

Bank Financing of Global Supply Chains

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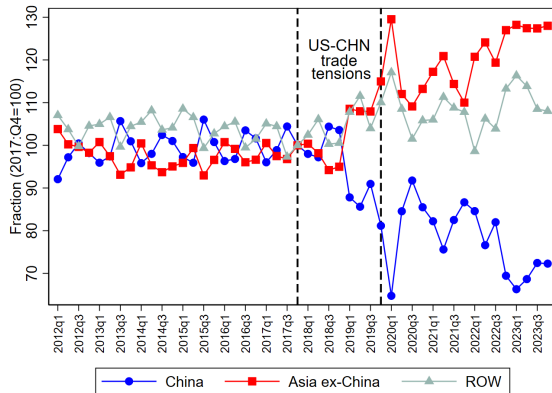
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Motivation

The “great reallocation” of global supply chains

- Rising U.S.-China trade tensions, geopolitical risks, and the pandemic triggered **large shifts in trade flows**
- U.S. firms have started to relocate production and **change the geography of their foreign goods sourcing**
- Supply chain disruptions $\Rightarrow$ sizable macroeconomic costs

U.S. (maritime) import shares



Source: U.S. Census Bureau. Period of analysis: 2016–2017 vs 2018–2019.

U.S.-China trade tensions in 2018–2019 and beyond

2018–2019

- U.S. imposed tariffs on more than 13,000 HS-10 product codes and 100 countries
- China at the forefront of the trade tensions
 - U.S. imports from China valued at \$362 billion in 2017 subject to tariff rates between 10% and 25%
- Average tariff rate on Chinese imports increased 6-fold between 2017 and 2019

2020–2025

- Tariff hikes on Chinese semiconductors and EVs
- Average tariff rate $\approx$ 17% in mid-November 2025

Supply chains relationships are sticky and reallocation is costly

- Finding new suppliers imposes nontrivial **search costs** on importers

⇒ search costs generate **durable and sticky relationships**

⇒ U.S. importers are **undiversified**

- Tariffs ⇒ large input cost shock to U.S. importers

⇒ How did firms respond?

⇒ Role of **financial & information** frictions ⇒ median U.S. importer is mid-sized private firm reliant on bank loans

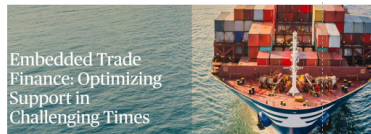
U.S. importer diversification

		# source countries (within-product)*	
		Median	Max
Median	2016	1.00	1.00
	2022	1.00	1.00
75th pct	2016	1.00	2.00
	2022	1.00	1.00
95th pct	2016	3.00	4.00
	2022	3.00	3.00

*At HS6 product level. Source: S&P Panjiva Supply Chain Intelligence.

Specialized banks can mitigate search frictions and support reallocation

- **Specialized banks** can help firms mitigate search frictions due to **informational advantages** in:
 1. supplying certain services (e.g., trade finance) and
 2. covering certain foreign markets (e.g., Asia)
- **Specialized banks** can support importers through **two channels**:
 1. *credit* $\Rightarrow$ better loan terms
 2. *information* $\Rightarrow$ bank-supplier networks



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Research question

Research questions and findings

How does bank specialization help mitigate the real effects of a trade policy shock?

- How do specialized banks help firms overcome financial and information frictions in the search for new foreign trade partners and reconfiguration of supply chains?

Findings

1. Tariff-hit importers engage in **significant supply chain realignment** of goods sourcing
2. Tariff-hit importers $\uparrow$ **credit demand** to meet tariff and search costs
3. **Specialized banks** mitigate both **financial and information frictions**
4. **Value of specialized banks**: $\downarrow$ the time it takes to match to a new foreign supplier by nearly 6 months on average

Data and empirics

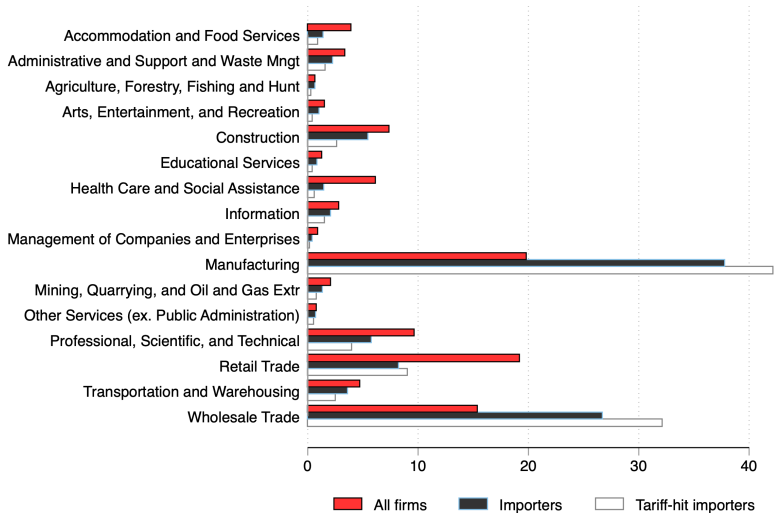
Data sources

- **Firm-supplier international shipment data** from S&P Panjiva Supply Chain Intelligence on U.S. firms' import volumes and suppliers (at HS6 product level)
- **Bank-firm loan-level data** from the Federal Reserve Y-14Q with quarterly information on C&I loans ($> \$1$ mn) from the largest U.S. banks (assets $> \$100$ bn)
- **Matching** between importers and bank borrowers via exact matching on company names (Capital IQ used for additional matching)
- **Tariff data** from Fajgelbaum et al. (2020, 2024) (at HS6 product level)

Key advantage $\Rightarrow$ analyzing supply chain realignment at the firm level and bank credit dynamics at the bank-firm level (supply vs demand)

Industry classification of importers

► Importer characteristics



Main outcomes: Trade and Bank lending

Supply chain participation (firm-product-year)

- 0/1 for losing or gaining suppliers from China & Asia (ex-China)
- # of **suppliers lost** in China; # of **suppliers gained** in Asia
- **Import shares** (based on TEU volume) from China and Asia

Lending outcomes (bank-firm-quarter)

- **Credit channel**: Credit line utilization, loan terms (interest rates, maturity), probability of default
- **Information channel**: Bank's **advisory fees**

Main variables: **Tariff-hit importers** and **specialized banks**

Tariff-hit importers

- A firm-product pair is treated (“tariff-hit”) if the firm was **importing at least one product from China in 2016–2017**, and the product was **subject to tariffs during 2018–2019**
 - A firm is “tariff-hit” if at least one of its products is subject to tariffs

Specialized banks in Asian countries (pre-tariffs)

- Banks with **cross-border trade finance exposure to Asia** (ex-China) in 2016–2017
 - Account for one-third of total loans
- *Placebo*: Banks with trade finance exposure to Europe (not Asia)

Main Empirical Approach

Supply chain realignment

$$\text{Trade Outcome}_{ipt} = \exp[\beta_1 \text{Tariff-hit}_{ip} \times \text{Post}_t + \beta_2 X_i \times \text{Post}_t + \sigma_{ip} + \theta_{pt} + \phi_{kt} + \mu_{st}] + \epsilon_{ipt}$$

Bank lending

$$\text{Bank Credit Outcome}_{ibt} = \delta_1 \text{Tariff-hit}_i \times \text{Post}_t + \delta_2 X_i \times \text{Post}_t + \alpha_i + \varphi_{kst} + \kappa_{bt} + \tau_{ib} + \epsilon_{ibt}$$

where:

- Tariffs-hit indicates firm-product pairs (trade) or firms (banks) subject to tariffs
- Post = 1 in 2018–2019 and 0 in 2016–2017
- X_i : size, leverage, liquidity, profitability at end-2017, dummy for firms subject to retaliatory export tariffs

Results

The results in 6 tables

1. Supply chain realignment
2. Supplier search costs
3. Increase in bank credit demand
4. The *credit* channel of specialized banks
5. The *information* channel of specialized banks
6. Supply chain realignment and specialized banks

1. Supply chain realignment

	0/1 Exit	# Chinese suppliers lost	Import share China	0/1 Entry	# Asian suppliers gained	Import share Asia
	Shift away from China			Shift toward Asia		
Tariffs-hit $\times$ Post	0.5988*** (0.1172)	0.5832*** (0.1565)	-1.9357*** (0.2552)	0.6433*** (0.0313)	0.5619*** (0.0366)	0.3890*** (0.0208)
Semi-elasticity (%)	82.0	79.2	-85.6	90.3	75.4	47.6
Observations	151,437	151,437	159,073	122,543	122,543	126,803
Firm controls $\times$ Post	Y	Y	Y	Y	Y	Y
State $\times$ Year FE	Y	Y	Y	Y	Y	Y
Industry $\times$ Year FE	Y	Y	Y	Y	Y	Y
Product $\times$ Year FE	Y	Y	Y	Y	Y	Y
Product $\times$ Firm FE	Y	Y	Y	Y	Y	Y

2. Supplier search costs

	Odds of finding a new Asian supplier	
0/1 Firm with low-stickiness relationships	1.1571*** (0.0191)	
0/1 Firm with prior suppliers in Asia		2.9511*** (0.1310)
Observations	729,697	778,132
Firm controls	Y	Y
Firm credit demand	Y	Y
State FE	Y	Y
Industry FE	Y	Y

3A. Increase in bank credit demand

Dependent variable:	Credit line utilization	Loan rate		Probability of default
		All loans	New loans	
Tariffs-hit×Post	0.0071*** (0.0021)	0.0360*** (0.0076)	0.2582** (0.1138)	0.0038*** (0.0008)
Observations	775,974	890,517	19,613	805,620
R^2	0.7586	0.8079	0.9007	0.6766
Firm controls×Post	Y	Y	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

3B. Increase in bank credit demand: Decomposing trade costs

Dependent variable:	Credit line utilization			
Tariffs-hit $\times$ Post	0.0071*** (0.0021)	0.0050** (0.0023)	0.0101*** (0.0021)	0.0067*** (0.0021)
Δ Effective tariff rate		0.1344** (0.0549)		
Δ Unit cost				0.0059*** (0.0018)
Observations	775,974	775,974	783,891	711,966
R^2	0.7586	0.7586	0.7401	0.7437
Firm FE, Firm controls $\times$ Post	Y	Y	Y	Y
State $\times$ Industry $\times$ Quarter FE	Y	Y	-	-
State $\times$ Quarter FE	-	-	Y	Y
Bank $\times$ Quarter FE, Bank $\times$ Firm FE	Y	Y	Y	Y

4. The **credit channel** of specialized banks

Dependent variable:	Credit line utilization	Loan rate		Probability of default
		All loans	New loans	
(A) Baseline: Asia specialization				
Tariffs-hit×Post×Specialized bank [1]	0.0065** (0.0028)	0.0180 (0.0207)	-0.1852 (0.1878)	0.0022 (0.0021)
Tariffs-hit×Post×Other Bank [2]	0.0074** (0.0037)	0.0458*** (0.0166)	0.3447** (0.1368)	0.0048** (0.0020)
Observations	775,974	890,517	19,613	805,620
R ²	0.7586	0.8079	0.9008	0.6766
pvalue ttest H _a : 1 > 2	0.403	-	-	-
Firm controls×Post	Y	Y	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

5A. The information channel of specialized banks: Banks' local networks

	Odds of finding a new supplier in Asia			
			in a country where the specialized bank has local information via...	
0/1 Firm with Specialized Bank	1.0848*** (0.0294)	1.0455* (0.028)		
...local presence (offices)			1.1585*** (0.059)	1.1531*** (0.0623)
Observations	731,698	731,698	322,015	322,015
Firm controls	Y	Y	Y	Y
Asian country FE	-	-	Y	Y
Firm credit demand	Y	Y	Y	Y
Industry FE	-	Y	-	Y
State FE	-	Y	-	Y

Notes: Amiti-Weinstein (2018) firm credit demand estimate obtained on full Y-14 dataset for firms/quarters with an outstanding loan facility.

5B. The information channel of specialized banks: Banks' advisory fees

	Advisory fee income (% assets)	
Post × Asian subsidiary	0.0137*** (0.0043)	
Post × Asian subsidiary × Specialized Parent Bank [1]		0.0246*** (0.0009)
Post × Asian subsidiary × Other Parent Bank [2]		0.0127** (0.0046)
Observations	6,364	6,364
R-squared	0.4642	0.4642
pvalue ttest $H_a: [1] > [2]$		0.015
Foreign subsidiary size	Y	Y
Parent bank x Quarter FE	Y	Y

6. Supply chain realignment toward Asia and specialized banks

	0/1 Entry	# Suppliers gained	Import share	0/1 Entry	# Suppliers gained	Import share
	Specialized in Asia			Placebo: Specialized in Europe		
Tariffs-hit $\times$ Post						
... $\times$ 0/1 Firm with Specialized Bank [1]	0.6895*** (0.1631)	0.6205*** (0.1789)	0.4191*** (0.0952)	0.5732*** (0.1526)	0.4612*** (0.1526)	0.3733*** (0.0924)
... $\times$ 0/1 Firm with Other Bank [2]	0.6104*** (0.1511)	0.5187*** (0.1627)	0.3817*** (0.0927)	0.6746*** (0.1560)	0.6091*** (0.1785)	0.4046*** (0.0946)
Diff. specialized - other	15.2	18.0	5.6			
Observations	101,290	101,290	105,881	101,290	101,290	105,881
pvalue t-test $H_a: 1 > 2 $	0.026	0.077	0.147			
p-value t-test $H_a: 1 \neq 2 $				0.00774	0.0227	0.345
Firm controls $\times$ Post	Y	Y	Y	Y	Y	Y
State $\times$ Industry $\times$ Quarter FE	Y	Y	Y	Y	Y	Y
Bank $\times$ Quarter FE	Y	Y	Y	Y	Y	Y
Bank $\times$ Firm FE	Y	Y	Y	Y	Y	Y

Value of relationship with specialized banks

- **Average time to match to a new supplier in Asia:** 11.7 quarters
- **Value of a specialized bank:**
 - Importers with specialized banks match up to 3 months faster (hazard rates are higher by 4.6%-8.5%)
 - Importers with specialized banks that also have **local offices in particular Asian countries** find new suppliers up to nearly 6 months faster than those with specialized banks with no offices in those countries.

Conclusions

Summary

- **Trade policy shock:** U.S. importers face salient tariff and search costs; supply chain realignment to foreign markets takes time and is fraught with informational problems.
- **Specialized banks:** Tariff-hit importers with specialized banks received bank credit at relatively advantageous terms and were more likely to find new suppliers in Asia.

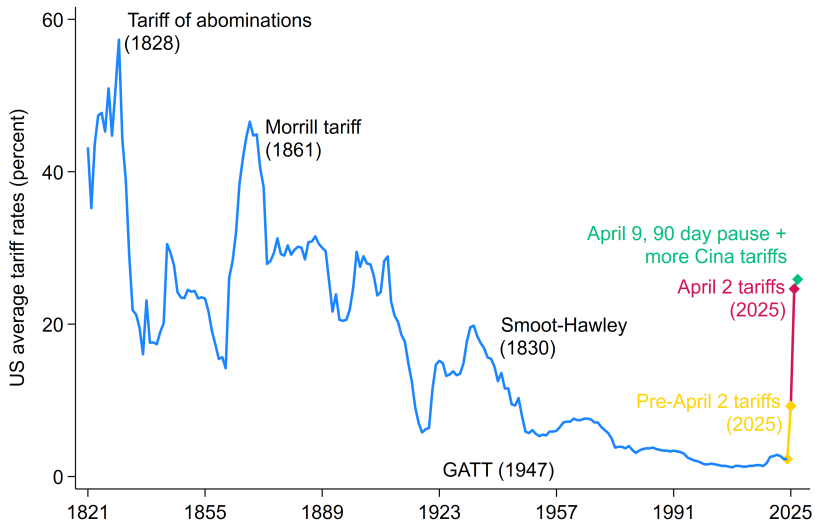
Key takeaways

- Specialized banks reduce financial and information frictions, thus mitigating the real effects of trade policy shocks
- Emphasize the importance of bank relationships during the “great reallocation” of global value chains post-2018 and speak to recent events



Background slides

What is to come?



Who are the importers? [▶ Back](#)

In the Y14-Panjiva matched dataset, 29% of bank borrowers are importers, of which 28% import at least one product from China during 2016–2017.

	All Firms	Importers	Non-Importers
Total assets (log)	17.13	17.49	16.96
Cash ratio	13%	11%	14%
Leverage (debt/assets)	33%	28%	35%
ROA	16%	15%	16%
0/1 Firm with retaliatory tariffs	1%	2%	0%
0/1 Firm is multinational	2%	8%	0%
0/1 Firm is exporter	12%	33%	3%
0/1 Firm is public	3%	5%	2%

$$\begin{aligned}
 V(p_{j,t}) = & \max_k \pi(p_{j,t}) + \beta \mathbb{E}[V(p_{j,t+1})] \\
 & + \mathbb{E}_\epsilon \left[\underbrace{\epsilon_{k,t} + \beta \int_{p_k^{\min}}^{p_k^{\max}} [V(p_{k,t+1}) - V(p_{j,t+1}) - C_{k,t}] dG(p_k)}_{\text{expected value of switching suppliers}} \right], \quad (1)
 \end{aligned}$$

where

$$\mathbb{E}(C_j) = \delta r_j F_j + (1 - \delta) r_k F_j, \quad (2)$$

- p_j : intermediate input price inclusive of tariff $p_j = \hat{p}_j \tau_j$, $\tau_j \geq 1$
- $\pi(p_j)$: instantaneous profits, $\pi'(p_j) < 0$
- $V(p_k)$: value of a new match
- C_k : total cost of switching suppliers
- F_j : switching cost net of financing costs
- δ : probability of matching to a specialized bank
- r_j (r_k): cost of capital from a specialized (other) lender, $r_j < r_k$

Probability of switching to a new supplier:

$$\lambda_{jk,t} = \frac{\exp[\mathbb{E}(V(p_{k,t+1}) - V(p_{j,t+1}) - C_{k,t})]}{\sum_{k'} \exp[\mathbb{E}(V(p_{k',t+1}) - V(p_{j',t+1}) - C_{k',t})]} \quad (3)$$

- increases in tariff imposed on the existing supplier;
- is higher if matched to a specialized bank.

Maturity and Default Probability (credit lines and term loans)

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Dependent variable:	Maturity (log)				Probability of default	
	All loans	New loans	All loans	New loans	All loans	
Tariffs-hit×Post	0.0136** (0.0056)	0.1156* (0.0696)			0.0032*** (0.0006)	
... × Specialized Bank			0.0183** (0.0080)	0.3106*** (0.1014)		0.0013 (0.0018)
... × Other Bank			0.0110 (0.0104)	0.0584 (0.0809)		0.0044*** (0.0015)
Observations	1,268,355	34,361	1,268,355	34,361	1,169,456	1,169,456
R-squared	0.6776	0.7090	0.6776	0.7091	0.6600	0.6600
Firm controls×Post	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
State×Industry×Quarter FE	Y	Y	Y	Y	Y	Y
Bank×Quarter FE	Y	Y	Y	Y	Y	Y
Bank×Firm FE	Y	Y	Y	Y	Y	Y

Loan Performance

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Dependent variable:	0/1 Loan is non-accruing	0/1 Loan is non-performing	0/1 Loan is charged-off
Tariffs-hit×Post×Specialized Bank	-0.0003 (0.0016)	-0.0011 (0.0009)	-0.0004 (0.0005)
Tariffs-hit×Post×Other Bank	0.0014 (0.0015)	0.0004 (0.0011)	-0.0000 (0.0003)
Observations	1,283,554	1,283,554	1,283,554
R-squared	0.6531	0.3865	0.5380
Firm controls×Post	Y	Y	Y
Firm FE	Y	Y	Y
State×Industry×Quarter FE	Y	Y	Y
Bank×Quarter FE	Y	Y	Y
Bank×Firm FE	Y	Y	Y

No Bank Balance Sheet Shock

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Dependent variables:	Loan loss provisioning	Non-performing loan ratio	Net charge-offs
Specialized bank x Post	-0.0004 (0.0005)	-0.0022* (0.0012)	-0.0005 (0.0003)
Observations	518	518	518
R-squared	0.9108	0.9452	0.9626
Bank controls	Y	Y	Y
Quarter FE	Y	Y	Y
Bank FE	Y	Y	Y

Diagnostic tests: Tariffs-hit importers vs. other firms

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	(1)	(2)	(3)
	Tariffs-hit importers	Other firms	Normalized difference (2)-(1)
Firm characteristics:			
Total assets (log)	17.028	17.072	0.082
Liquidity (cash/assets)	0.105	0.135	0.058
Leverage (debt/assets)	0.281	0.342	0.072
Return on assets	0.152	0.158	0.020
0/1 Firm with retaliatory tariffs	0.030	0.002	-0.186
0/1 Firm is public	0.030	0.024	0.014
No. firms	N=5,658	N=72,765	
Lending outcomes:			
Credit line utilization	0.354	0.353	-0.025
Interest rate (all loans)	0.036	0.035	-0.060
Interest rate (new loans)	0.038	0.037	-0.040
No. loans	N=29,632	N=362,939	

Diagnostic tests: Tariffs-hit importers with specialized banks vs. other banks [▶ Back](#)

	(1) Tariffs-hit importers with specialized banks	(2) other banks	(3) Normalized difference (2)-(1)
Firm characteristics:			
Total assets (log)	17.354	16.937	-0.202
Cash ratio (cash/assets)	0.107	0.105	-0.003
Leverage (debt/assets)	0.299	0.275	-0.079
Return on assets	0.152	0.151	0.004
0/1 Firm with retaliatory tariffs	0.031	0.030	-0.005
0/1 Firm is public	0.071	0.019	-0.245
No. firms	N=1,230	N=4,428	
Lending outcomes:			
Credit line utilization	0.323	0.370	0.118
Interest rate (all loans)	0.035	0.037	0.109
Interest rate (new loans)	0.036	0.039	0.156
No. loans	N=10,556	N=19,076	

Diagnostic tests: Specialized vs. other banks

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	(1)	(2)	(3)
	Specialized banks	Other banks	t-test (1)=(2) (p-value)
Total assets (log)	20.245	19.163	0.045
Capital ratio (CET1)	0.125	0.147	0.288
Core deposits (% liabilities)	0.705	0.579	0.278
Leverage (equity/assets)	0.110	0.119	0.502
Efficiency (overhead/assets)	0.027	0.031	0.471
Loan loss reserves (% gross loans)	0.013	0.011	0.720
Nonperforming loans (% gross loans)	0.014	0.012	0.654
Net chargeoffs (% gross loans)	0.005	0.007	0.764
Return on assets	0.018	0.022	0.570
Return on equity	0.167	0.200	0.607

No Substitution with Trade Credit

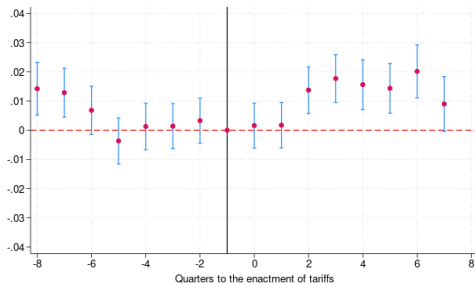
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Dependent variable:		Accounts Payable (% assets)		
Tariff-hit	-0.0004 (0.0015)	0.0001 (0.0014)		
Tariff-hit $\times$ Post	0.0004 (0.0014)	0.0003 (0.0014)	-0.0008 (0.0012)	-0.0007 (0.0012)
Observations	29,371	29,018	28,190	27,863
R-squared	0.0579	0.0915	0.8245	0.8221
Firm controls	-	Y	-	Y
Firm controls $\times$ Post	-	-	-	Y
Firm FE	-	-	Y	Y
State $\times$ Year FE	Y	Y	Y	Y
Industry $\times$ Year FE	Y	Y	Y	Y

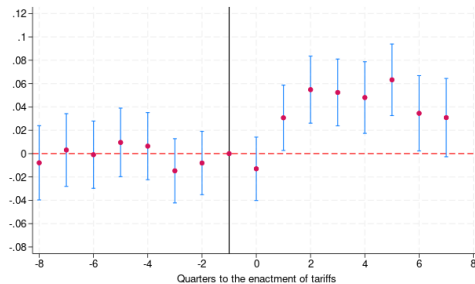
Control for Relationship Banking

Dependent variable:	Credit line utilization	Loan interest rate	Credit line utilization	Loan interest rate	Credit line utilization	Loan interest rate
Tariffs-hit x Post	0.0065*** (0.0021)	0.0346*** (0.0076)	0.0077*** (0.0023)	0.0394*** (0.0080)		
Tariffs-hit x Post x Specialized Bank [1]					0.0067* (0.0033)	0.0199 (0.0215)
Tariffs-hit x Post x Other Bank [2]					0.0085** (0.0039)	0.0532*** (0.0175)
Relationship intensity x Post	-0.0035 (0.0066)	0.1950*** (0.0283)	-0.0026 (0.0067)	0.1992*** (0.0287)	-0.0026 (0.0131)	0.2004** (0.0867)
Tariffs-hit x Relationship intensity x Post			-0.0235 (0.0317)	-0.1005 (0.1125)	-0.0263 (0.0475)	-0.1487 (0.1477)
Observations	730,612	840,197	731,850	840,197	731,850	840,197
R-squared	0.7512	0.8048	0.7513	0.8048	0.7513	0.8048
pvalue t-test (1) > (2)					0.2965	-
Firm controls x Post	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
State x Industry x Quarter FE	Y	Y	Y	Y	Y	Y
Bank x Quarter FE	Y	Y	Y	Y	Y	Y
Bank x Firm FE	Y	Y	Y	Y	Y	Y

Import tariffs and bank lending: **Dynamic diff-in-diff coeff plots** [▶ Back](#)



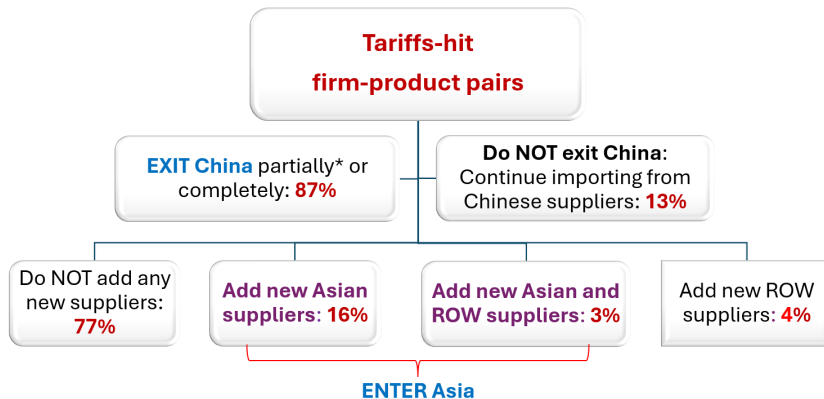
(a) Credit line utilization rate



(b) Loan interest rates

Notes: Each chart plots the estimated DiD coefficients and the associated 90% CI of the dynamic variant of the bank lending specifications with interaction terms between "Tariffs-hit" dummy and quarterly dummies (with base period 2017:Q4. Sample: Credit lines in (a) and all loans in (b).

Extent of reallocation during 2018–2022



Figures are for the period 2018–2022. * denotes firms that drop some or all existing Chinese suppliers and/or add new Chinese suppliers. Chart omits firms that acquire new Chinese suppliers during 2018–2019 and did not have any such suppliers previously.