexico: Also gained import share in electrical and electronic equipment (e.g., discs, tapes and storage devices, calculating machines). Also: autos and auto parts, glass iron and steel products.

  - Broadly speaking: Less upstream (proximity to the US), or higher labor share products.

✓**Policy Driven Reallocation. Both Vietnam and Mexico: Greater response for products with higher US tariffs on China.**

Caution I: Higher Unit Values from "Friends"
Alfaro and Chor (2023)

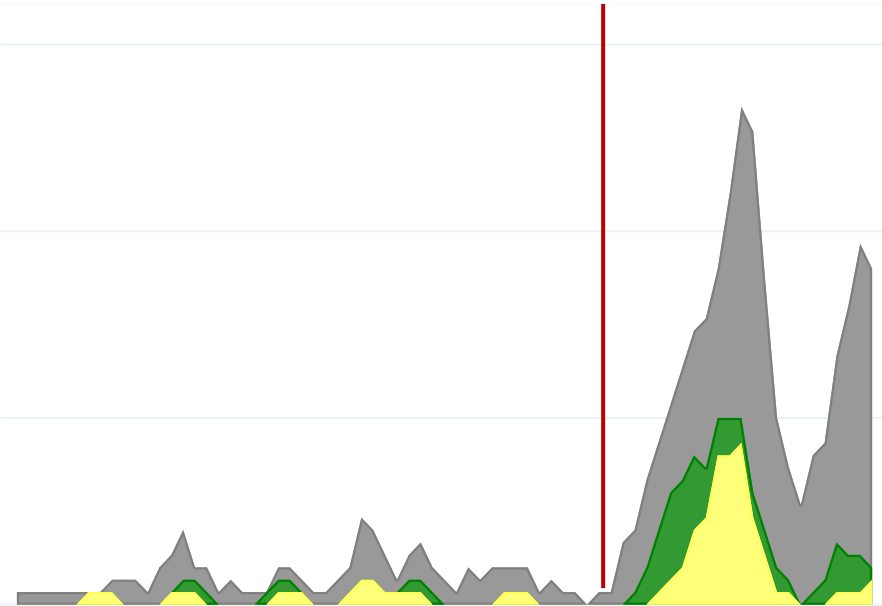| Dependent variable:	Δ Log US product-level **import unit value** from c (2017-2022)						
Import sources, c:	VNM	MEX	CAN	IND, THA, MYS, IDN	KOR, TWN, SGP	IRL, CHE	ROW
ΔCHN import share (2017-2022)	-1.960* [1.001]	-0.630** [0.282]	0.062 [0.367]	-0.905 [0.905]	-0.460* [0.245]	-0.331 [0.622]	-0.700 [1.110]
Lag Δ log import unit value from c (2012-2017)	-0.334*** [0.086]	-0.198*** [0.027]	0.045 [0.086]	-0.416*** [0.090]	-0.234*** [0.056]	-0.297*** [0.077]	-0.788*** [0.151]
Observations	634	926	982	1,025	954	847	286
R-squared	0.342	0.355	0.424	0.350	0.404	0.325	0.306
HS2 fixed effects?	Y	Y	Y	Y	Y	Y	Y
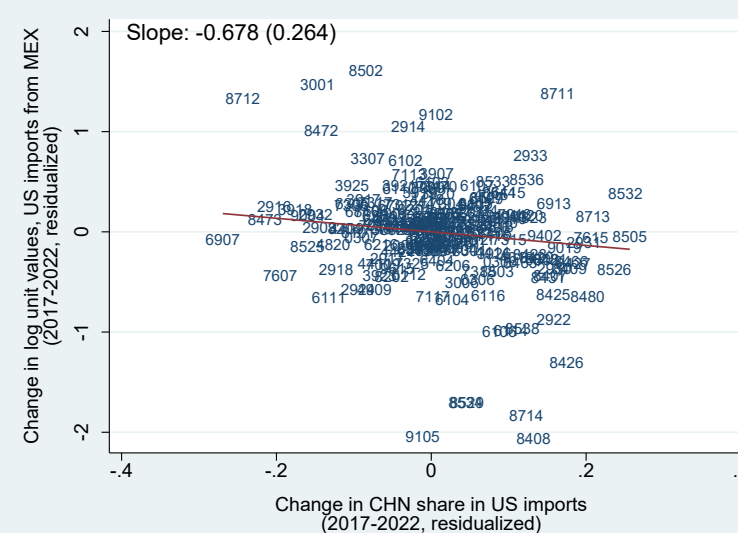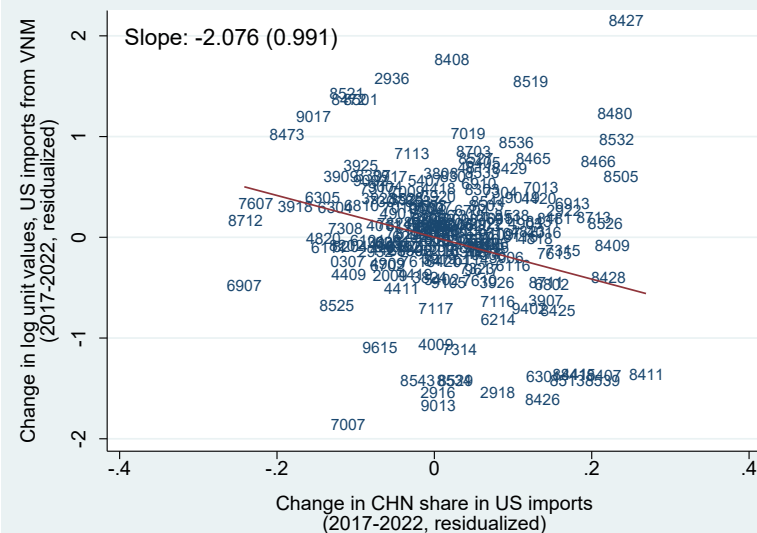
Product-level decreases in China's import share:

➢ **Increases in the unit values** of goods purchased by the US from **Vietnam (10%), Mexico (3%)**

• A combination of cost-push or demand-pull forces

The Great Reallocation: Firms' Strategies
## Offshoring and Greenfield FDI
Alfaro and Chor (2023)

- **Intent/Attention:** In companies' earnings call transcripts, increased mentions of "friend/near/reshoring" + potential moves away from China, toward Vietnam or Mexico

- **Modes**: China dropped off as a preferred destination for greenfield FDI originating from the US + other source countries

Friend/Near/Reshoring in Earnings Calls
(2005-2023Q3) Refinitiv & NL Analytic
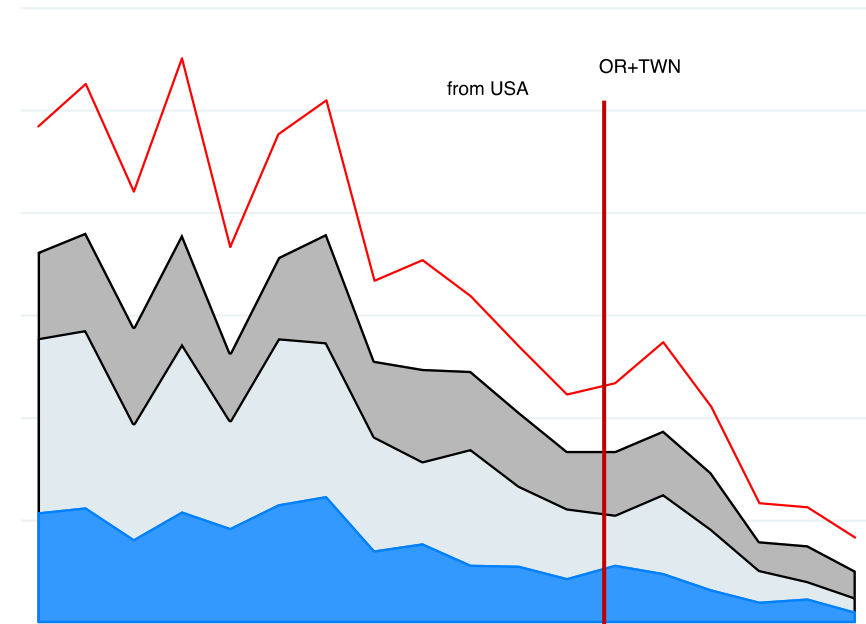
China's Inward Greenfield FDI (2005-2022)
FT fDi Markets

Caution I: Diversification and Reallocation are Costly
Sticky Supply Chains Relationships

- Supply chains impose nontrivial search costs on participants and are often governed by incomplete contracts ⇒ sunk costs generate durable and sticky relationships (U.S. suppliers are not diversified)

- The tariff hikes were a—large shock to U.S. importers from China and induced reallocation

  ➢ How did firms deal with costs so fast? Role of financing constraints?

Table 1. Number of Source Countries Per Imported Product by US Firms

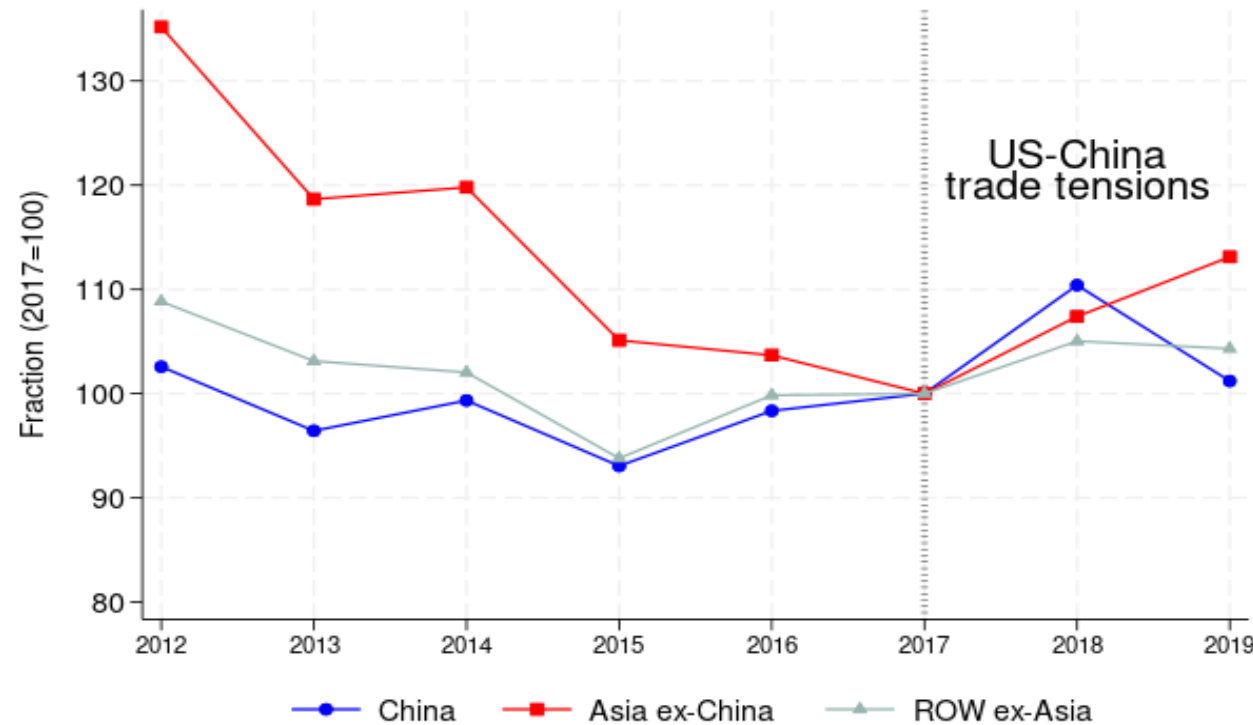|	Firm Level		
	Mean	Median	Max
Mean	1.11	1.03	1.78
Median	1.00	1.00	1.00
95th percentile	1.61	1.00	4.00

Source: Antràs, Fort and Tintelnot (2017). Table reports statistics on the number of countries from which a firm imports the same HS10 product for the year 2007.

Source: Antràs, Fort, Tinelton (2017)

The Great Reallocation: Firm-Supplier Evidence
Importing Firms Suppliers (Alfaro, Brussevich, Minoiu, Presbitero, 2024)

Reallocation Post Tariffs: **U.S. Firms that were importing at least one product** from a **Chinese Supplier reduced their** relationship (# of suppliers' entries)

Import Tariffs and Supply Chains: Firm Level Reallocation
(Alfaro, Brussevich, Minoiu, Presbitero, 2024)

$$\text{Trade Outcome}^m = \beta \text{Tariff-hit}_{ip} \times \text{Post}_t + \gamma X_i \times \text{Post}_t + \sigma_{ip} + \theta_{pt} + \phi_{kt} + \delta_{st} + \epsilon_{ipt}$$
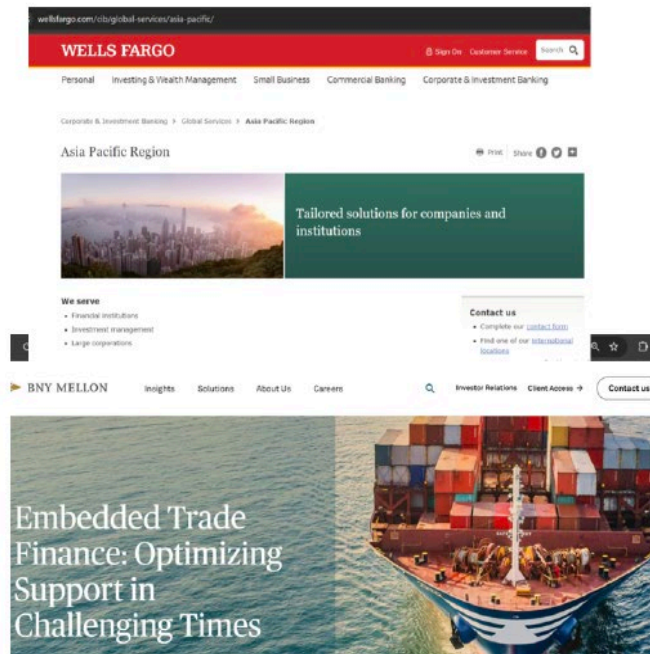
- Tariff-hit indicates firms (or firm-product pairs) exposed to tariffs; Post equals 1 in 2018-2019 and 0 in 2016-2017
- X_i includes size, leverage, liquidity, profitability and a high-yield dummy, as of 2017

Dependent variables:	(1) # exiting suppliers	(2) # entering suppliers	(3) Total # suppliers	(4) Import share
(A) China				
Tariff-hit×Post	0.5645***	-2.0853***	-1.9194***	-1.8096***
	(0.1724)	(0.4404)	(0.3655)	(0.2422)
Observations	210,924	207,956	227,742	219,523
(B) Asia (excl. China)				
Tariff-hit×Post	-0.5986***	0.5334***	0.2795***	0.3685***
	(0.0360)	(0.0358)	(0.0239)	(0.0191)
Observations	184,266	179,899	203,074	183,565
Firm controls×Post	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
State×Year FE	Y	Y	Y	Y
Industry×Year FE	Y	Y	Y	Y
Product×Year FE	Y	Y	Y	Y
Product×Firm FE	Y	Y	Y	Y

Specialized Banks, Information Frictions, Reallocation Costs
(Alfaro, Brussevich, Minoiu, Presbitero, 2024)

- Relationship banks: Specialized Information can help during distress times

- Specialized banks have informational advantages in working with borrowers

  - Credit demand: Do tariff-hit importers increase their demand for bank credit?

  - Bank financing channel: Did Tariff-hit firms borrowing from specialized banks obtain more credit and at better terms?
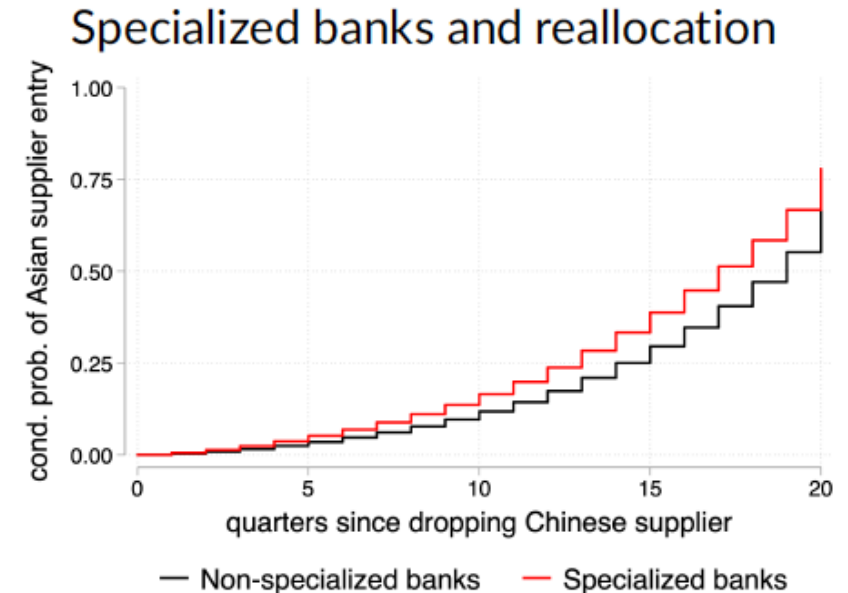

Specialized banks and reallocation

Tariff-hit Importing and Costly Reallocation: Higher Credit Demand
(Alfaro, Brussevich, Minoiu, Presbitero, 2024)

- Bank Credit Outcome$_{ibt}$ = βTariff-hit$_i$ × Post$_t$ + γX_i × Post$_t$ + α_i + ϕ_{kst} + θ_{bt} + δ_{ib} + ϵ_{ibt}
  - Tariff-hit indicates firms (or firm-product pairs) exposed to tariffs; Post equals 1 in 2018-2019 and 0 in 2016-2017
  - X_i includes size, leverage, liquidity, profitability and a high-yield dummy, as of *2017*

Dependent variable:	(A) Credit Line Utilization		(B) New Loan	
Tariff-hit×Post	0.0092***	0.0078**	0.0061***	0.0047**
	(0.0033)	(0.0033)	(0.0023)	(0.0023)
Observations	615,832	521,571	1,568,340	1,340,285
R^2	0.8115	0.8095	0.2209	0.1921
Firm controls×Post		Y		Y
Firm FE	Y	Y	Y	Y
State×Industry×Quarter FE	Y	Y	Y	Y
Bank×Quarter FE	-	-	Y	Y
Bank×Firm FE	-	-	Y	Y

Dependent variable:	(C) Loan Amount (log)		(D) Loan Rate	
Tariff-hit×Post	0.0107***	0.0048#	0.0240***	0.0156**
	(0.0029)	(0.0030)	(0.0060)	(0.0061)
Observations	1,568,155	1,340,134	1,085,432	928,122
R^2	0.8090	0.7984	0.8188	0.8061
Firm controls×Post		Y		Y
Firm FE	Y	Y	Y	Y
State×Industry×Quarter FE	Y	Y	Y	Y
Bank×Quarter FE	Y	Y	Y	Y
Bank×Firm FE	Y	Y	Y	Y

Lending outcomes
- Loan **volumes**: credit line utilization rate (defined at the firm-quarter level), a dummy for new loan, and loan volume (defined at the bank-firm-quarter level)
- Loan **terms**: loan rate, maturity and collateral requirements (defined at the bank-firm-quarter level)

Import Tariffs and Banking Relationships
Specialized Banks in Cross-Border Trade Finance: Better Terms
(Alfaro, Brussevich, Minoiu, Presbitero, 2024)

| Dependent variable:	(1) Loan Amount (log)	(2) Interest Rate	(3) Import Share from Asia	(4) Entry to Asia
Tariffs-hit x Post x Specialized bank [1]	0.0001	-0.0497***	0.3922***	0.5601***
	(0.0056)	(0.0101)	(0.0212)	(0.0323)
Tariffs-hit x Post x Other bank [2]	0.0061*	0.0333***	0.3624***	0.5043***
	(0.0033)	(0.0067)	(0.0173)	(0.0277)
pvalue ttest Ha: |1| > |2|	-	-	0.083	0.039
Observations	1,340,134	928,122	134,976	130,923
R-squared	0.7984	0.8061	-	-
Firm FE, Firm controls x Post	Y	Y	Y	Y
Industry x State x Quarter FE	Y	Y	-	-
Bank x Quarter FE, Bank x Firm FE	Y	Y	-	-
State x Year FE, Industry x Year FE	-	-	Y	Y
Product x Year FE, Product x Firm FE	-	-	Y	Y

The Back Door: Does Friendshoring Reduce Dependence?
Alfaro and Chor (2023)

- **Rising greenfield FDI** by China in Vietnam and Mexico (in line with FDI trends reported by VNM/MEX statistical agencies)

China's Inward Greenfield FDI, 2005-2022
(FT fDi Markets)
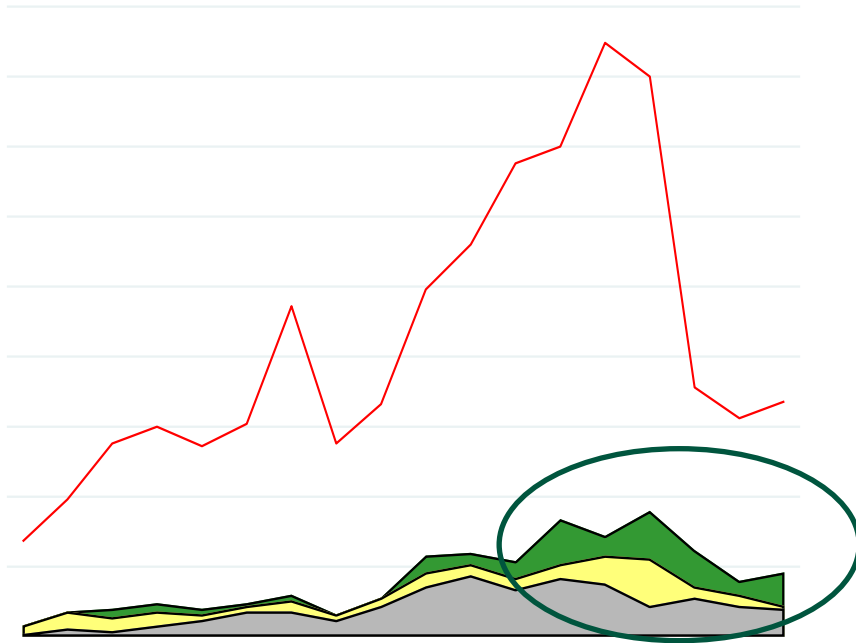
- **Rising share of imports** from China in third-countries, including US "friends"

China's Market Share- Top US Trading Partners
(Comtrade, Eurostat)

#	2017		2022	
	MEX			
1	USA	46.4%	USA	43.9%
2	**CHN**	**17.6%**	**CHN**	**19.6%**
	CAN			
1	USA	51.4%	USA	48.6%
2	**CHN**	**12.6%**	**CHN**	**14.0%**
	JPN			
1	**CHN**	**24.5%**	**CHN**	**21.0%**
2	USA	11.0%	USA	10.1%
	DEU			
1	**CHN**	**10.2%**	**CHN**	**12.0%**
3	USA	6.3%	USA	6.1%
	VNM			
1	**CHN**	**27.5%**	**CHN**	**33.2%**
6	USA	4.4%	THA	3.8%
	EU			
1	**CHN**	**18.2**	**CHN**	**20.9**
2	USA	11.5	USA	11.9

Mexico:
Imports of Capital Goods and Investment

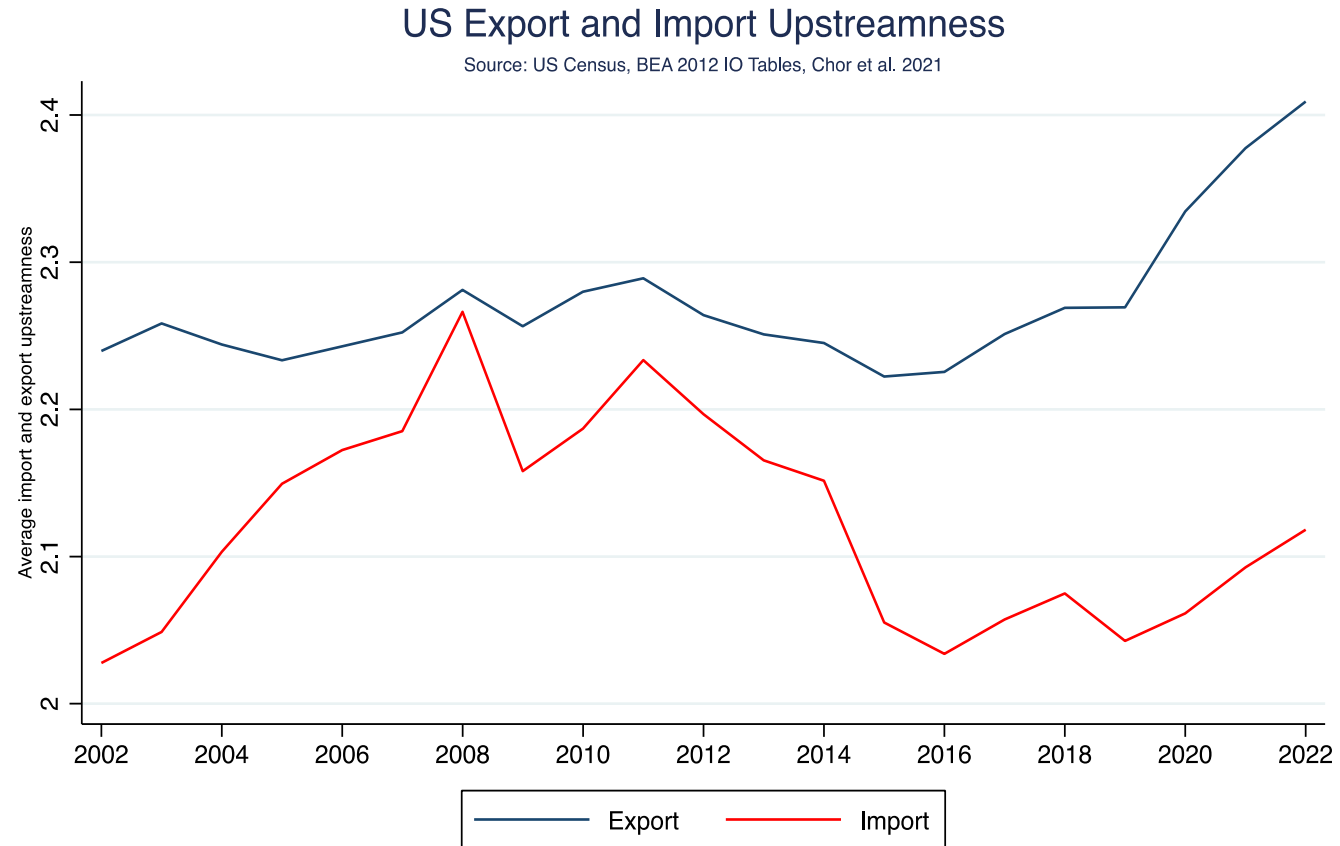Source: Bank of Mexico (Luis de la Calle)
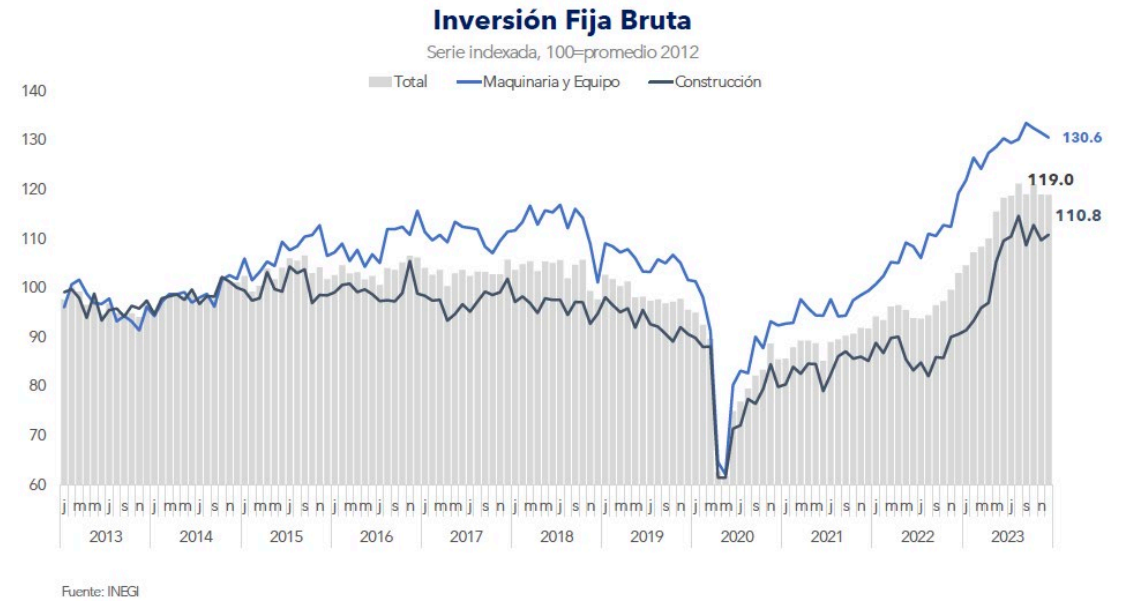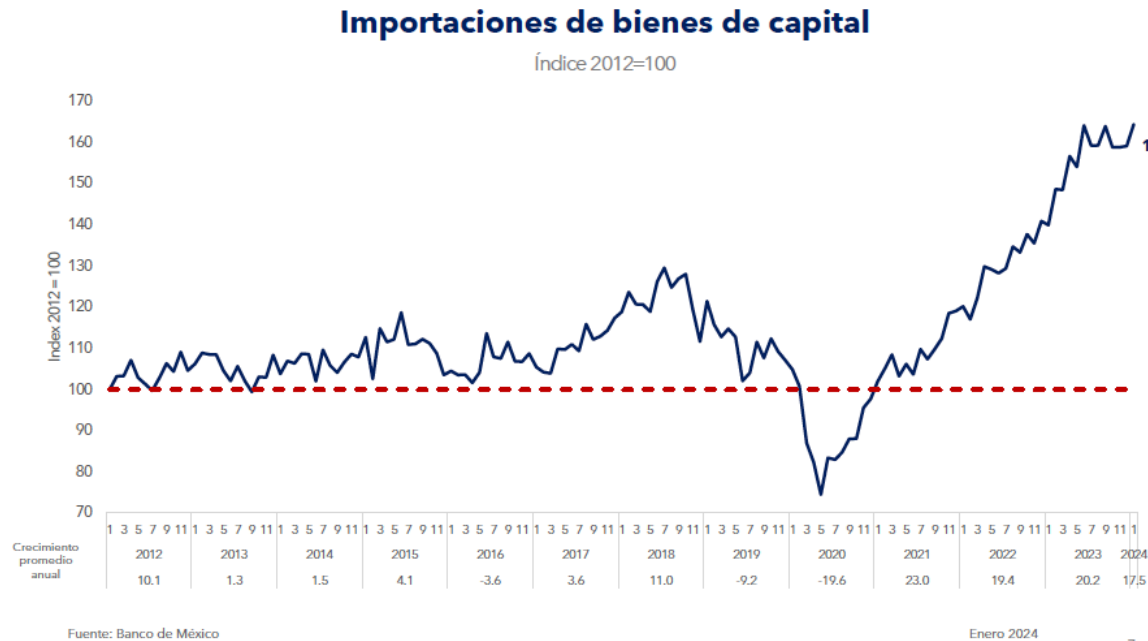
Preliminary Evidence: Reshoring & Upstreamness
Alfaro and Chor (2023)

- **Rise in US import upstreamness**
  - ✓ Suggests more finishing stages being performed within the US

US Export and Import Upstreamness
Source: US Census, BEA 2012 IO Tables, Chor et al. 2021

Legend: Export, Import

Preliminary Evidence: Reshoring, Cont.
US Employment in Key Manufacturing Sectors (Levels and Shares), 2005-2022
Alfaro and Chor (2023)
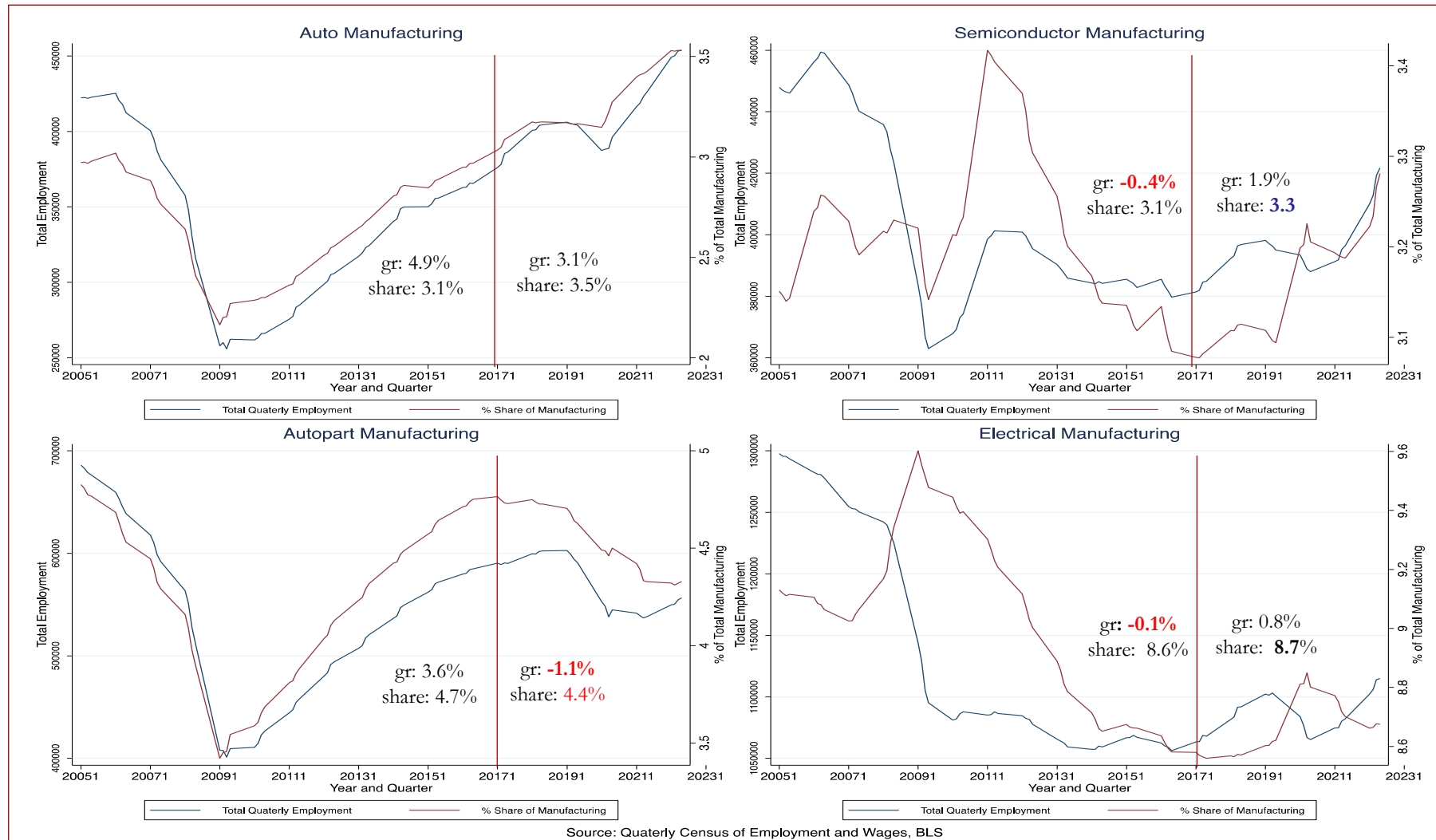
Source: Quaterly Census of Employment and Wages, BLS

- **Rise in US import upstreamness** suggests more finishing stages being performed within the US (Slide 2, right figure).

- Data up to 2022 (BLS): In some manufacturing subsectors, **long-run decline in employment (and establishments) bottomed out.**

BUT… not a uniform story: in some (e.g., autos), prior to 2017; in others (e.g., semiconductors), post-2017.

Global Supply Chains
Implications and Conclusions

✓ **Reallocation: Direct US sourcing from China has decreased; "Friends" have gained**

- Gaining market share: low-wage locations in Asia (e.g., Vietnam) + nearshoring (e.g., Mexico)
- US imports have become more upstream (reshoring of production stages)

o But … **caution** (beyond preliminary data):

a. True **extent** of decoupling **remains to be seen**: different modes of globalization
   - Trade: China gaining market share with "friends" (Mexico, Vietnam, EU…) + FDI: China increasing presence in "friends" → Not total independence from China

b. Reallocation is **costly**: tariffs on China have been passed on to consumers (Amiti et al., 2019; Cavallo et al., 2021)
   - **+ Rising unit import prices from alternative source countries**, including Vietnam and Mexico (Alfaro and Chor, 2023)
   - **+** Bank financing is critical for mitigating large search costs related to trade disruptions and for supply chain resilience (Alfaro, Brussevich, Minoiu, Presbitero, 2024)

- **Crucial debate:** weigh static losses against dynamic gains (Mill-Bastable test)
  - Policies eliminated "exhibitions of indecision" (Kennan, 47): political backing + sentiment (Alfaro, Chen, Chor, 2023)
    - Important to develop frameworks to subject policies to evaluation