

The Impact of the US-China Trade War on Taiwan's International Trade

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Overview

- 1 Introduction
- 2 Data
- 3 Empirical Analysis
- 4 Conclusion

Motivation

- This paper investigates third-country effects of the US-China trade war.
 - ▶ Taiwan: close trade relation with both the US and China and has been named as one of the beneficiaries of the Trade War (Nicita, 2019).
- US tariffs on China and China's retaliation:
 - ▶ Reduce bilateral trade
 - ▶ Diverse trade to third countries
 - ▶ Restructure of global supply chains
- Supply chain restructuring:
 - ▶ The East Asian supply chain is shifting from a China-centric model to a diversified one.
 - ▶ Firms are reshoring, nearshoring, and implementing "China+1" strategies to mitigate risks.
- Focus on trade diversion and reallocation using Taiwanese customs data.

Background: Taiwan's International Trade

- Key role in global supply chains:
 - ▶ Taiwan is a major supplier of intermediate goods, particularly in high-tech industries.
 - ▶ Strong integration in global production networks, supplying components to China, the US, and Southeast Asia.
- Export structure:
 - ▶ Taiwan's exports concentrate on intermediate and capital goods, with electronic parts and components accounting for approximately 40%.
 - ▶ Machinery, precision instruments, and chemicals also contribute significantly to export value.
 - ▶ Close trade relations with both the US (23%) and China (20%) in 2024.

Background: East-Asia Supply Chain

- Pre-Trade war: East-Asian supply chains were highly China-Centric
 - ▶ China served as the world's factory, handling final assembly, while Taiwan, Japan, and South Korea supplied key components.
 - ▶ Supply chain division: U.S. design → Taiwan, Japan and South Korea supply parts → China assembly → global export.
- Post-Trade war: Diversification and restructuring of the supply chain
 - ▶ Taiwanese firms reshoring: The government provided investment incentives, leading to a surge in Taiwan's exports to the U.S. (2018–2019).
 - ▶ China+1 strategy: Countries such as Vietnam and Mexico took over production capacity previously based in China.
 - ▶ Major firms expanded operations in Southeast Asia and the U.S. to avoid trade barriers.

Background: Anecdotes

- TSMC (advanced chip manufacturing and global market dominance)
 - ▶ After losing Huawei orders, TSMC expanded its wafer fabs in Arizona and Kumamoto to diversify risks.
- Foxconn (innovation integration design manufacturing, IIDM)
 - ▶ Expanded iPhone assembly to India and Vietnam to reduce reliance on China.
 - ▶ Established a new factory in Mexico to address U.S. tariffs and nearshoring trends.
- Is the US-China supply chain decoupled?
 - ▶ While Vietnam and Mexico have replaced some of China's exports, their imports of Chinese components have increased.
 - ▶ The supply chain has shifted to a China indirect supply → third-country assembly → US export model, demonstrating the rerouting effect.

- Assess the impact of the US-China trade war on the international trade of Taiwanese manufacturers:
 - ① **Direct tariff effect (trade diversion)**: when the US imposed additional tariffs on imports from China, China's exports of such product may be replaced by exports from other countries.
 - ② **Indirect tariff effects (restructure of supply chains)**: when the downstream products are subject to additional tariffs, exports of products that are upstream in the supply chain linkage may be redirected.
 - ③ **Impact on investment and employment**

Antecedents

- Examine the effect of trade diversion and reallocation for a closely related trading partner
 - Diversion effect: Nicita (2019), Cigna et al. (2022), Choi and Nguyen (2023)
 - Reallocation effect: Fajgelbaum et al. (2024), Utar et al, (2025)
- Address the heterogeneity of the firm and product in the effects of the trade war at the firm-product level
 - Impact of the trade war on the US: Amiti et al. (2019), Waugh (2020), Fajgelbaum et al. (2020), Cavallo et al. (2021), Handley et al. (2024)
 - Impact on China: Benguria et al. (2022), Jiao et al. (2024)
 - Financial market: Huang et al. (2023)
- Analysis impact of US trade policy on the reshaping of global supply chains
 - Impact of tariffs on imports from China: Freund et al. (2024)
 - Evolution of global supply chains: Alfaro and Chor (2023)

Using Taiwanese customs data from 2012 to 2022, we find that:

- Product-country-level: Positive effect of direct tariff on exports to the U.S. and positive effect of indirect tariff on exports to Southeast Asia, Mexico and Korea (and also China).
- Firm-product-country level: positive effects of indirect tariffs on China, Mexico and some Southeast Asian countries.

Contribution:

- Evaluate the impact of US-China trade war on restructure of global supply chains (redirection of exports of intermediate inputs).
- Assess the impact on firms' domestic investment and employment (on-going).

- Data Description
- Empirical Analysis:
 - ▶ Product-country level.
 - ▶ Firm-product-country level.
 - ▶ Impact on investment and employment.
- Conclusion

Taiwanese Customs Data

- Transaction-level customs data from 2006 to 2023, aggregated into annual data
- The dataset used in this study covers the period from January 2012 to December 2022
- Covers firm-product(HS6)-country-year level, allowing for granular trade pattern analysis
- The customs data are also merged with:
 - ▶ Corporate income tax files to obtain industry code and financial statement data
 - ▶ Individual income tax files to obtain the number of employees

Key Patterns in Taiwan's Exports

Table 1: Taiwan's Top 10 Export Destinations, 2012-2022

Rank	Export Value in billion TWD													
	(Export Value of electrical machinery and electronics (HS-84&85) in billion TWD)													
	2012		2017		2018		2019		2020		2021		2022	
1	CN	2,136 (888)	CN	2,489 (1,371)	CN	2,741 (1,541)	CN	2,637 (1,569)	CN	2,800 (1,808)	CN	3,134 (1,981)	CN	3,004 (2,051)
2	SEA	1,335 (690)	SEA	1,612 (921)	SEA	1,617 (877)	SEA	1,548 (882)	US	1,459 (835)	US	1,782 (992)	US	1,997 (1,172)
3	HK	991 (683)	HK	1,112 (896)	US	1,156 (566)	US	1,386 (768)	SEA	1,458 (911)	SEA	1,763 (1,085)	SEA	1,989 (1,312)
4	US	945 (472)	US	1,083 (536)	HK	1,107 (905)	HK	1,101 (922)	HK	1,256 (1,043)	HK	1,428 (1,239)	HK	1,401 (1,252)
5	JP	517 (252)	JP	581 (332)	JP	648 (360)	JP	661 (384)	JP	618 (381)	EU	707 (334)	JP	801 (503)
6	EU	484 (250)	EU	564 (283)	EU	625 (313)	EU	597 (301)	EU	537 (275)	JP	690 (408)	EU	772 (380)
7	KR	377 (240)	KR	404 (268)	KR	438 (261)	KR	462 (275)	KR	417 (305)	KR	508 (379)	KR	583 (466)
8	GB	107 (55)	GB	112 (55)	GB	115 (55)	GB	109 (54)	GB	98 (50)	IN	124 (42)	IN	146 (57)
9	AU	100 (36)	IN	99 (35)	IN	111 (37)	IN	100 (32)	AU	84 (25)	GB	114 (53)	MX	132 (80)
10	IN	97 (34)	AU	88 (28)	AU	97 (27)	AU	92 (28)	IN	77 (25)	AU	113 (27)	AU	126 (30)

Note: The export value of electrical machinery and electronics (HS-84&85) is reported in parentheses. Source: Author's own calculations from Taiwanese customs data.

- Measure of Direct Tariff
 - ▶ Tariff imposed by the United States on imports from China (MFN tariff rates plus the additional tariff increases caused by the trade war)
- Tariff Data
 - ▶ MFN tariff data are from USITC
 - ▶ The additional tariff data are from Bown (2021)
 - ▶ The tariff is aggregated to the 6-digit HS level (τ_{jt}^{US})
 - ▶ In this paper, we consider measures that the US imposed on China summarized below:

Background: US Tariff on Chinese Imports

Table 2: US Tariff on Chinese Imports, 2018-2020

No.	Section	Effective Date	Tariff Rates	Type of Products
1	201	Feb 7, 2018	20%/30%	washing machines/solar cells
2	232	Mar 23, 2018	25%/10%	steel product/aluminum products
3	301*	Jul 6, 2018	25%	intermediate and capital goods
4	301*	Aug 23, 2018	25%	intermediate and capital goods
5	301*	Sep 24, 2018	10%	wide range of products
6	201	Feb 7, 2019	-2%/-5%	same as #1
7	301*	Jun 1, 2019	15%	same as #5
8	301*	Sep 1, 2019	15%	consumption
9	201	Feb 7, 2020	-2%/-5%	same as #1
10	232	Feb 8, 2020	25%/10%	steel product/aluminum products
11	301	Feb 14, 2020	-7.5%	same as #8

Source: Compiled by the author based on Bown (2021). * refers to what is commonly known as the US-China trade war.

The Indirect Tariffs: Downstream Tariffs

- Tariffs that a product faces when the industries that use this product as an input are subject to tariff
- Supply chain linkage: 2012 use table from US BEA (405 industries)
- downstream tariffs:

$$w_{s,k}^D = \frac{f_{s,k}}{\sum_{k,s \neq k} f_{s,k}} \quad (1)$$

$$\tau_{s,t}^D = \sum_k w_{s,k}^D \times \tau_{k,t}^{US} \quad (2)$$

- ▶ $f_{s,k}$: the use of product s in the production of product k
- ▶ $w_{s,k}$: the share of use of s in k in the total use of product s
- ▶ $\tau_{s,t}^D$: weighted average downstream tariffs that the upstream product s faces

Summary Statistics: Tariff Data

Table 3: Tariff Rates (%)

Sector Category	$\tau_{j,t}^{US}$			$\tau_{j,t}^D$		
	2012	2017	2022	2012	2017	2022
Animal	3.27	3.27	16.52	4.07	4.02	19.60
Vegetable	3.10	3.11	19.10	5.66	5.55	24.85
Foodstuffs	9.77	9.73	28.58	9.71	9.57	28.69
Mineral	0.63	0.63	22.75	2.25	2.24	26.12
Chemicals	3.13	3.11	23.24	3.01	2.99	22.89
Plastics/Rubbers	4.08	4.07	27.68	4.04	4.03	25.48
Leathers/Furs/Hides	4.43	4.56	26.66	3.18	3.20	21.71
Wood	1.08	1.07	24.00	2.34	2.30	23.12
Textiles	9.07	9.07	27.66	4.17	4.16	22.17
Footwear/Headgear	8.36	8.34	17.86	2.94	2.93	22.82
Stone/Glass	3.79	3.78	25.17	3.12	3.00	24.97
Metals	1.85	1.85	26.45	2.33	2.30	26.71
Machinery/Electrical	1.77	1.67	26.16	2.44	2.37	26.26
Transportation	3.30	3.30	27.03	2.74	2.72	26.13
Miscellaneous	2.66	2.41	18.05	2.18	1.97	21.04

Source: Based on the author's calculations using USITC's annual tariff data and Bown (2021).

Empirical Analysis: Product-Country Level Exports

$$\Delta y_{jct} = \alpha + \beta \Delta \tau_{jt}^{US} + \gamma \Delta \tau_{jt}^D + F_s + F_{ct} + \epsilon_{jct} \quad (3)$$

- Level: product (j)/ country (c)/ sector (s)/ year (t)
- Y: export value in TWD
- τ_{jt}^{US} , τ_{jt}^D : direct and downstream tariff rates
- Δ : 5 years difference
 - ▶ $t = 1, 2$
 - ▶ $\Delta y_{jc,1} \equiv \ln Y_{jc,2017} - \ln Y_{jc,2012}$ and $\Delta y_{jc,2} \equiv \ln Y_{jc,2022} - \ln Y_{jc,2017}$
 - ▶ the same operation is performed for τ_{jt}^{US} and τ_{jt}^D
- Interact with: I_c , a dummy variable indicating whether country/region c belongs to the destination

Evidence: Product-Country Level Exports

Table 4: The Impact of Tariff Rates on Exports: Product-Country Level Analysis

Dep. Δy_{jct}	World		interact with US		interact with CN		interact with KR		interact with MX		interact with SEA	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\Delta \tau_{jt}^{US} (\hat{\beta}_1)$	0.0022** (0.0011)	0.0017 (0.0015)	0.0021* (0.0011)	0.0015 (0.0016)	0.0023** (0.0011)	0.0016 (0.0015)	0.0023** (0.0011)	0.0018 (0.0015)	0.0022** (0.0011)	0.0017 (0.0015)	0.0026** (0.0011)	0.0019 (0.0016)
$\dots \times I_c (\hat{\beta}_2)$			0.0071* (0.0038)	0.0123** (0.0058)	-0.0038 (0.0044)	0.0053 (0.0057)	-0.0033 (0.0048)	-0.0085 (0.0056)	-0.0004 (0.0066)	0.0012 (0.0074)	-0.0030 (0.0020)	-0.0018 (0.0022)
$\Delta \tau_{jt}^D (\hat{\gamma}_1)$	0.0026 (0.0027)	0.0062 (0.0056)	0.0020 (0.0027)	0.0066 (0.0056)	0.0019 (0.0027)	0.0054 (0.0057)	0.0024 (0.0027)	0.0054 (0.0057)	0.0022 (0.0027)	0.0058 (0.0056)	0.0031 (0.0029)	0.0030 (0.0060)
$\dots \times I_c (\hat{\gamma}_2)$			0.0190** (0.0085)	-0.0239 (0.0203)	0.0256** (0.0101)	0.0367** (0.0185)	0.0107 (0.0109)	0.0493** (0.0193)	0.0338** (0.0161)	0.0367 (0.0328)	-0.0029 (0.0049)	0.0241** (0.0107)
$\hat{\beta}_1 + \hat{\beta}_2$			0.0092** (0.0037)	0.0138** (0.0058)	-0.0015 (0.0045)	0.0069 (0.0058)	-0.0010 (0.0048)	-0.0067 (0.0059)	0.0018 (0.0067)	0.0029 (0.0075)	-0.0004 (0.0020)	0.0001 (0.0025)
$\hat{\gamma}_1 + \hat{\gamma}_2$			0.0209** (0.0086)	-0.0172 (0.0204)	0.0275*** (0.0102)	0.0421** (0.0182)	0.0131 (0.0109)	0.0546*** (0.0191)	0.0360** (0.0163)	0.0424 (0.0329)	0.0001 (0.0048)	0.0271*** (0.0100)
Sample	All	HS-84&85	All	HS-84&85	All	HS-84&85	All	HS-84&85	All	HS-84&85	All	HS-84&85
N	193,064	58,206	193,064	58,206	193,064	58,206	193,064	58,206	193,064	58,206	193,064	58,206
R-sq	0.027	0.037	0.027	0.037	0.027	0.037	0.027	0.037	0.027	0.037	0.027	0.037

Note: Sector, and Country \times Year FE are included in all regressions. We denote significance at the 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at HS-6 digits product level are reported in parentheses. The constant term is included but not reported.

Evidence: Product-Country Level Exports

Table 5: The Impact of Tariff Rates on Exports to 6 Major SEA Countries: Product-Country Level Analysis

Dep. Δy_{jct}	interact with VN		interact with TH		interact with SG		interact with MY		interact with PH		interact with ID	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\Delta \tau_{jt}^{US} (\hat{\beta}_1)$	0.0020* (0.0011)	0.0016 (0.0015)	0.0022** (0.0011)	0.0017 (0.0015)	0.0023** (0.0011)	0.0017 (0.0015)	0.0023** (0.0011)	0.0017 (0.0015)	0.0023** (0.0011)	0.0018 (0.0015)	0.0022** (0.0011)	0.0017 (0.0015)
$\dots \times I_c (\hat{\beta}_2)$	0.0083* (0.0042)	0.0078 (0.0056)	0.0027 (0.0043)	-0.0004 (0.0047)	-0.0067 (0.0045)	0.0011 (0.0062)	-0.0061 (0.0042)	-0.0039 (0.0060)	-0.0060 (0.0048)	-0.0099* (0.0056)	-0.0023 (0.0051)	-0.0015 (0.0050)
$\Delta \tau_{jt}^D (\hat{\gamma}_1)$	0.0025 (0.0027)	0.0052 (0.0057)	0.0028 (0.0027)	0.0053 (0.0057)	0.0023 (0.0027)	0.0062 (0.0056)	0.0028 (0.0027)	0.0058 (0.0057)	0.0025 (0.0027)	0.0052 (0.0057)	0.0028 (0.0027)	0.0057 (0.0057)
$\dots \times I_c (\hat{\gamma}_2)$	0.0008 (0.0108)	0.0461* (0.0246)	-0.0107 (0.0106)	0.0452* (0.0265)	0.0140 (0.0102)	-0.0005 (0.0214)	-0.0089 (0.0097)	0.0187 (0.0246)	0.0047 (0.0126)	0.0515** (0.0233)	-0.0138 (0.0126)	0.0299 (0.0222)
$\hat{\beta}_1 + \hat{\beta}_2$	0.0103** (0.0042)	0.0094 (0.0058)	0.0048 (0.0043)	0.0013 (0.0048)	-0.0044 (0.0045)	0.0028 (0.0061)	-0.0037 (0.0042)	-0.0021 (0.0060)	-0.0037 (0.0048)	-0.0081 (0.0057)	-0.0000 (0.0051)	0.0002 (0.0051)
$\hat{\gamma}_1 + \hat{\gamma}_2$	0.0033 (0.0109)	0.0514** (0.0243)	-0.0078 (0.0106)	0.0505* (0.0262)	0.0163 (0.0102)	0.0057 (0.0214)	-0.0060 (0.0097)	0.0246 (0.0245)	0.0072 (0.0126)	0.0567** (0.0232)	-0.0110 (0.0127)	0.0357 (0.0218)
Sample	All	HS-84&85	All	HS-84&85	All	HS-84&85	All	HS-84&85	All	HS-84&85	All	HS-84&85
N	193,064	58,206	193,064	58,206	193,064	58,206	193,064	58,206	193,064	58,206	193,064	58,206
R-sq	0.027	0.037	0.027	0.037	0.027	0.037	0.027	0.037	0.027	0.037	0.027	0.037

Note: Sector, and Country \times Year FEs are included in all regressions. We denote significance at the 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at HS-6 digits product level are reported in parentheses. The constant term is included but not reported.

Summary: Tariff Impacts by Product-Country

- Direct Tariff:
 - ▶ Trade diversion effect: increase of Taiwan's exports to the US.
 - ▶ A 1% increase in the US tariff rate on Chinese imports (25% increase on average from 2017 to 2022) may boost Taiwan's electrical machinery and electronics exports to the US by 1.38%.
- Downstream Tariff:
 - ▶ 1% increase in downstream tariffs led to a more than 5% increase in exports for Taiwan's upstream products in South Korea and Vietnam, implying a redirection of supply chains.

Empirical Analysis: Firm-Product-Country Level Exports

$$\Delta y_{ijct} = \alpha + \beta \Delta \tau_{jt}^{US} + \gamma \Delta \tau_{jt}^D + F_i + F_s + F_{ct} + \epsilon_{ijct} \quad (4)$$

- Level: firm (i)/ product (j)/ country (c)/ sector (s)/ year (t)
- Y: export value in TWD
- τ_{jt}^{US} , τ_{jt}^D : direct and downstream tariff rates
- Δ : 5 years difference
 - ▶ $t = 1, 2$
 - ▶ $\Delta y_{jc,1} \equiv \ln Y_{jc,2017} - \ln Y_{jc,2012}$ and $\Delta y_{jc,2} \equiv \ln Y_{jc,2022} - \ln Y_{jc,2017}$
 - ▶ the same operation is performed for τ_{jt}^{US} and τ_{jt}^D
- Interact with: I_c , a dummy variable indicating whether country/region c belongs to the destination

Evidence: Firm-Product-Country Level Exports

Table 6: The Impact of Tariff Rates on Exports: Firm-Product-Country Level Analysis

Dep. Δy_{jct}	World		interact with US		interact with CN		interact with KR		interact with MX		interact with SEA	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\Delta r_{jt}^{US} (\hat{\beta}_1)$	-0.0008 (0.0007)	-0.0030** (0.0014)	-0.0008 (0.0006)	-0.0027* (0.0015)	-0.0010 (0.0007)	-0.0033** (0.0014)	-0.0008 (0.0007)	-0.0028** (0.0014)	-0.0008 (0.0007)	-0.0031 (0.0014)	-0.0011 (0.0008)	-0.0036** (0.0015)
$\dots \times I_c (\hat{\beta}_2)$			-0.0001 (0.0016)	-0.0029 (0.0037)	0.0015 (0.0016)	0.0031 (0.0034)	-0.0032 (0.0026)	-0.0053 (0.0044)	-0.0002 (0.0031)	0.0126 (0.0089)	0.0012 (0.0012)	0.0043* (0.0025)
$\Delta r_{jt}^D (\hat{\gamma}_1)$	0.0117*** (0.0024)	0.0225*** (0.0056)	0.0109*** (0.0023)	0.0206*** (0.0055)	0.0117*** (0.0024)	0.0207*** (0.0055)	0.0115*** (0.0024)	0.0224*** (0.0056)	0.0114*** (0.0024)	0.0223*** (0.0057)	0.0120*** (0.0026)	0.0208*** (0.0059)
$\dots \times I_c (\hat{\gamma}_2)$			0.0071 (0.0045)	0.0148 (0.0110)	0.0009 (0.0046)	-0.0007 (0.0089)	0.0092 (0.0066)	0.0009 (0.0148)	0.0281** (0.0116)	0.0202 (0.0292)	-0.0013 (0.0034)	0.0127 (0.0070)
$\hat{\beta}_1 + \hat{\beta}_2$			-0.0009 (0.0016)	-0.0056 (0.0035)	0.0005 (0.0016)	-0.0002 (0.0033)	-0.0040 (0.0027)	-0.0081* (0.0048)	-0.0010 (0.0031)	0.0095 (0.0086)	0.0001 (0.0011)	0.0007 (0.002)
$\hat{\gamma}_1 + \hat{\gamma}_2$			0.0180*** (0.0051)	0.0355*** (0.0120)	0.0126** (0.0050)	0.0220** (0.0105)	0.0206*** (0.0071)	0.0233 (0.0157)	0.0395*** (0.0114)	0.0425 (0.0279)	0.0107*** (0.0031)	0.0335*** (0.0073)
Sample	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic
N	409,920	88,962	409,920	88,962	409,920	88,962	409,920	88,962	409,920	88,962	409,920	88,962
R-sq	0.066	0.063	0.066	0.063	0.066	0.063	0.066	0.063	0.066	0.063	0.066	0.063

Note: Firm, Sector, and Country \times Year FEs are included in all regressions. We denote significance at the 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at HS-6 digits product level are reported in parentheses. The constant term is included but not reported.

Evidence: Firm-Product-Country Level Exports

Table 7: The Impact of Tariff Rates on Exports to 6 Major SEA Countries: Firm-Product-Country Level Analysis

Dep. Δy_{jt}	interact with VN		interact with TH		interact with SG		interact with MY		interact with PH		interact with ID	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\Delta \tau_{jt}^{US} (\hat{\beta}_1)$	-0.0010 (0.0007)	-0.0033** (0.0014)	-0.0008 (0.0007)	-0.0030** (0.0014)	-0.0009 (0.0007)	-0.0031** (0.0014)	-0.0008 (0.0007)	-0.0030** (0.0014)	-0.0009 (0.0007)	-0.0033** (0.0014)	-0.0009 (0.0007)	-0.0030** (0.0014)
$\dots \times I_c (\hat{\beta}_2)$	0.0027 (0.0019)	0.0112** (0.0051)	-0.0007 (0.0019)	0.0007 (0.0042)	0.0009 (0.0025)	0.0026 (0.0044)	-0.0012 (0.0020)	-0.0009 (0.0047)	0.0017 (0.0027)	0.0169*** (0.0044)	0.0032 (0.0023)	-0.0031 (0.0071)
$\Delta \tau_{jt}^D (\hat{\gamma}_1)$	0.0118*** (0.0024)	0.0227*** (0.0053)	0.0116*** (0.0024)	0.0218*** (0.0056)	0.0116*** (0.0024)	0.0223*** (0.0057)	0.0115*** (0.0024)	0.0217*** (0.0057)	0.0116*** (0.0024)	0.0220*** (0.0056)	0.0122*** (0.0024)	0.0228*** (0.0056)
$\dots \times I_c (\hat{\gamma}_2)$	-0.0016 (0.0068)	-0.0057 (0.0168)	0.0020 (0.0062)	0.0252** (0.0120)	0.0052 (0.0070)	0.0070 (0.0166)	0.0082 (0.0062)	0.0297** (0.0145)	0.0056 (0.0070)	0.0277 (0.0178)	-0.0286*** (0.0092)	-0.0387 (0.0285)
$\hat{\beta}_1 + \hat{\beta}_2$	0.0017 (0.0019)	0.0079 (0.0053)	-0.0015 (0.0019)	-0.0023 (0.0043)	-0.0000 (0.0025)	-0.0005 (0.0040)	-0.0020 (0.0020)	-0.0039 (0.0045)	0.0008 (0.0026)	0.0136*** (0.0042)	0.0023 (0.0023)	-0.0061 (0.0071)
$\hat{\gamma}_1 + \hat{\gamma}_2$	0.0102 (0.0067)	0.0169 (0.0170)	0.0136** (0.0067)	0.0470*** (0.0135)	0.0167** (0.0069)	0.0293* (0.0163)	0.0197*** (0.0063)	0.0514*** (0.0142)	0.0172*** (0.0067)	0.0497*** (0.0181)	-0.0164* (0.0086)	-0.1589 (0.0288)
Sample	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic
N	409,920	88,962	409,920	88,962	409,920	88,962	409,920	88,962	409,920	88,962	409,920	88,962
R-sq	0.066	0.063	0.066	0.063	0.066	0.063	0.066	0.063	0.066	0.063	0.066	0.063

Note: Sector, and Country \times Year FEs are included in all regressions. We denote significance at the 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at HS-6 digits product level are reported in parentheses. The constant term is included but not reported.

Summary: Tariff Impacts by Firm-Product-Country

- The U.S.:
 - ▶ The impact of direct tariffs on US exports is not evident at the firm-product-country level, as our results primarily reflect manufacturers with a long history of exporting the same products to the US.
 - ▶ A 1% increase in downstream tariffs causes a 3.6% increase on upstream exports in electronics to the US-greater effect than direct tariffs. The averaging tariff increment was 24% in the 2017-2022 period.
- China:
 - ▶ Positive effects of downstream tariffs: exports to China still increase, implying the supply chain is unlikely to easily disrupted.
- Southeast Asia:
 - ▶ Positive effects of downstream tariffs on Taiwanese firms' electronics and machinery exports to the Southeast Asia: the impact of supply chain adjustments.

Empirical Analysis: Firm Level Factor Inputs

$$\Delta y_{it} = \alpha + \beta \Delta \tau_{it}^{US} + \gamma \Delta \tau_{it}^D + F_s + F_t + \epsilon_{it} \quad (5)$$

- Level: firm (i)/ sector (s)/ year (t)
- Y: capital (K), labor (L), and R&D intensity (RD)
- τ_{it}^{US} , τ_{it}^D : firm-level direct and downstream tariff rates
 - ▶ $\tau_{it} \equiv \sum_j w_{ij,0} \cdot \tau_{jt}$
 - ▶ $w_{ij,0}$: share of product j in firm i 's total export value in the initial year
- Δ : 5 years difference
 - ▶ $t = 1, 2$
 - ▶ $\Delta y_{i,1} = \ln Y_{i,2017} - \ln Y_{i,2012}$ and $\Delta y_{i,2} = \ln Y_{i,2022} - \ln Y_{i,2017}$
 - ▶ the same operation is performed for τ_{it}^{US} and τ_{it}^D

Evidence: Firm Level Impacts

Table 8: The Impact of Trade War Tariffs on Investment and Employment

Dep.	$\Delta \ln K$		$\Delta \ln L$		$\Delta \ln(RD)$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \tau_{it}^{US}$	-0.0003 (0.0010)	-0.0042* (0.0025)	0.0014*** (0.0004)	-0.0003 (0.0011)	0.0001 (0.0001)	0.0000 (0.0002)
$\Delta \tau_{it}^D$	0.0013 (0.0019)	0.0122** (0.0056)	-0.0001 (0.0009)	0.0025 (0.0024)	-0.0001 (0.0001)	-0.0008 (0.0005)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Manuf.	Electronic	Manuf.	Electronic	Manuf.	Electronic
N	32,658	4,477	32,700	4,705	32,439	4,441
R-sq	0.005	0.006	0.017	0.000	0.001	0.001

Note: Sector and year FEs are included in all regressions. We denote significance at the 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at firm level are reported in parentheses. The constant term is included but not reported.

Summary: Firm Level Responses to Tariffs

- A 1% increase in downstream tariffs has, on average, led to a 1.22% impact on capital growth by electronics firms, indicating the role of supply chain restructuring in driving their capital investments.
- The US tariffs on China have not only created a trade diversion effect for manufacturers but have also contributed to employment growth, albeit to a limited extent.

Conclusion

- Trade diversion effect:
 - ▶ The US tariff policy on China positioned Taiwan as an alternative trade source
 - ▶ Taiwan's exports to the US, especially in electronics and machinery, experienced substantial growth
- Supply chain restructuring:
 - ▶ Downstream tariffs have influenced Taiwan's upstream exports: expand upstream component exports to Southeast Asia, Korea, and Mexico, which have absorbed parts of the shifting Chinese supply chain.
- Investment and employment:
 - ▶ When electronics firms face additional downstream tariffs, their production demand rises, with investment growth being especially notable.