Pricing the Global Trade Vulnerability

Jiatao Liu

Xi'an Jiaotong-Liverpool University

ABFER 13th Annual Conference

May 19, 2026

Joint work with Jun Pan (Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University)

Motivation: The Emergence of Trade as a New Front Line of Risk

- Over the past two decades, global trade has shifted from a source of efficiency gains to a source of heightened uncertainty and disruption.
- A key trade vulnerability is concentrated sourcing: importers (countries/firms) that rely heavily on a small number of countries (suppliers) are more exposed to trade shocks.
- This vulnerability became especially salient after a sequence of shocks:
  - Trump 1.0: U.S.–China tariff escalation.
  - Covid-19: underscored the fragility of the global trade.
  - Trump 2.0: a broad-based blow to all international trade.

This Paper: Pricing the Global Trade Vulnerability

- As trade uncertainty becomes a central force shaping corporate decisions and driving asset allocation, we look into financial markets to uncover the emerging risk factors on global trade, and importantly, to estimate the market price of trade uncertainty.
- Central to our paper is the concept of trade vulnerability:
  - Measured from the ground up using firm-level import data from S&P Panjiva.
  - Firms with more concentrated trade exposure to a small number of countries are more vulnerable to disruptions in global trade.
- Our main hypothesis:
  - Trade vulnerability elevates from a firm-level concern to a system-wide risk.
  - Firms with higher exposure to trade risk are expected to earn a higher risk premium, giving rise to a priced risk factor on global trade.

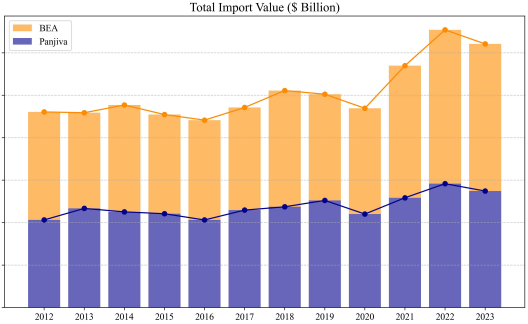
Related Literature

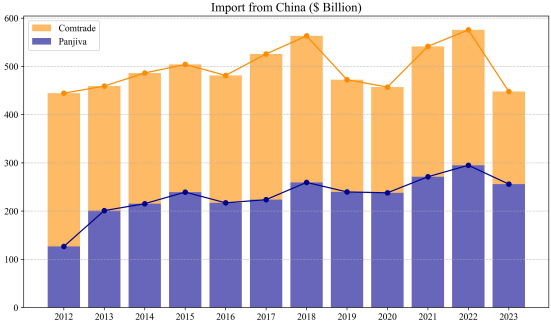
- Asset Pricing under Trade/Geopolitical Uncertainty
  - Choke-points: Dyakov & Jiang 2025.
  - Policy uncertainty measures: Baker et al. 2016.
  - Geopolitical risk: Sheng et al. 2025 and Clayton et al. 2025.
- Supply-Chain Disruptions
  - Firm-level sourcing decisions: Grossman et al. 2023 and Ersahin et al. 2024.
  - Economic losses due to concentrated sourcing: Ahn & Tan 2025.
  - On China dependence: Aral et al. 2025 and Alfaro & Chor 2023.
  - Macro implications: Carvalho et al. 2021 and Acemoglu and Tahbaz-Salehi 2025.

Part I: Data

- S&P Panjiva Bill of Lading Data
  - The Panjiva dataset is compiled from U.S. Customs, shipping companies, and digitized paper bills of lading collected by S&P Global.
  - This highly granular dataset includes both private and public U.S. firms, containing detailed shipment-level information (e.g., shipment value, supplier, cargo description, TEU, and date).
- Public Firms Sample
  - We extract Panjiva import shipment records from 2012–2023 and merge U.S. consignees with Compustat public firms using S&P Global Company IDs.
  - The final sample includes 1,840 unique firms, with a cumulative shipment value of $469.9 billion.
  - The average annual import value is approximately $44 million per firm.

Total Import Value: Panjiva vs BEA



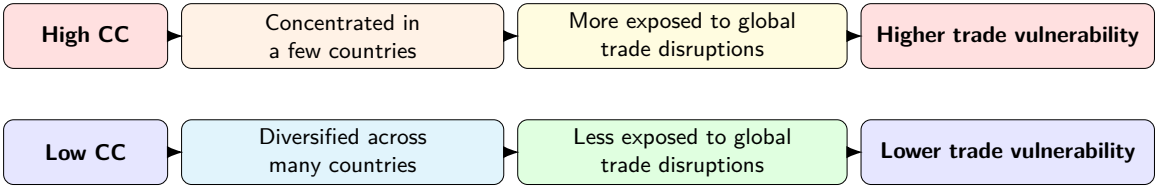


Part II: Country Concentration Measures Trade Vulnerability

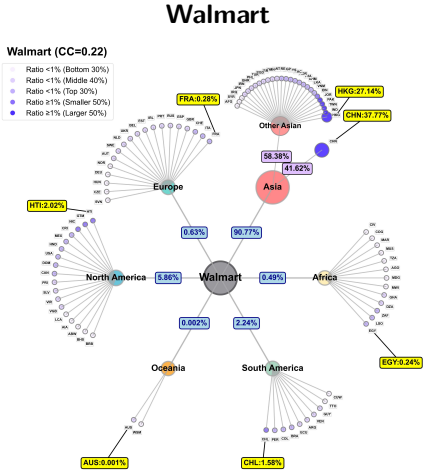
- Central to our analysis is **Country Concentration (CC)**.
- For firm i in year t, CC_{it} is the Herfindahl index of country-level import shares:

$$\text{CC}_{it} = \sum_{c} \left(\frac{\text{Import Value}_{itc}}{\sum_{c} \text{Import Value}_{itc}} \right)^2$$

- $\text{CC}_{it} = 1$ when a firm sources from only one country; the lower bound is approximately the inverse of the number of sourcing countries.

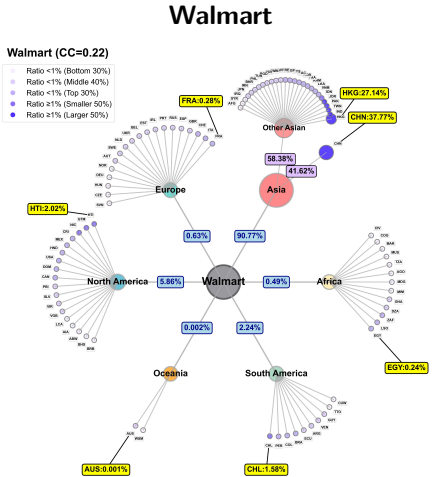


Walmart's Import Network and Top 20 Suppliers



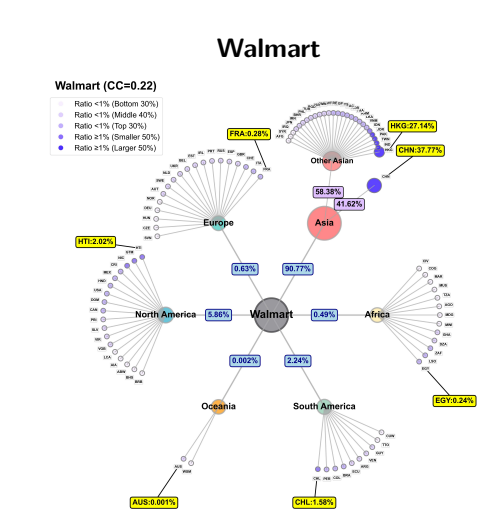
Source: **S&P Panjiva (2012-2023)**

Walmart's Import Network and Top 20 Suppliers



Source: **S&P Panjiva (2012-2023)**

Walmart's Import Network and Top 20 Suppliers



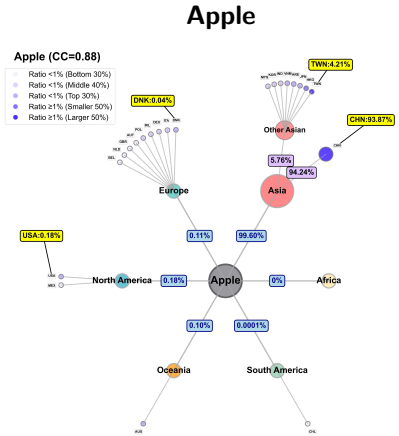
Source: **S&P Panjiva (2012-2023)**

Walmart: Top Suppliers by Ranking

Rank	Supplier	Country	%Cost
1	MCK	US	7.73%
2	PG	US	2.62%
3	PEP	US	2.46%
4	TSN	US	1.93%
5	Nestle	Switzerland	1.53%
6	BRK/A	US	1.64%
7	Kraft Heinz	US	0.99%
8	ULVR	UK	0.95%
9	GIS	US	0.83%
10	CAG	US	0.65%
11	Grupo Bimbo	Mexico	0.63%
12	SJM	US	0.56%
13	KDP	US	0.50%
14	KMB	US	0.49%
15	KO	US	0.48%
16	Smithfield	US	0.44%
17	AB InBev	Belgium	0.40%
18	CL	US	0.42%
19	Arca Continental	Mexico	0.41%
20	CPB	US	0.41%
China Total			**0.00%**

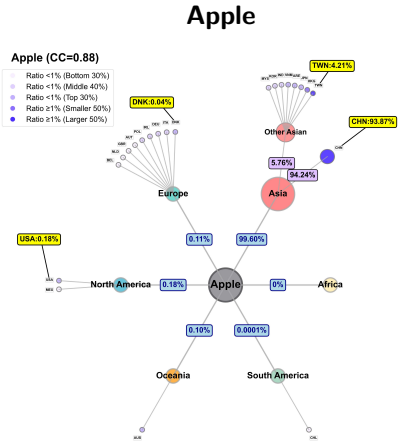
Source: **Bloomberg SPLC (2024–25)**

Apple's Import Network and Top 20 Suppliers



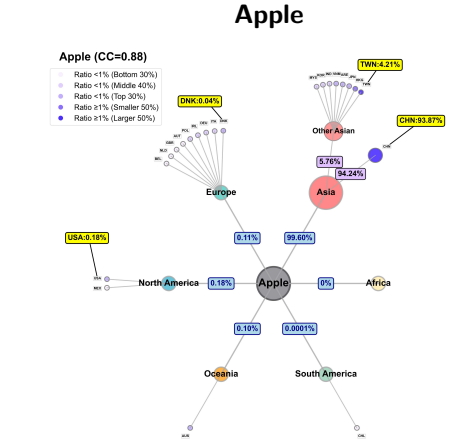
Source: **S&P Panjiva (2012-2023)**

Apple's Import Network and Top 20 Suppliers



Source: **S&P Panjiva (2012-2023)**

Apple's Import Network and Top 20 Suppliers



Source: **S&P Panjiva (2012-2023)**

Apple: Top Suppliers by Ranking

Rank	Supplier	Country	%Cost
1	**Hon Hai**	**China**	**31.75%**
2	**Luxshare**	**China**	**12.19%**
3	TSMC	Taiwan, China	7.70%
4	**Quanta**	**China**	**7.42%**
5	LG Innotek	South Korea	5.72%
6	Samsung	South Korea	6.13%
7	QCOM	US	4.38%
8	LG Display	South Korea	4.00%
9	**Pegatron**	**China**	**3.45%**
10	SK hynix	South Korea	1.88%
11	**Lens**	**China**	**2.41%**
12	ASE	Taiwan, China	2.58%
13	**GoerTek**	**China**	**2.40%**
14	Wistron	Taiwan, China	1.59%
15	**BOE**	**China**	**2.08%**
16	**Zhen Ding**	**China**	**1.86%**
17	AVGO	US	1.72%
18	**Dongshan**	**China**	**1.35%**
19	SWKS	US	1.24%
20	MU	US	0.79%
China Total			**64.91%**

Source: **Bloomberg SPLC (2024–25)**

Concentrated Exposure to China

Trump-Xi Summit in May 2026

Concentrated Exposure to China

Trump-Xi Summit in May 2026

Concentrated Exposure to China

Trump-Xi Summit in May 2026

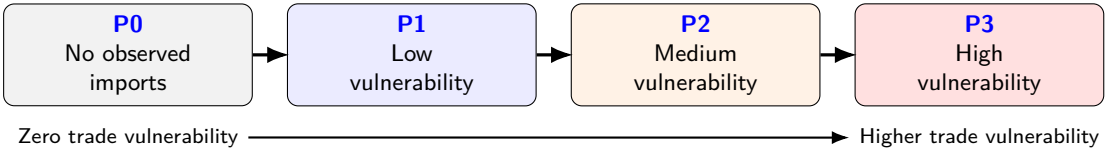
Lens Technology Co Ltd: Top Customers by Ranking

Rank	Customer	Country
1	**AAPL**	**US**
2	Xiaomi	China
3	**TSLA**	**US**
4	Huawei	China
5	Samsung	South Korea
6	VOW	Germany
7	**GOOGL**	**US**
8	BMW	Germany
9	MBG	Germany
10	Lenovo	China
11	BYD	China
12	**AMZN**	**US**
13	Huaqiang	China
14	Contemporary Amperex	China
15	LI	China
16	NIO	China
17	**META**	**US**
18	Sinocera	China

Source: Bloomberg SPLC (2024–25)

Part III: From Trade Vulnerability Portfolios to a Trade Risk Factor

Following the standard procedure in empirical asset pricing, we sort firms by lagged, industry-adjusted country concentration into **three CC portfolios** and one **no-observed-trade portfolio**.



Country-Concentration Trade Factor

$$R_t^{\text{CCTF}} = R_t^{P3} - R_t^{P0}$$

Long high-vulnerability firms; short firms with no observed direct import exposure.
Market price of trade vulnerability: CCTF risk premium, controlling for existing risk factors.

Summary Statistics of the CC-Sorted Portfolios

	Mean			
	P1	P2	P3	P0
Country Concentration (industry demeaned)	-0.31	-0.05	0.28	
Country Concentration	0.31	0.55	0.91	
Supplier Concentration	0.22	0.41	0.78	
HS2 Goods Concentration	0.51	0.64	0.83	
Number of Countries	12.20	7.11	2.99	
Number of Suppliers	49.08	28.25	7.54	
Number of HS2 Goods	11.53	7.70	3.80	
Import Value ($ million)	102	71	28	
Import/Revenue Ratio (%)	1.65	2.00	1.79	
China Value ($ million)	17	19	9	
China Ratio (%)	19.98	26.73	29.97	
Number of Firms	175	195	229	2190
Market Cap ($ million)	23,608	23,142	18,333	6,519
Revenue ($ million)	13,928	9,184	6,711	3,881

Empirical Performance of the CC-Sorted Portfolios

$$R_t^i - r_f = \alpha^{\text{FF5}} + \beta^{\text{MKT}}\left(R_t^{\text{MKT}} - r_f\right) + \beta^{\text{SMB}} R_t^{\text{SMB}} + \beta^{\text{HML}} R_t^{\text{HML}} + \beta^{\text{RMW}} R_t^{\text{RMW}} + \beta^{\text{CMA}} R_t^{\text{CMA}} + \epsilon_t^i$$

	No Trade	CC-Sorted Portfolios			CCTF Factors	
	P0	P1	P2	P3	P3 - P0	P3 - P1
Excess ret (%)	0.84 [2.78]	0.80 [3.05]	1.03 [2.82]	1.71 [4.50]	0.86 [3.74]	0.90 [3.46]
FF5 alpha (%)	-0.03 [-0.46]	-0.11 [-1.08]	-0.00 [-0.01]	0.52 [3.22]	0.54 [2.86]	0.63 [2.84]
MKT beta	0.98 [88.62]	0.90 [32.46]	1.03 [24.74]	1.09 [28.27]	0.11 [2.44]	0.19 [3.66]
SMB beta	0.08 [3.13]	-0.03 [-0.81]	-0.06 [-1.05]	-0.03 [-0.46]	-0.11 [-1.38]	-0.00 [-0.04]
HML beta	0.12 [4.46]	0.09 [1.84]	-0.22 [-3.60]	-0.19 [-2.42]	-0.31 [-3.50]	-0.28 [-2.38]
RMW beta	-0.14 [-3.99]	0.22 [3.28]	-0.04 [-0.57]	0.26 [2.74]	0.40 [3.38]	0.05 [0.34]
CMA beta	-0.09 [-1.88]	0.15 [1.68]	0.01 [0.08]	-0.16 [-1.13]	-0.07 [-0.38]	-0.32 [-1.53]

The Emergence of a Trade Risk Factor

Part IV: Understanding the Drivers of the Trade Risk Factors

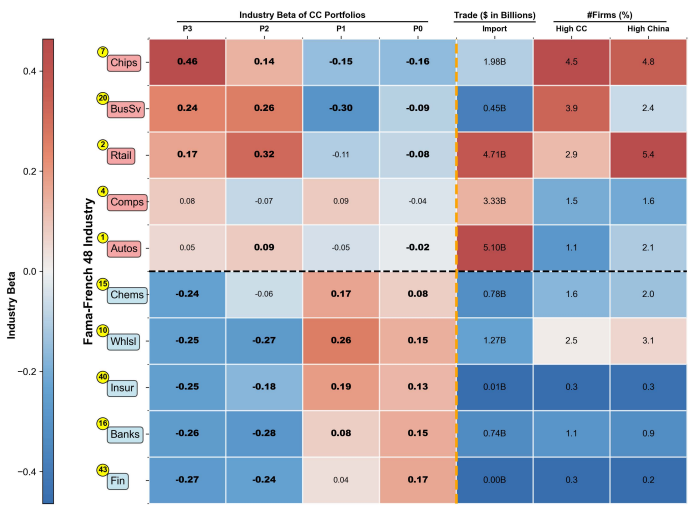
Concentrated exposure on China as the main driver:

- Firms need intermediate goods for production.
- China offers a unique supply chain for US firms, especially US tech firms.
- This complete supply chain is difficult to replicate in the near term.
- A sudden stop in trade — via the US – China trade war or Covid — is an inherent risk factor for firms with **concentrated exposure to China**.
- Importantly, this is a systematic risk, not limited to just one or two firms, giving rise to the emerging new risk premium after the 2018 US–China trade war.

Concentrated China Exposure as a Key Driver

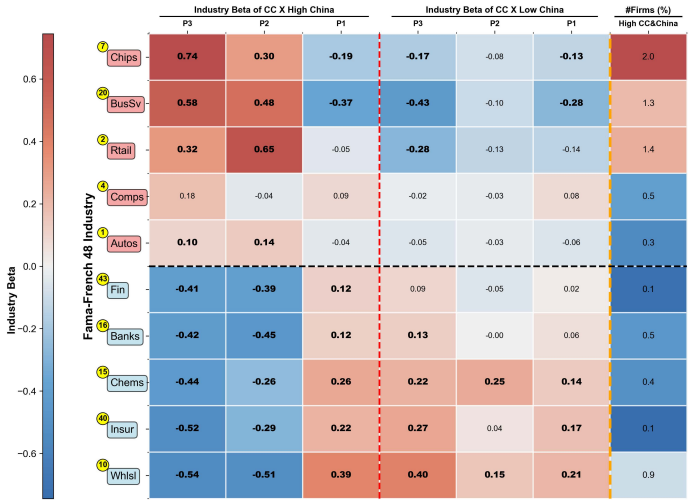
	Country Concentration					
	P1 (low)		P2		P3 (high)	
	High CHN	Low CHN	High CHN	Low CHN	High CHN	Low CHN
Ex Ret (%)	0.84	0.81	1.28	0.74	2.03	0.93
	[2.99]	[3.05]	[2.81]	[2.29]	[4.40]	[3.44]
alpha (%)	-0.14	-0.08	0.06	-0.08	0.68	0.18
	[-0.94]	[-0.76]	[0.31]	[-0.42]	[2.90]	[0.83]
MKT beta	0.99	0.85	1.18	0.86	1.17	0.84
	[25.56]	[29.45]	[18.43]	[25.38]	[18.48]	[16.17]
SMB beta	0.05	-0.06	-0.15	0.05	-0.14	0.27
	[0.76]	[-1.45]	[-1.49]	[0.77]	[-1.23]	[3.61]
HML beta	0.10	0.10	-0.41	0.08	-0.35	0.13
	[1.42]	[1.96]	[-4.44]	[1.11]	[-2.91]	[1.19]
RMW beta	0.19	0.24	-0.09	0.06	0.34	0.09
	[1.94]	[3.52]	[-0.70]	[0.94]	[2.46]	[0.94]
CMA beta	0.12	0.16	0.02	0.02	-0.18	0.04
	[1.29]	[1.70]	[0.10]	[0.13]	[-0.87]	[0.28]

Industry Exposures of the CC-Sorted Portfolios



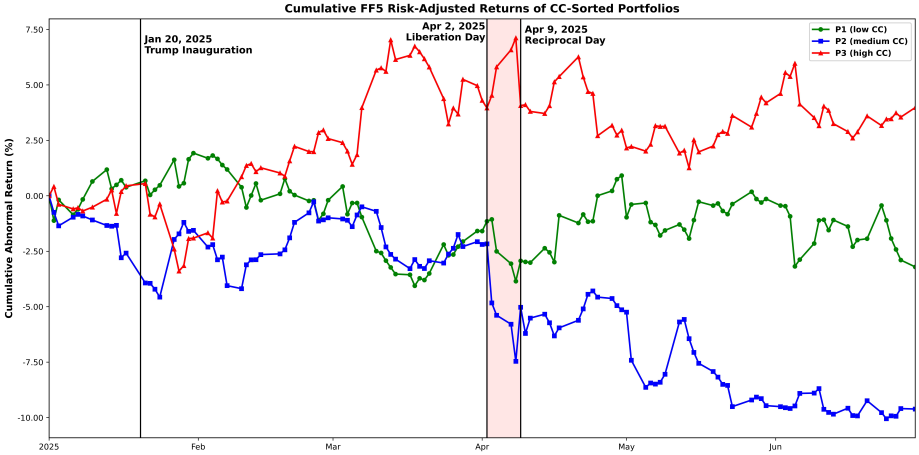
$$R_t^i - r_f = \alpha + \beta_i^{\mathsf{MKT}} \left(R_t^{\mathsf{MKT}} - r_f \right) + \beta_i^{\mathsf{IND}} \left(R_t^{\mathsf{IND}} - r_f \right) + \epsilon_t^i$$

Industry Exposures of CC×China-Sorted Portfolios

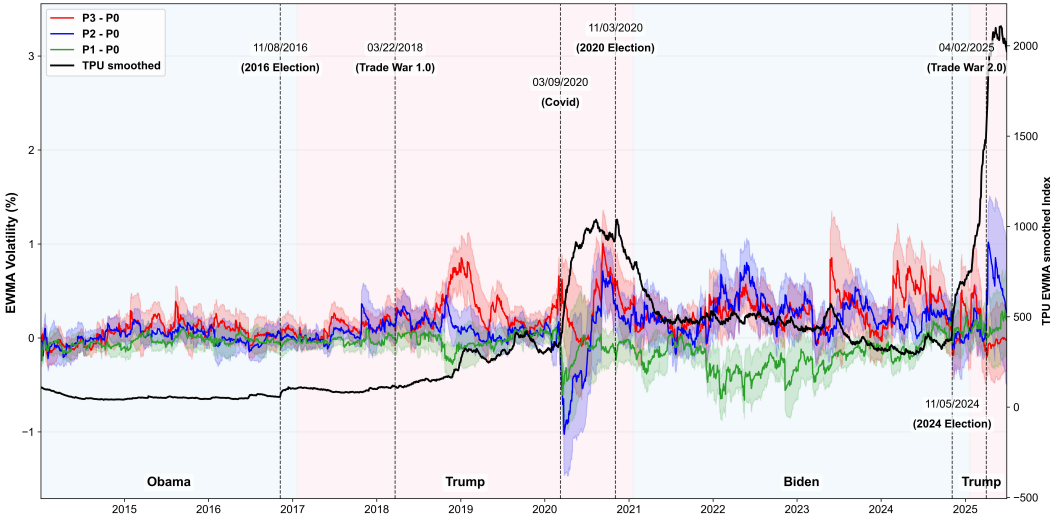


$$R_t^{i,j} - r_f = \alpha + \beta_{i,j}^{\mathsf{MKT}} \left(R_t^{\mathsf{MKT}} - r_f \right) + \beta_{i,j}^{\mathsf{IND}} \left(R_t^{\mathsf{IND}} - r_f \right) + \epsilon_t^i$$

The Evolving Nature of Trade Vulnerability



When is the High-CC Portfolios More Volatile?



Can Tech Performance Explain the CCTF Risk Premium

	With Industry Control						Without Industry Control					
	CC-Sorted Portfolios				Risk Factors		CC-Sorted Portfolios				Risk Factors	
	P0	P1	P2	P3	P3 - P0	P3 - P1	P0	P1	P2	P3	P3 - P0	P3 - P1
alpha	-0.12	-0.01	0.07	0.28	0.44	0.30	-0.08	0.06	-0.05	0.52	0.60	0.46
	[-1.92]	[-0.17]	[0.56]	[3.01]	[3.72]	[2.45]	[-1.11]	[0.77]	[-0.34]	[2.98]	[2.80]	[2.41]
MKT beta	1.04	1	1.02	1.01	-0.05	0.01	1.01	0.87	1.02	1.10	0.09	0.23
	[66.06]	[30.46]	[44.94]	[30.38]	[-1.50]	[0.27]	[75.67]	[37.59]	[30.71]	[31.06]	[2.07]	[4.92]
NASDAQ$^{\perp}$ beta	-0.18	-0.54	-0.11	-0.02	0.10	0.52	-0.27	-0.59	0.57	0.76	1.03	1.35
	[-3.10]	[-7.29]	[-1.18]	[-0.29]	[1.10]	[4.64]	[-3.93]	[-5.78]	[4.16]	[6.68]	[6.74]	[8.08]
alpha	-0.08	0.04	0.1	0.3	0.42	0.27	-0.03	0.1	-0.12	0.42	0.46	0.33
	[-1.25]	[0.60]	[0.75]	[3.34]	[3.52]	[2.25]	[-0.49]	[1.08]	[-0.89]	[2.60]	[2.34]	[1.91]
MKT beta	1.04	1	1.02	1.01	-0.05	0.01	1.01	0.87	1.02	1.10	0.09	0.23
	[76.40]	[28.84]	[46.91]	[31.57]	[-1.46]	[0.26]	[93.12]	[35.68]	[31.76]	[32.91]	[2.30]	[4.92]
QQQ$^{\perp}$ beta	-0.2	-0.39	-0.13	-0.06	0.1	0.33	-0.25	-0.37	0.47	0.61	0.86	0.97
	[-5.70]	[-6.23]	[-1.66]	[-1.19]	[1.85]	[3.85]	[-5.72]	[-4.73]	[4.75]	[6.70]	[7.67]	[7.29]
alpha	-0.05	0	0.13	0.24	0.33	0.24	0.00	0.08	-0.06	0.28	0.28	0.20
	[-0.96]	[0.01]	[0.95]	[2.43]	[2.98]	[2.14]	[-0.01]	[0.75]	[-0.35]	[2.25]	[2.26]	[1.17]
MKT beta	1.04	1	1.02	1.01	-0.05	0.01	1.01	0.87	1.02	1.10	0.09	0.23
	[77.91]	[30.65]	[45.36]	[28.82]	[-1.44]	[0.27]	[94.96]	[37.31]	[25.30]	[38.96]	[2.79]	[5.66]
Chips$^{\perp}$ beta	-0.12	-0.13	-0.09	0.05	0.16	0.19	-0.16	-0.15	0.14	0.46	0.62	0.62
	[-5.17]	[-3.96]	[-2.55]	[2.43]	[5.80]	[4.68]	[-5.66]	[-3.77]	[2.74]	[14.52]	[14.08]	[9.94]

Can CCTF Explain the Tech Performance?

	NASDAQ	QQQ	SP500TECH	Comps	Chips	BusSv	Rtail	Autos
	CAPM: $R_t^i - r_f = \alpha + \beta^{\text{MKT}}\,(R_t^{\text{MKT}} - r_f) + \epsilon_t^i$							
alpha (%)	0.17 [1.06]	0.37 [1.76]	0.51 [2.52]	0.11 [0.56]	0.80 [2.76]	0.32 [1.38]	0.16 [0.64]	-0.02 [-0.04]
MKT beta	1.10 [30.53]	1.07 [20.78]	1.10 [20.59]	1.04 [14.77]	1.22 [16.77]	1.05 [26.94]	1.01 [16.99]	1.80 [8.75]
	Add CCTF: $R_t^i - r_f = \alpha + \beta^{\text{MKT}}\,(R_t^{\text{MKT}} - r_f) + \beta^{\text{CCTF}} R_t^{\text{CCTF}} + \epsilon_t^i$							
alpha (%)	-0.09 [-0.63]	0.01 [0.07]	-0.02 [-0.13]	0.01 [0.08]	-0.04 [-0.29]	0.14 [0.67]	-0.01 [-0.02]	-0.52 [-0.90]
MKT beta	1.07 [37.95]	1.03 [27.08]	1.04 [34.93]	1.02 [15.21]	1.12 [25.96]	1.02 [25.81]	0.99 [16.90]	1.74 [8.51]
CCTF beta	0.33 [6.88]	0.46 [6.91]	0.68 [13.19]	0.12 [1.18]	1.08 [12.79]	0.23 [3.17]	0.21 [2.38]	0.64 [1.76]
	Add Industry-Controlled CCTF: $R_t^i - r_f = \alpha + \beta^{\text{MKT}}\,(R_t^{\text{MKT}} - r_f) + \beta^{\text{CCTF}} R_t^{\text{CCTF}} + \epsilon_t^i$							
alpha (%)	0.12 [0.68]	0.27 [1.22]	0.25 [1.11]	0.14 [0.79]	0.31 [1.08]	0.33 [1.51]	0.13 [0.46]	-0.47 [-0.81]
MKT beta	1.1 [29.40]	1.08 [19.90]	1.12 [19.51]	1.03 [14.39]	1.27 [16.24]	1.04 [27.04]	1.01 [17.09]	1.84 [8.16]
CCTF beta	0.12 [1.07]	0.21 [1.81]	0.58 [5.41]	-0.07 [-0.37]	1.06 [5.67]	-0.04 [-0.35]	0.05 [0.39]	0.98 [1.23]

Robustness

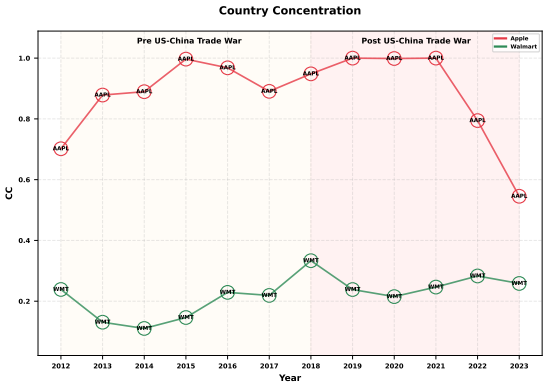
- Alternative vulnerability measures: supplier concentration, goods concentration, number of countries, suppliers, goods, import volume, and China ratio.
- Country concentration remains the most robust predictor of the trade-vulnerability premium.
- Industry-controlled CC portfolios further balance industry exposure across vulnerability portfolios.
- Leave-one-FF12-industry-out tests show that the P3–P0 premium is not driven by any single major industry.

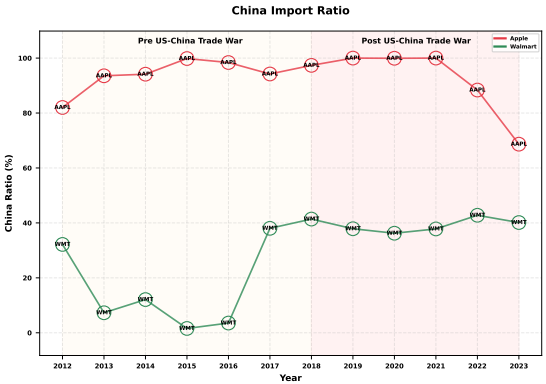
Conclusions

- We document the emergence of a priced global trade risk factor
  - Central to our estimation is the concept of trade vulnerability, measured by the firm-level country concentration using granular bill-of-lading data.
  - High-concentration firms, more vulnerable to disruptions in global trade, demand a significantly higher risk premium.
- Triggered by the 2018 US-China tariff war and exacerbated by Covid-19 supply chain disruptions, concentrated exposure to China is a key driver to the estimated risk premium.
- Pushing beyond China, the broad-based Liberation Day tariffs hit the pricing of medium-concentration firms the hardest, reflecting the evolving nature of trade vulnerability.

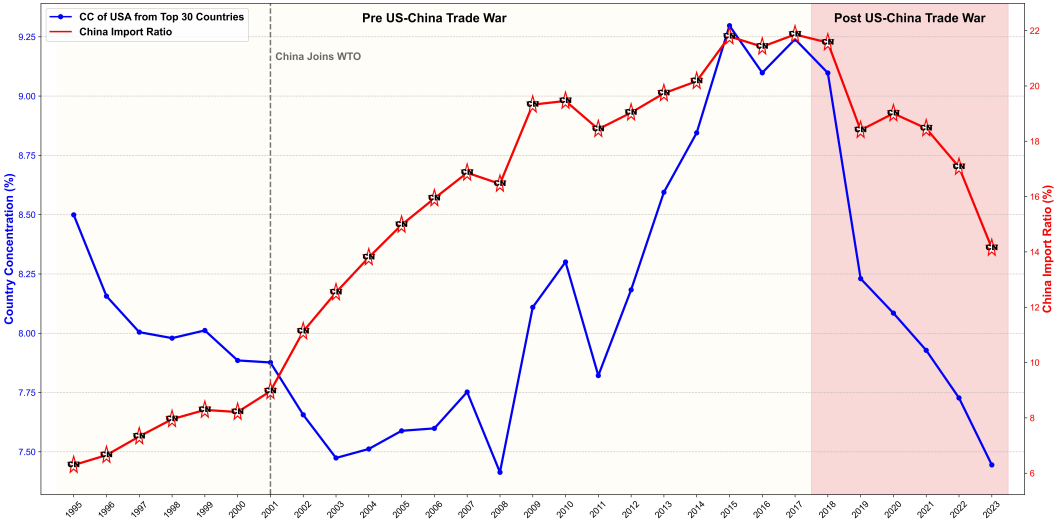
Appendix

Apple vs Walmart on CC and China Ratio





USA's Country Concentration and China Exposure



Alternative Measures of Trade Vulnerability

Alternative Measures	Fama-French 5-Factor Alpha (%)					
	No Trade	Sorted Portfolios			Long/Short	
	P0	P1	P2	P3	P3 - P0	P3 - P1
Supplier Concentration (SC)	-0.03 [-0.46]	0.05 [0.56]	-0.10 [-0.65]	0.42 [2.31]	0.44 [2.08]	0.36 [1.82]
HS2 Goods Concentration (GC)	-0.03 [-0.46]	0.08 [0.79]	-0.02 [-0.11]	0.31 [1.93]	0.34 [1.90]	0.24 [1.34]
1/Number of Countries (1/NC)	-0.03 [-0.46]	0.19 [1.89]	-0.32 [-2.05]	0.54 [2.18]	0.57 [2.13]	0.36 [1.26]
1/Number of Suppliers (1/NS)	-0.03 [-0.46]	0.25 [2.34]	-0.33 [-3.10]	0.42 [1.83]	0.45 [1.83]	0.18 [0.64]
1/Number of HS2 Goods (1/NG)	-0.03 [-0.46]	0.19 [2.18]	-0.23 [-1.50]	0.21 [0.91]	0.24 [0.94]	0.03 [0.10]
Import/Revenue (Import)	-0.03 [-0.46]	0.24 [1.44]	0.13 [1.29]	-0.14 [-1.01]	-0.12 [-0.71]	-0.38 [-1.50]
China Ratio (China)	-0.03 [-0.46]	0.11 [0.52]	-0.07 [-0.60]	0.22 [1.54]	0.25 [1.40]	0.11 [0.40]

A Two-Factor Model with Country Concentration Trade Factor (CCTF)

- We construct the country concentration trade factor (CCTF) via

$$R_t^{\text{CCTF}} = R_t^{\text{P3}} - R_t^{\text{P0}},$$

  where P3 is the high-CC portfolio and P0 is the portfolio with no trade exposure.
- Our two-factor model:

$$R_t^i - r_f = \alpha + \beta^{\text{MKT}} \left(R_t^{\text{MKT}} - r_f\right) + \beta^{\text{CCTF}} R_t^{\text{CCTF}} + \epsilon_t^i .$$

- Applied to the long/short portfolios constructed from the alternative measures:

Alternative Measures	SC	GC	1/NC	1/NS	1/NG	Import	China
alpha (%)	0.00	0.13	0.08	0.02	-0.14	-0.11	-0.09
	[0.02]	[1.04]	[0.56]	[0.13]	[-0.72]	[-0.65]	[-0.58]
MKT beta	-0.01	-0.04	0.05	0.11	0.12	-0.11	-0.01
	[-0.15]	[-1.06]	[1.03]	[2.09]	[2.22]	[-2.84]	[-0.23]
CCTF beta	0.69	0.36	0.94	0.72	0.71	0.17	0.78
	[6.41]	[3.11]	[9.84]	[5.52]	[5.94]	[2.20]	[7.71]