

# **How Trade Wars Disrupt Global Supply Chains: The Effective Rate of Spillover Protection**

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# Presentation Outline

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- US-China Trade War and GSC Relocations
- Analytical Framework
- Data and Method
- Results
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- (Appendix – Derivation of Measures)

## Introduction

- Motivation is to try and answer the following two, inter-related questions:
- (1) Why did the restructuring of GSCs happen so soon after the first tariffs were raised in the US-China trade war?
- (2) How can a relatively small bilateral tariff cause significant disruption, resulting in costly restructuring of GSCs to take place?

## US-China Trade War – An Overview

- Bilateral tariffs were first raised by 25% by US on Chinese exports in July 2018, progressively covering increasing amounts of trade.
- \$250 billion of Chinese exports with 25% tariffs, and \$200 billion at 10%.
- China has retaliated in a tit-for-tat fashion - 25% tariffs on \$110 billion of US exports, and \$60 billion at 10%.

# How the US-China trade war has escalated



The US and China have threatened to impose new tariffs and increase existing ones.

# US-China Trade War – An Overview

- “Phase one” deal signed in January 2020 to include the following:
  - i. Both countries to **suspend** tariffs due to come into force on 15 December 2019;
  - ii. US to **half new tariffs** imposed in September 2019 on \$120bn of Chinese exports;
  - iii. China to **increase purchases** by \$200bn above 2017 levels;
  - iv. agreement to strengthen IP rules; currency

## US-China Trade War – An Overview

- Tensions were easing before COVID: US dropped “currency manipulator” designation in Jan 2020, and in Feb, China halved additional tariffs on \$75 billion of US exports
- Remaining issues were to be addressed in a "phase two" deal, which hasn't materialised; unlikely before US elections.
- Things have become more politicised since COVID, with tit-for-tat responses raising tensions, with no end in sight.

## Are GSCs Restructuring?

- By their very nature, GSCs are dynamic beasts, continuously evolving - restructuring and relocating is their lifeblood
- Restructuring started long before the trade war however, with rising wages and tightening of environmental regulations in China.
- The trade war may increase the amount and hasten the pace of the restructuring, but it does not account for all of the observed disruption- **accelerator more than inducer.**

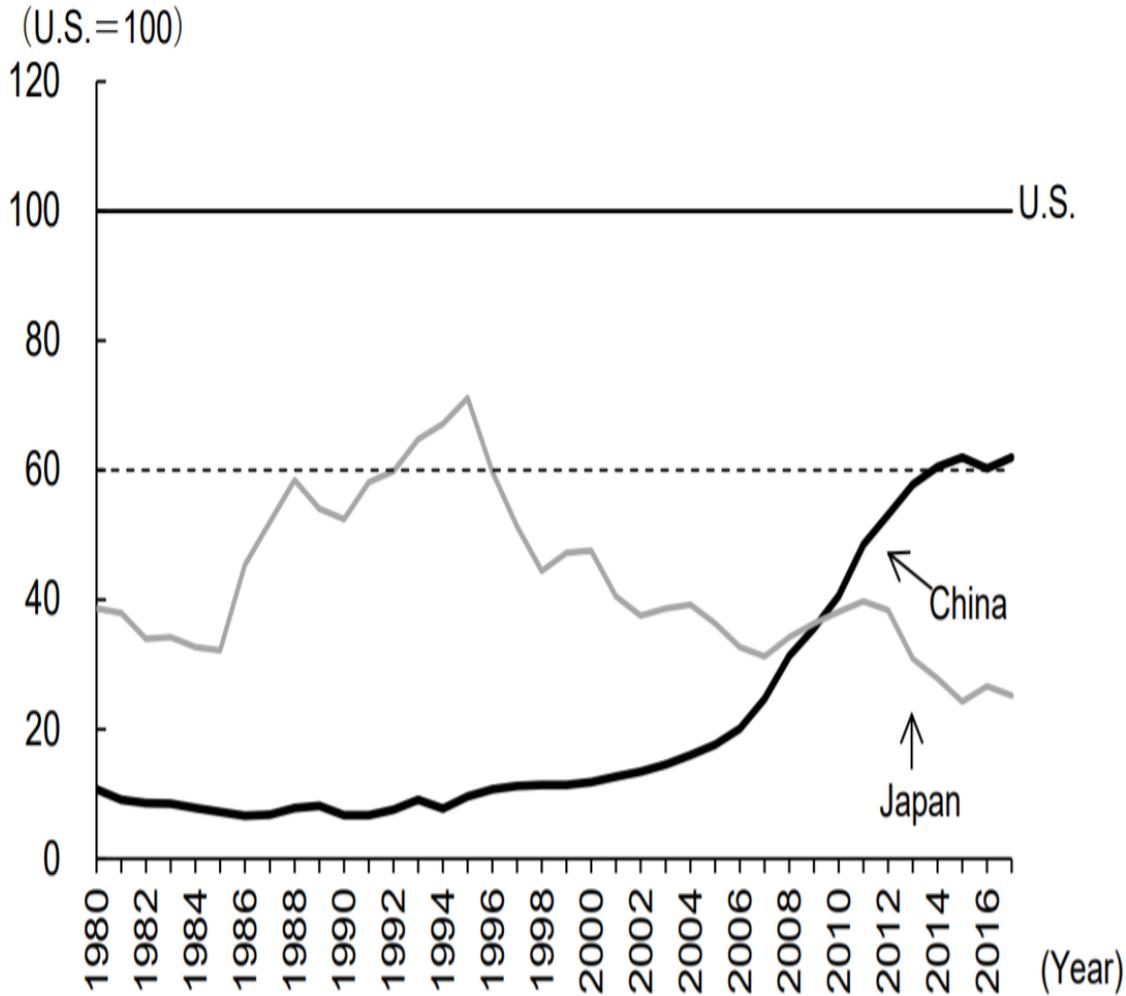
# Are GSCs Restructuring?

- Both micro and macro evidence of relocations
- Micro –surveys of firms, press reports, abound. Other anecdotal evidence like land purchases by China in industrial parks in Eastern Economic Corridor in Thailand rising from 3% to 43% following trade war etc.
- Macro –Eg. (1) Malaysia FDI in Q12019 rose 75% y-o-y, and doubled to \$12 billion by mid-year, mostly from China and US in manufacturing. Eg. (2) before COVID, ADB forecast Bangladesh as fastest growing country in Asia in 2020, b/c of massive relocations of textile and clothing investment from China mostly.

## Q1 – Why Adjust So Fast?

- Most of the answer to 1., and part of the answer to 2., is provided by how the US-China trade war is being perceived.
- The trade war is mostly a symptom of larger, underlying forces at play.
- Struggle for geopolitical dominance, as the position of the prevailing hegemon comes under threat. (eg. CH Kwan's 60% rule)

Figure 1. Change in the economic size of China and Japan relative to the United States in terms of GDP



# The Trade War is a Symptom

- Tensions rise when there are significant shifts in the distribution of global economic power.
- These tensions will not go away with the resolution of this dispute, if they're merely symptomatic.
- We have seen the focus shift from trade to IP to currency to technology, and now even COVID-19 (eg. Sen Lindsey Graham)
- These shifts have been accompanied by a move from tariffs to non-tariff mechanisms

## The Trade War is a Symptom

- If the dispute will continuously find new forms of expression, then it is unlikely to be transitory.
- **Therefore, the quicker the adjustment, the lower will be the costs.**
- Apart from the endurance of the conflict, the costs still have to be perceived to be sufficiently large to justify relocation.

## Q2 – Why Adjust At All?

- The rest of the explanation for (1), and the main reason for (2), relates to the effective rate of protection provided to competitors, in the presence of GSCs.
- While the tariff is applied on total value of the product, it is the VA share from China that results in the punitive tariff being imposed. (And vice-versa for US firms facing retaliatory tariffs in the Chinese market.)

# Effective Rate of Spillover Protection

- Intuition: one bad apple idea.
- We can measure the effective rate of protection provided to competing locations for activities currently undertaken in China within GSCs as a result of trade war tariffs.
- We call it the Effective Rate of Spillover Protection (*ERSP*), which is inversely related to the VA share.

# Analytical Framework

- That is:

$$ERSP = \frac{T}{\alpha} \quad (1)$$

Where  $T$  is the trade war nominal tariff rate and  $\alpha$  is the Chinese value added share

- The discriminatory US tariff against China will provide a powerful incentive to move China out of global supply chains terminating in the US for products in which  $\alpha$  is quite small (for a given  $T$ ).

## Analytical Framework

- As  $\alpha$  approaches 1, the difference between nominal and effective rates approaches zero.
- So, for goods with a high  $\alpha$ , the ERSP may not justify a relocation. Here, transshipment may be pursued to avoid the tariff.
- This occurs when Chinese exports undergo minimal processing — sometimes just relabelling — in a third country and are re-exported as if originating from that country.

# Analytical Framework

- US Customs and Border Protection have already identified Vietnam, Malaysia and the Philippines as transshipment points, and has started imposing additional punitive duties on goods it deems to have been transhipped.
- These problems arise because there are no clear rules of origin (RoO) specified in determining the nationality of a processed product, leaving the bill of lading as the main certification mechanism. (HK)

## Analytical Framework

- To bring in RoO, we assume a product is of Chinese origin if the Chinese share in total value added is greater than  $\beta$ .
- Without RoO,  $\beta$  is implicitly assumed to be 100%, as long as it is not zero, depending on where it is being shipped from.
- Assuming  $\alpha > \beta$  so that the RoO is binding, our measure of ERSP now becomes:

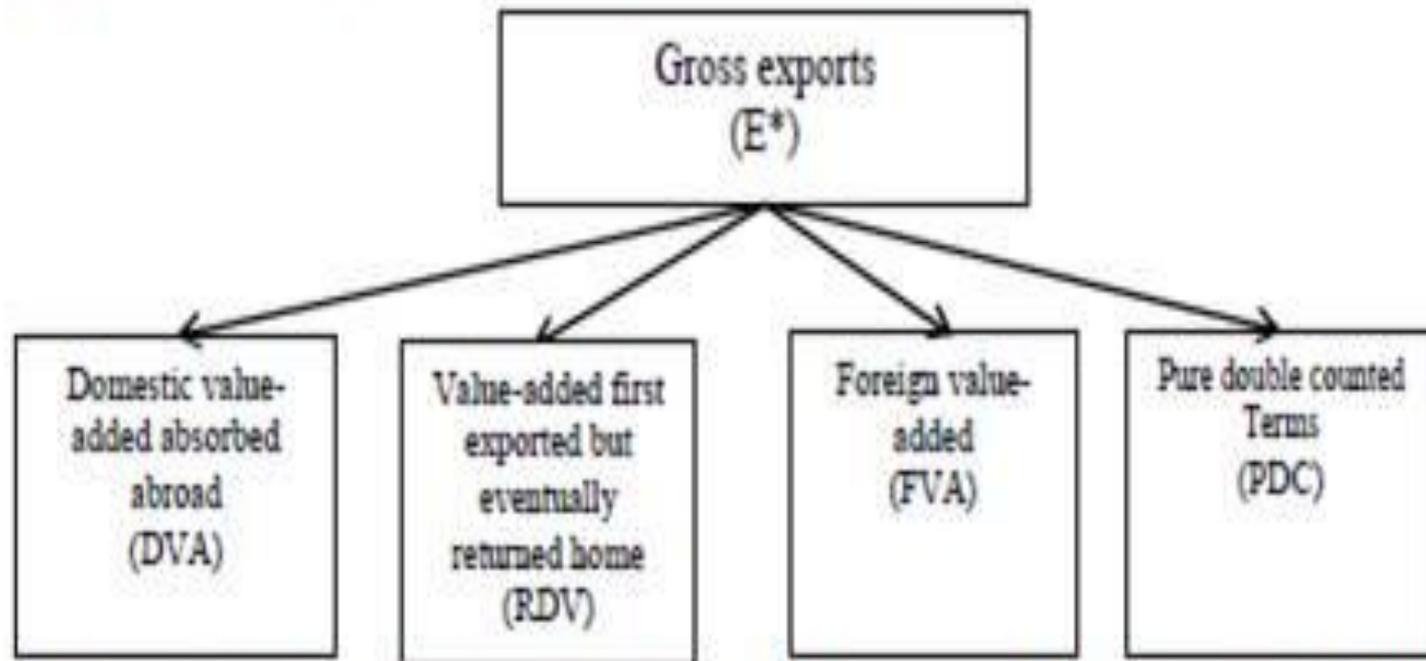
$$ERSP = \frac{T}{(\alpha - \beta)} \quad (2)$$

# Data and Method

- To measure ERSP, we need to estimate  $\alpha$  – the domestic value added of Chinese exports to the US - as accurately as possible.
- Our basic database is the ADB's multi-regional input-output (MRIO) tables for 2018. (For details-  
[http://www.wiod.org/otherdata/ADB/ADB\\_MRIO\\_SM.pdf](http://www.wiod.org/otherdata/ADB/ADB_MRIO_SM.pdf))
- We use these data to decompose gross exports into domestic value added, returned domestic value added, foreign value added, and pure double counting

# Data and Method

Figure 1a Gross Exports Accounting: Major Categories



Note:  $E^*$  can be at country/sector, country aggregate, bilateral /sector or bilateral aggregate; both DVA and RDV are based on backward linkages

# Data and Method

- This decomposition allows us to remove foreign VA and pure double counting from gross exports
- We employ the methodology proposed by Wang, Wei, and Zhu (2017).
- This improves on the method developed by Koopman, Wang, and Wei (2014) in a number of ways, including enabling decomposition of gross trade flows at the bilateral-sector level.

# Results

- For total manufacturing, domestic value added for Chinese exports to the US in 2018 is estimated at less than one-third (31%).
- There is significant variation in  $\alpha$  across sectors.
- It is highest for leather and footwear (52.1%); electrical equipment (40.5%); and textiles and clothing (31.9%);
- It is lowest for transport equipment (5.4%); food and beverages (7.4%) and chemical products (9.9%).

## Value Added (VA) in China of Exports to the US, and Effective Rate of Spillover Protection (ERSP), 2018

Column1	Column2	Column3	Column4	Column5	Column6
	VA (\$ m)	VA (%)	ERSP 1	ERSP2	ERSP3
	2018	$\alpha$	T=15	T=25	T=30
Food, Beverages, and Tobacco	6,273	7.4	203	338	406
Textiles and Clothing	41,329	31.9	47	78	94
Leather and Footwear	24,037	52.1	29	48	58
Wood and Wood Products	3,220	22.3	67	112	134
Paper, Printing, and Publishing	3,620	10.4	145	241	289
Chemicals and Chemical Products	20,479	9.9	151	252	302
Rubber and Plastics	11,093	21.1	71	119	142
Other Non-Metallic Minerals	6,992	27.4	55	91	110
Basic Metals and Fabricated Metal	23,231	14.5	103	172	207
Machinery, Nec	33,736	22.3	67	112	135
Electrical and Optical Equipment	159,459	40.5	37	62	74
Transport Equipment	20,296	5.4	279	465	558
Manufacturing, Nec.	29,660	28.1	53	89	107
<b>TOTAL</b>	<b>383,424</b>	<b>30.9</b>	<b>49</b>	<b>81</b>	<b>97</b>

Source: Autiher's calculations. Data from ADB Multi-Regional Input–Output Tables; methodology by Wang, Wei, and Zhu (2017)

# Results

- Disaggregation also highlights differences in the shares of fixed versus variable costs in total costs.
- In labour-intensive industries like textiles, clothing and footwear, the low share of sunk costs makes them more footloose, and therefore less costly to relocate.
- This is unlike more complex and capital intensive manufacturing industries like machinery, electrical or transport equipment.

# Results

- The lower (higher) the share of sunk costs in total costs, the higher (lower) is the likelihood that the activity will be transferred across borders to avoid the tariff, for any given  $\alpha$ .
- Even if explicit RoO are unlikely to be adopted, notional ones must guide the determination of nationality for GSC manufactures.

# Results

- To achieve the objectives of the trade war,  $\beta$  should not be too low or too high, depending on the level of commodity disaggregation.
- Setting  $\beta = 25\%$  results in 68% of total Chinese exports to the US being affected.
- Raising it to 40% (AFTA min.) reduces it to 48%, and to 50% (EU min.) reduces it to 6%.

# Conclusions & Policy Implications

- Main conclusion: a relatively small bilateral tariff can have rapid and significant impacts on GSCs.
- It is rapid because the trade war is seen as symptomatic of larger, underlying forces at play, which are likely to endure beyond the dispute. The quicker the adjustment, the lower the cost
- It is significant because the amount of protection provided to countries that compete with China for activities along the GSC is much higher than implied by the tariff rate alone, and usually some multiple of it.

# Conclusions & Policy Implications

- While the disruption was almost immediate and noticeable, not all of it is of the kind intended by the Trump administration.
- If the intention was to assist US producers and/or penalize Chinese firms, both objectives are compromised by the presence of GSCs.
- Like Japan following the Plaza Accord, China can limit the impact of punitive tariffs by shifting activities within GSCs to third countries, and reporting their bilateral surplus with the US from these countries.

# Conclusions & Policy Implications

- The retaliatory tariffs by China are also affecting US firms exporting to China.
- Both parties are made worse off, world welfare is reduced, but countries that compete for activities undertaken in China within GSCs may benefit. Some in ASEAN.
- Some decoupling from China and US, and an increase in deglobalisation with reshoring and near-shoring is likely in order to manage risks.

# **Appendix**

Analytical Framework:

Derivation of *ERSP* (with and without RoO)

# Analytical Framework

- Assume that the U.S. is importing a product from China at a cif cost of  $C$  in which the Chinese share in the constituent value added is  $\alpha$ .
- Now assume that as a result of the trade war, the U.S. imposes a discriminatory tariff at rate  $T$  on products deemed to be produced in China.
- To protect market share in the US, this will cause the Chinese activity that contributes to the product to be moved out of China (including possibly to the US) if the activity can be carried out in a non-Chinese location at a cost less than  $Z$  where:

## Analytical Framework

$$(1-\alpha)*C + Z = (1+T)*C \quad (1)$$

- We define the effective rate of protection given to potential non-Chinese producers of the Chinese activity that contributes to the import, or the effective rate of spillover protection (*ERSP*) by

$$ERSP = \frac{Z}{\alpha*C} - 1 \quad (2)$$

## Analytical Framework

- The tariff makes it possible for an alternative supplier to compete with China in the production of this activity or task providing that the proportionate extra cost in the alternative location is less than  $ERSP$  defined by (1) and (2).
- From (1) and (2) we see that

$$ERSP = \frac{T}{\alpha} \quad (3)$$

# Analytical Framework

- Alternative producers become competitive in Chinese activities contributing  $(\alpha - \beta) * C$  to VA providing their costs are less than  $Z$  where

$$(1 - \alpha) * C + \beta * C + Z = (1 + T) * C \quad (4)$$

- We define the effective rate of protection given to potential non-Chinese producers of the Chinese activities beyond the VA threshold by

$$ERSP = \frac{Z}{(\alpha - \beta) * C} - 1 \quad (5)$$

- From (4) and (5)

$$ERSP = \frac{T}{(\alpha - \beta)} \quad (6)$$

For questions or comments, please contact

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