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

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January 4, 2021

Motivation

- The US-China trade tension has a large impact on global trade.
- The US imposed high tariffs (up to 25%) on imports from China and China retaliated by levying tariffs on goods imported from the US.
  - ▸ Reduced bilateral trade.
- Potential trade diversion effect for Taiwan: US imports from China may be diverted to other countries.
- Nicita (2019): Taiwan is among the countries that benefit from the US-China trade war.
- Empirical studies of the impact of the US-China trade are emerging.
  - ▸ Little research from the perspective of a third country.
  - ▸ Firm heterogeneity: Empirical evidence at the country, firm and product level are needed.

Objectives

- This paper assesses the impact of US-China trade war on Taiwan's international trade.
- Use Taiwanese customs data at the country, firm and product level from 2017 to 2019 to investigate:
  - ▸ Whether Taiwan's exports to the US increased with tariff on China? Trade with other countries?
  - ▸ Which products are more affected?
  - ▸ What kind of firms are more affected?

Contribution

- Evaluate the impact of US-China trade war on a closely related third country.
  - ▶ Impact of the trade war on the US economy: Amiti et al. (2019), Waugh (2019), Fajgelbaum et al. (2020), Handley et al. (2020), Cavallo et al. (forthcoming).
  - ▶ Financial market: Huang et al. (2019)
  - ▶ Diversion effect: Nicita (2019), Meinen et al. (2019), Bekkers and Schroeter (2020).
- Key Findings:
  - ▶ Substantial effects on Taiwan's exports lagged by approximately a quarter.
    - ★ Short run effects.
  - ▶ Destination: The effects are more pronounced on exports to the US.
  - ▶ Products: Compared to intermediate and capital goods, the effect is larger for consumption goods.
  - ▶ At the firm, country and product level: effects are larger for large firms.

Data: Taiwanese customs data

- Transaction level data aggregated to monthly or quarterly data.
- Original data: 2006-2019
- Use: January 2017 to December 2019
- Sample restriction: exclude agricultural and mineral products (chapters 1 to 27).
- At the firm, country and product level (HS6).
- Level: firm (i)/product (j)/country (c)/month(quarter)(t) or product/country/month(quarter).
- The customs data are also merged with:
  - Labor Insurance files to obtain the number of employees.
  - Corporate income tax files to obtain industry classification (year 2017).

Data: Tariff Data

- The tariff change data are from CARD Trade War Tariff Database.
- The tariff increases are aggregated to the 6 digit HS level, and we need to create a variable with difference between a month and same month in the previous year ($\Delta \tau_{jt}$).
- In this paper, we consider measures that the US imposed on China summarized below:

Table 1: List of Tariff Imposed by the US on Imports from China

US	Tariff Implemented				
Wave	Measure	Date	Month	Quarter	Tariff Increase
1	List 1	06jul2018	jul2018	20183	25 ppt.
2	List 2	23aug2018	sep2018	20183	25 ppt.
3	List 3-1	24sep2018	oct2018	20184	10 ppt.
4	List 3-2	10may2019	may2019	20192	15 ppt.
5	List 4a	01sep2019	sep2019	20193	15 ppt.

Event Study

$$ln(y_{jct}) = \sum_{k=-6}^{6} \beta_{0k} I(event_{jt} = k) + \sum_{k=-6}^{6} \beta_{1k} I(event_{jt} = k) * target_j + F_{jc} + F_{ct} + \epsilon_{jct}$$
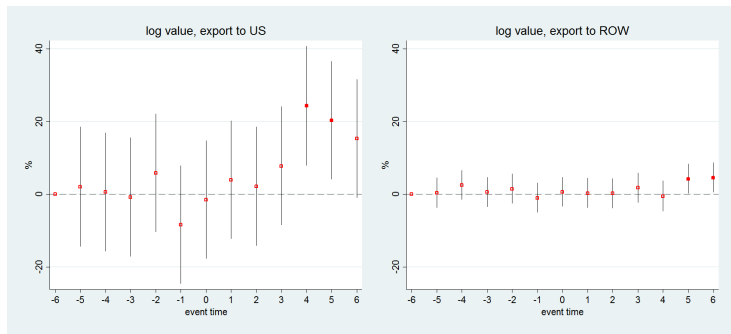
Note: The line drawn is 95% confidence intervals, and solid denotes statistically significant from 0 at least at 5% level.

Figure 1: Event Study: Log Export Value

Product Level Evidence

$$\Delta ln(y_{jct}) = \sum_{n=0}^{6} \beta_n \Delta\tau_{j,t-n} + F_{hc} + F_{ct} + F_{yr} + \epsilon_{jct}$$

- Control for product (HS4)-country (F_{hc}), country-month (F_{ct}) and year (F_{yr}) fixed effects.

Table 2: Product Level Export Regression

Dep. $\Delta ln(y_{jct})$	World	ROW	SEA	US	CN
tariff	0.0491	0.0405	0.1153	0.2830*	0.0106
	(0.0489)	(0.0498)	(0.1320)	(0.1667)	(0.1602)
L1_tariff	0.0761*	0.0744*	0.1636*	0.1328	0.2131
	(0.0434)	(0.0447)	(0.0797)	(0.1574)	(0.1543)
L2_tariff	-0.0171	-0.0295	-0.0037	0.3199*	0.1058
	(0.0450)	(0.0448)	(0.1002)	(0.1652)	(0.1588)
L3_tariff	0.1153**	0.1095**	0.0887	0.2658*	0.1300
	(0.0452)	(0.0457)	(0.1278)	(0.1600)	(0.1593)
L4_tariff	0.0026	-0.0145	0.1368	0.4481**	0.0585
	(0.0452)	(0.0440)	(0.0989)	(0.1804)	(0.1703)
L5_tariff	0.1305***	0.1124***	-0.0243	0.6094***	0.0923
	(0.0477)	(0.0454)	(0.0834)	(0.1732)	(0.1544)
L6_tariff	0.1258***	0.1267***	0.1293	0.1071	0.0921
	(0.0397)	(0.0410)	(0.0919)	(0.1555)	(0.1597)
HS4-Country FE	Yes	Yes	Yes	Yes	Yes
Country-Month FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	967,475	925,132	206,009	42,343	49,939
R-sq	0.057	0.057	0.044	0.043	0.049

Note: Standard errors clustered at HS-6 product are reported in the parentheses. *, **, and *** indicate significance at the

Product Level Exports: Interaction Effects

$$\Delta ln(y_{jct}) = \sum_{g=K,M,C} \sum_{n=0}^{6} \beta_{gn}(D_g * \Delta\tau_{j,t-n}) + F_{hc} + F_{ct} + F_{yr} + \epsilon_{jct}$$

- g: product groups. Use BEC code to separate products into capital (K), intermediate (M) and consumption goods (C).
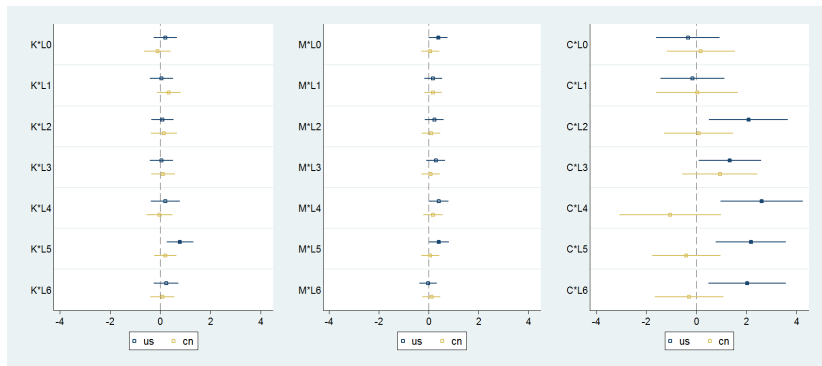
Note: The products are classified by BEC, that is, capital goods (K), intermediate goods (M), and consumption goods (C). Standard errors clustered at HS-6 product. The line drawn is 95% confidence intervals, and solid denotes statistically significant from 0 at least at 5% level.

Figure 2: Interaction Effects with Goods Categories: Exports

Summary of Results

- US tariff on China has a positive effect on Taiwan's exports.
  - Larger for exports to the United States.
  - Lagged by 5 months.
- When differentiated by product types (capital, intermediate and consumption goods): effects are larger for consumption goods.

Firm and Product Level Exports

$$\Delta ln(y_{ijct}) = \sum_{n=0}^{6} \beta_n \Delta\tau_{j,t-n} + F_i + F_{hc} + F_{ct} + F_{yr} + \epsilon_{ijct}$$

Table 3: Firm-Product Level Export Regression

Dep. $\Delta ln(y_{ijct})$	World	ROW	SEA	US	CN
tariff	0.0004	0.0035	-0.0899	-0.0041	-0.0112
	(0.0249)	(0.0283)	(0.0523)	(0.0561)	(0.0609)
L1_tariff	0.0405	0.0377	0.0461	0.0681	0.0844
	(0.0274)	(0.0303)	(0.0767)	(0.0631)	(0.0665)
L2_tariff	0.0133	0.0111	0.0373	0.0343	0.0238
	(0.0238)	(0.0279)	(0.0728)	(0.0718)	(0.0705)
L3_tariff	0.0398	0.0267	-0.0348	0.1143*	0.0062
	(0.0289)	(0.0283)	(0.0449)	(0.0617)	(0.0672)
L4_tariff	0.0521*	0.0450	0.0302	0.0954	0.1106
	(0.0281)	(0.0316)	(0.0744)	(0.0714)	(0.0716)
L5_tariff	0.0993***	0.0915***	0.0345	0.1643**	0.2017***
	(0.0310)	(0.0347)	(0.0683)	(0.0682)	(0.0668)
L6_tariff	0.0219	0.0222	0.0510	0.0130	-0.0537
	(0.0274)	(0.0306)	(0.0357)	(0.0637)	(0.0659)
Firm FE	Yes	Yes	Yes	Yes	Yes
HS4-Country FE	Yes	Yes	Yes	Yes	Yes
Country-Month FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	1,767,434	1,533,936	343,516	232,647	245,474
R-sq	0.034	0.037	0.047	0.050	0.061

Note: Standard errors adjusted for clustering at the HS-6 product are reported in the parentheses. *, **, and *** indicate

The Role of Firm Heterogeneity

$$\Delta ln(y_{ijct}) = \sum_{q=1}^{4} \sum_{n=0}^{2} \beta_{qn}(emp_{Q_q} * \Delta\tau_{j,t-n}) + F_i + F_{hc} + F_{ct} + F_{yr} + \epsilon_{ijct}$$

- emp_{Q_q}: dummy for the 1st, 2nd, 3rd, and 4th quartile based on firm size (within industry).
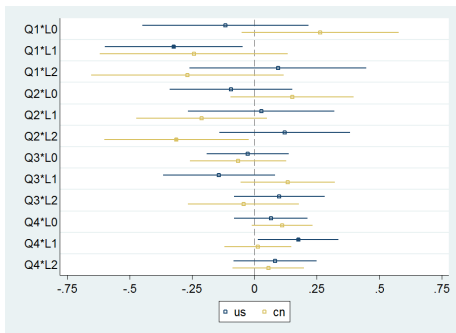
Note: The employee data is come from labor insurance database at the end of 2016. Standard errors are adjusted for clustering at the HS-6 product. The line drawn is the 95% confidence interval, and solid denotes statistically significant from 0 at least at 5% level.

Figure 3: Heterogeneous Reaction to the Tariff Change: Exports

Summary of Results

- At the firm and product level, the positive effect of US tariffs is also larger for exports to the US.
- Firm heterogeneity: the effects are more pronounced for larger firms (largest 25th percentile).

Conclusions

- This paper investigates the impact of US-China trade war on Taiwan's exports.
- The results suggest that significant but delayed effects of US tariffs change on Taiwan's exports to the US at both the product and firm/product levels.
- Our empirical findings further show heterogeneous effects across product types and firms. The effects are larger for consumption goods and for larger firms.
- These are the short-run effects that occurred in 2018 and 2019.
  - Further investigation is warranted.

Future Plans

- Extending the customs data to 2020:
  - Impact of both Covid-19 and the US-China trade war....
- Reorganization of global supply chains.
- Explore the effects on employment.