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The US-China Trade War: Spillover Effects on Indonesia and other Asian Countries

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Abstract

Approximately 41 percent of Indonesian exports are connected to global production networks, with the United States of America (US) and China as the two main trade partners. A network analysis is employed to trace the impact of US-China tariffs on their partners transmitted via the production networks. A 25 percent bilateral (US-China) tariff will decrease exports from China to the US twice as much as those from the US to China. Indirect exports from Indonesia may fall by US$300 million due to the US' tariffs on Chinese goods and US$36 million due to Chinese tariffs on the US' products. China has decreased the share of inputs originated from its leading input suppliers i.e., Japan and South Korea. The largest impacts of tariffs on Chinese exports to the US are computers, electronics, electrical equipment, textiles, and chemicals. Meanwhile, American goods suffering the largest effects are transportation equipment, chemicals, agricultural, and services.

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1. Introduction

Since 2018, the trade war between China and the United States of America (US) have intensified, triggering an increase in bilateral trade tariffs. Although efforts to remove tariffs have been proposed, tensions remain, with a possibility of duties escalating into another round of 'war'. The US-China trade war harms both countries' bilateral trade (Chong & Li, 2019; Iqbal et al., 2019; Li et al., 2018). More often than not, Chinese exports suffer bigger losses compared to the exports of American goods (Itakura, 2020; Kumagai et al., 2019; Li et al., 2020). However, it is uncertain to what extend the effects from tariffs are transferred to the integrated trade partners within the global value chain (GVC). The role of China as a major trade and production hub in Asia is likely to instigate spillover effects through its fragmented production networks to Asian countries (Xiao et al., 2020). Specifically, a reduction of exports from China to the US may lower demand for intermediate goods from the regional partners.

Studies on the diffusion of trade shocks suggest that the impacts of the trade war are mixed. While Korea (Lee, 2019), Southeast Asian countries (Aslam, 2019), and Europe (Huidrom et al., 2019; Vandenbussche et al., 2019) experienced adverse effects from the trade shocks, some Asian countries reported minor impacts from the US-China trade war (Mao & Görg, 2020). Raghavan and Devadason (2020), by employing a structural VAR approach, found that the indirect linkages of Southeast Asian (ASEAN) countries with China and the US are the transmission channels of the economic shocks. Aslam (2019) concludes that trade tensions could harm indirect exports from ASEAN to the US, although it is possible that ASEAN countries become substitute Chinese exports to the US. Caceres (2019) and Li et al. (2020) found similar results to those of Aslam (2019).

In this paper, we examine the role of the global value chain (GVC) in transmitting trade shocks from the US-China trade tensions to Indonesia. We first decompose gross trade into value-added components to measure the trade linkages across countries, following Koopman et al. (2014). Employing a network analysis, forward and backward linkages are used to estimate the transmission of effects of tariffs across countries from a 25 percent bilateral tariff levied between the US and China. We propose a scenario of 25% bilateral tariffs between the United States and China considering two points. First, in April 2018 US imposed tariffs on 25% on 50 billion of goods from China (Section 301), and China imposed equivalent tariffs on US imports. On 2018, imposition of further rounds of 25% tariffs continued (Bown, 2019). Second, in May 2019, the US announced that it will impose 25% tariffs on US$ 200 billion of imported Chinese goods, originally set at 10%, with threats to levy an additional 25% on nearly $325 billion of Chinese products. China announced equivalent increases in tariffs. Although in 2019 overall tariffs went beyond 25% (more than what it was implied), by December 2019 US tariffs on Chinese goods rose from 12% to 26.6% and those from China on US goods increased from 17% to 25.9% (Bown, 2019; Devarajan et al., 2020).

The current trade arrangement is portrayed by flows of slices of value-added exports under the highly fragmented production networks (Bems & Johnson, 2017). Interrelated activities under the GVC increases the exposure of countries to changes in global demand, international trade policies, and worldwide prices (Tan et al., 2019; Xiao et al., 2020). A value-added approach provides a framework to understand how effects of tariffs are transmitted to global production and trade (Huidrom et al., 2019; Simola, 2019; Vandenbussche et al., 2019).

Trade under fragmented networks is often analyzed by employing global input-output (I-O) models as it can measure the value-added traded under vertical structures (Koopman et al., 2014), and help to trace the distribution of trade shocks across the GVC. As noted by Mattoo et al. (2017), foreign intermediates parts and components (IPCs) are important elements in the

competitiveness of countries in the GVC, suggesting that trade shocks are likely to extent along the chain of indirect partners participating in the production of goods.

This paper estimates the spillover effects of the US-China tariff escalation on Indonesia and some Asian countries. We estimate the indirect impact on demand for Asian value-added exports deriving from the 25 percent bilateral tariff imposed across the US and China. Indonesia and selected Asian countries are chosen for this study as the region shows a rapid change in global integration, with intermediate inputs expanding at an accelerated speed, connecting with production networks in China (Padilla et al., 2019; Handoyo, Sugiharti, & Esquivias, 2021). Southeast Asian countries are shifting from large integration in early 2000 with Japan and South Korea, to a growing integration with China (Esquivias Padilla et al., 2017). For instance, Asian countries are more exposed to indirect effects in trade tensions in the US-China trade war as they had expanded their ties within the GVC (Purwono et al., 2020).

This paper contributes to the literature by firstly, adding to the empirical debate on the indirect effects of the US-China trade war on Asian countries. Second, we compare the effects on Indonesia to those in selected Asian countries (Japan, India, South Korea, and Southeast Asian countries). By doing so, we provide insights on how fragmented structures in production and trade become a channel to transmit trade shocks across regional partners—a point often neglected in the literature in regional trade.

To the best of our knowledge, this study provides the first-time quantitative estimates of the impact of the US-China trade on regional trade, by using a network analysis. We use the trade in value added (TiVA) dataset (OECD-WTO), covering the period of 2005-2015, which includes 64 countries (n) and 34 sectors (k).

2. Literature Review

In the last two decades, Asian countries expanded rapidly within the GVC, partly as liberalization of trade took place and important trade integration supported the free movement of goods within the region (Athukorala, 2012; Baldwin & Lopez-Gonzalez, 2015). After the full incorporation of China on the WTO, Factory Asia had placed China at the center of production and trade, connecting countries across the region to the GVC (Xiao et al., 2020). However, an increasing interconnectedness in production sharing structures increases countries' exposure to trade shocks and changes in global demand (Huidrom et al., 2019). Lee (2019) notes that South Korean Industries are progressively concentrated and globally interrelated, suggesting that the GVC trade linkages are avenues for spreading global shocks. Under the increasing trade tensions in dominant economies, partners countries (suppliers) are exposed to the risk to economic swings and job losses (Vandenbussche et al., 2019).

Other papers have explored the role of fragmented structures in the transmission of trade shocks, postulating that higher integration in the GVC lowers the bilateral head-to-head competition but increases exposure to shocks (Lee, 2019; Mattoo et al., 2017; Simola, 2019). The rising trade tensions between the US and China are likely to spill over in terms of demand-and-supply effects, with higher vulnerability in concentrated and interconnected networks.

Increasing uncertainty of trade and economic shocks are relevant in the GVC context, where far-reaching linkages hint that trade surprises are likely to spread across direct and indirect players (Kee & Tang, 2014). Sizeable differences in trade shocks' impacts when using value-added (Input-output models) instead of gross exports have been identified in highly integrated regions like Europe (Huidrom et al., 2019) or Asia, predominantly for countries that actively participate in trade under the GVC.

A growing strand of literature covering trade shocks and propagation of impacts across the GVC employs input-output frameworks (Huidrom et al., 2019; Simola, H., 2019). Using network analysis, Xiao et al. (2020) identify that after a tariff is imposed, the shock has a local

content (spread across sectors) and a foreign impact, forming a cascade of losses. The losses are then closely linked to value-added exports rather than gross exports. Simola (2019) looks at the impact of the recent US import tariffs levied on Chinese goods, pointing out the indirect effects on the third-country partners spreading across the production networks. A scenario proposed in Huidrom et al. (2019), assuming that the US imposes a 25 percent tariff in EU cars identifies that nearly half the impact is transmitted to the sector-country directly, while the rest is spread through the supply chains. When employing a value-added approach, the shock effects are traced in multiple countries and industries, rather than on the direct exporter alone.

Another set of studies employs the input-output framework to analyze the impact of growth shocks, identifying a negative impact transmitted to foreign players via trade channels. Vandenbussche et al. (2019) evaluate the Brexit's effects, finding strong linkages across European countries with an increase in the negative impacts especially among the upstream producers. Huidrom et al. (2019) estimate that economic shocks' effects are felt nearly 2.5 time more substantially in highly integrated economies than in less interconnected countries.

As for Asian countries, Esquivias Padilla et al. (2017) noted that East and Southeast Asian countries are likely to be affected by indirect shocks considering their crucial role as a supplier of inputs. Some Asian countries like Indonesia, India, Japan, and South Korea hold a forward position in the GVC (supplier of intermediates), meaning that shocks in demand from partners could lead to a fall in exports, as observed in other countries (Lee, 2019). Asian countries have developed increasing dependence on production networks within China (Purwono et al., 2020), whereas the direct exposure is lesser to North America and Europe. The indirect impacts from the trade pressures in China and a possible global slowdown could trigger unfavorable economic consequences for Asian countries.

3. Data and Model Specification

First, we carry out a decomposition of gross exports into value-added terms (VA hereafter) provided by Koopman et al. (2014) in a general case of *G* countries and *N* sectors, as applied in other studies (A. Aslam et al., 2017; Esquivias Padilla et al., 2017; Huidrom et al., 2019). Total exports (E_{sr}) within countries *s*, *r*, *g* split into exports of intermediate goods and final goods (Y_{sr}). Using the Leontief approach (total requirement matrix, B_{sr}), exports are expressed as the *direct input coefficient* A_{sr} *multiply by the gross output of country s* (Xiao et al., 2017). Gross exports are then decomposed into four groups of components (equation 13 in Koopman et al., 2014); 1) domestic value-added, 2) domestic value-added content initially exported then returned home, 3) foreign value-added content, and 4) double-counted terms.

$$
\begin{aligned}
uE_{s*} = &\left\{V_s \sum_{r\neq s}^{G} B_{ss}Y_{sr} + V_s \sum_{r\neq s}^{G} B_{sr}Y_{rr} + V_s \sum_{r\neq s}^{G}\sum_{t\neq s,r}^{G} B_{sr}Y_{rt}\right\} + \left\{V_s \sum_{r\neq s}^{G} B_{sr}Y_{rs} + V_s \sum_{r\neq s}^{G} B_{sr}A_{rs}(I-A_{ss})^{-1}Y_{ss}\right\} \\
&+ V_s \sum_{r\neq s}^{G} B_{sr}A_{rs}(I-A_{ss})^{-1}E_{s*} + \left\{\sum_{t\neq s}^{G}\sum_{r\neq s}^{G} V_t B_{ts}Y_{sr} + \sum_{t\neq s}^{G}\sum_{r\neq s}^{G} V_t B_{ts}A_{sr}(I-A_{rr})^{-1}Y_{rr}\right\} \\
&+ \sum_{t\neq s}^{G} V_t B_{ts}A_{sr} \sum_{r\neq s}^{G}(I-A_{rr})^{-1}E_{r*} \qquad (1)
\end{aligned}
$$

The four components are based on nine terms. X_{sr} is the vector of gross output specifying the amount of production from s used by r, Y_{sr} is the vector for the demand for final output from country *s* in country *r*. A_{sr} is an input-output coefficient vector (country r's use of inputs originated in s). The Vs matrix indicates the direct share of country *s* in the output. The complete step-by-step proof (extended version) of how value-added exports are fragmented is offered in Koopman et al. (2014).

The third and the fourth terms in equation 1 (see equation 13 in Koopman et al., 2014) indicate the forward linkages, while the sixth and seventh terms indicate the backward linkages. The forward linkages identify the value-added exports from a country e.g., Indonesia that will be shipped to a third country after a re-processing abroad. In our case, it is a value-added output that is originated from Asian countries and exported to the US via China (or to China via the US). Forward and backward linkages create a network of links between the countries that plays as a transmission channel for demand.

After computing value-added content in exports, we explore changes in demand due to the tariffs. Changes in demand for final goods (exp_{sj}) from sector *j* in country *s* arising from an increase in tariffs (τ) are computed by employing the model of Huidrom et al. (2019). A tariff equal to τ on exports from country *s*, sector *j* would imply a loss of α x τ x exp_{sj} in exports. α indicates the import elasticities (0.8 driving from studies as in Huidrom et al., 2019; Ossa, 2014). A 10 percent import tariff will reduce demand for goods by 8 percent. The exporting country's loss would be (DVA/exp_{sj}) α x τ x exp_{sj}, with DVA accounting for domestic value-added in exports. The difference (1 -(DVA/exp_{sj}) α x τ x exp_{sj} captures the effect that a foreign country will face. We compute forward linkages which capture the DVA of countries and sector that is indirectly re-exported.

A more detailed methodology of impact from tariffs is described in Huidrom et al. (2019). We use the TiVA dataset (OECD-WTO), covering the period of 2005-2015, which includes 64 countries (*s*) and 34 sectors (*j*). We propose a scenario of a 25 percent tariff of goods imposed bilaterally between China and the US, causing cascade effects across countries and sectors indirectly. We report the results from the direct impact of tariffs on value-added exports from the US and China and indirect losses for selected Asian countries. While this approach helps visualize how effects are spread through the GVC network, it misses accounting for the heterogeneity in elasticities across goods and countries.

It is worth noting that the network analysis is a partial equilibrium, assuming prices and total expenditure as given, not considering the possibility of trade diversion (M. Li et al., 2020). Nevertheless, in the context of complex production networks (GVC), trade diversion is improbable to take place within short periods (Handoyo, Sugiharti, & Esquivias, 2020).

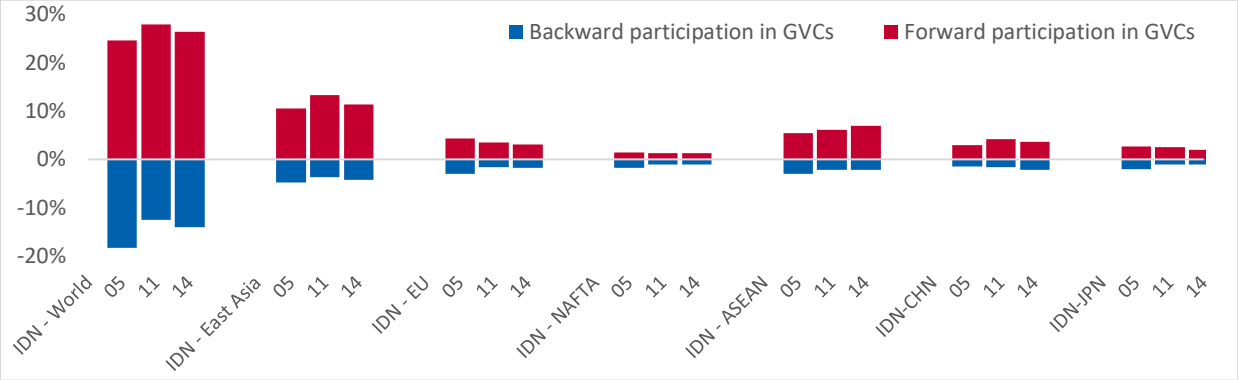
4. Results and Discussion

Regarding Indonesia's trade pattern from 2000 to 2014, gross exports multiplied from nearly US$70 billion to US$210 billion. The domestic value-added (VA) content of Indonesian exports remains similar (82 to 85 percent) within the period. Compared with countries like South Korea (73 percent) or Taiwan (68 percent), Indonesia has high domestic value-added content embedded in goods exported and low foreign value-added. Second, the share of intermediate parts and components (IPCs) in Indonesia expanded from 65 percent to nearly 75 percent of the total value-added exports. Compared to its Asian neighbors, which export nearly 60 percent of value-added content on IPCs, Indonesia has a notable large share of exports in raw and intermediate goods (Purwono et al., 2020). Large exports of IPCs to Asia imply that a decrease in demand for Asian goods e.g., due to a hike in tariffs imposed by the US on Chinese goods may indirectly harm the competitiveness of Indonesian exports. The impact of price changes will depend on how engaged Indonesia is in the GVC and how elastic the demand is towards changes in prices (Mattoo et al., 2017).

Around 40 percent of total value-added exports in Indonesia occurs under production networks (the GVC). As noted in Figure 1, nearly 27 percent of Indonesia exports are value-added content that will be re-exported by third countries (forward linkages). On the contrary, Indonesian exports contain 14 percent of foreign value-added content (backward linkages). Spillover effects from upstream or downstream players can indirectly affect the demand for

Indonesian goods. Indonesia's substantial participation in the GVC is with East Asia or Southeast Asian countries (ASEAN). China is the primary driver of the indirect exports for Indonesia (3.6 percent of total value-added exports), in line with increasing China's expansion as a GVC hub in Asia (Xiao et al., 2020).

Figure 1: Backward and Forward Linkages - Indonesia (2005, 2011, 2014)



Notes. Backward Linkages (Foreign value-added share of gross exports). Forward Linkages (Domestic value added in foreign exports). Indonesia (IDN). East Asia (Japan, South Korea, Hong Kong, Taiwan). European Union (EU). North America (NAFTA). Southeast Asian Countries (ASEAN). China (CHN). Japan (JPN).

4.1 Network Analysis

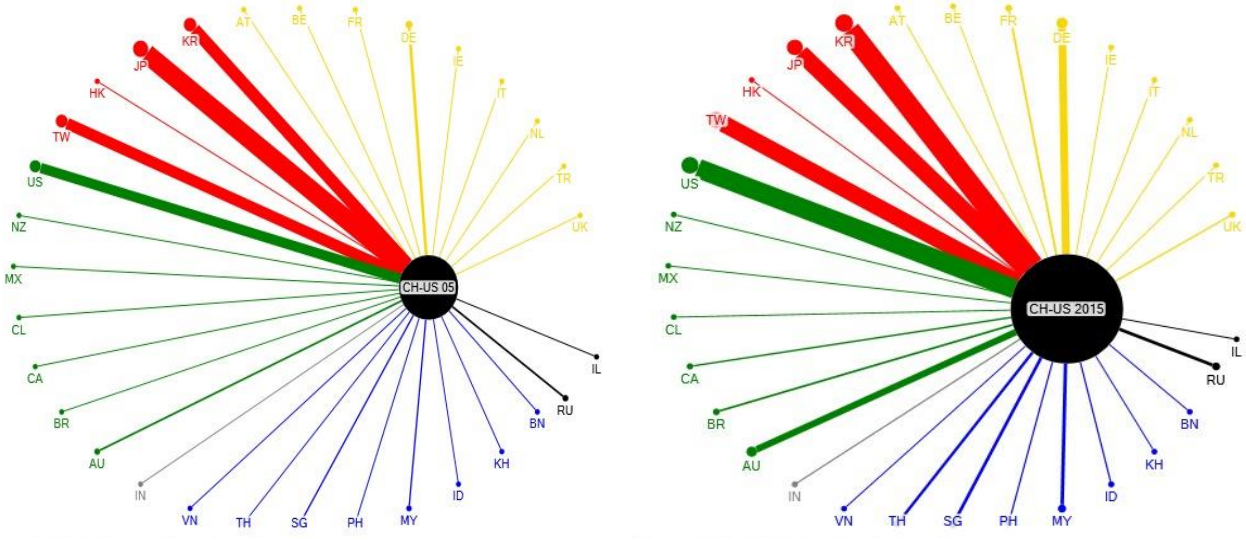
As a background, in 2014, exports from China to the US recorded nearly US$468 billion of goods, US$193.4 billion of final goods (FG), and US$230 billion of intermediate parts and components (IPCs). In 2014, exports of computers, electronic, and electrical equipment (CEE) to the US were the largest category, equivalent to US$158 billion. The second and third largest contributors to exports were textile products (US$75 billion), and other manufacturing goods (US$40 billion). Interestingly, China increased its domestic value-added content on exports to the US, from 73 percent back in 2005 to more than 80 percent in 2014 (See *Figure 2*). In the CEE sector, China increased its domestic content from 59 percent in 2005 to 70 percent in 2014 (See *Figure 3*). In textile goods, China expanded its domestic content to nearly 90 percent of total value-added in 2014. Kee and Tang (2014) noted that China substituted foreign inputs for domestic ones, becoming highly competitive in sourcing intermediate goods at home.

Table 1: Bilateral Gross Exports China - the United States (Selected sectors 2005 - 2014)

	China Exports to the US (US$ billion)				**US Exports to China** (US$ billion)				**Domestic Value-Added Share on Exports (DVA)**			
	Final Goods		**IPC**		**Final Goods**		**IPC**		**China**		**US**	
	2005	**2014**	**2005**	**2014**	**2005**	**2014**	**2005**	**2014**	**2005**	**2014**	**2005**	**2014**
Computers, electronic, electrical	46,2	73,3	27,6	85,2	1,9	5,8	5,7	14,3	60%	71%	87%	89%
Textiles, apparel, leather	27,0	56,8	10,1	19,0	0,1	0,3	0,2	0,5	82%	89%	85%	83%
Other manufacturing	14,8	34,5	2,9	5,4	0,2	1,6	0,1	1,2	79%	84%	87%	87%
Chemicals, non-metallic mineral	4,4	13,5	11,5	30,4	0,4	3,3	5,8	19,0	77%	82%	81%	80%
Machinery, equip	4,3	9,6	8,3	26,6	3,3	8,5	1,9	4,1	75%	82%	82%	80%
Basic metals, fabricated	2,1	4,5	11,7	26,3	0,1	0,8	3,1	7,6	76%	80%	84%	82%
Transport equipment	5,8	16,5	3,2	6,0	3,2	21,7	1,5	12,5	77%	81%	81%	79%
Wood, paper	0,7	2,1	3,9	8,8	0,1	0,5	2,6	8,7	80%	85%	88%	86%
Food, beverages, tobacco	1,9	4,6	0,9	2,6	0,9	4,2	0,5	3,6	90%	91%	90%	89%
Agriculture, forestry, fishing	0,1	0,4	0,3	1,1	1,3	6,6	2,4	13,3	94%	93%	91%	90%
Mining and quarrying	0,0	0,0	0,6	0,2	0,0	0,0	0,3	2,4	89%	86%	89%	96%
Manufacturing	107,1	215,3	80,2	210,1	10,2	46,6	21,5	71,5	71%	79%	84%	82%
Total services	10,6	22,0	7,2	18,0	6,7	43,2	10,1	43,4	89%	93%	95%	95%
TOTAL	118,0	238,1	88,5	230,1	18,2	96,3	34,3	130,6	73%	80%	89%	89%

Note. Final Goods (FG), Intermediate Parts and Components (IPC), Domestic Value Added (DVA), Share of DVA % of Chinese Goods (CHN) exported to the US (Data estimated from TiVA Database).

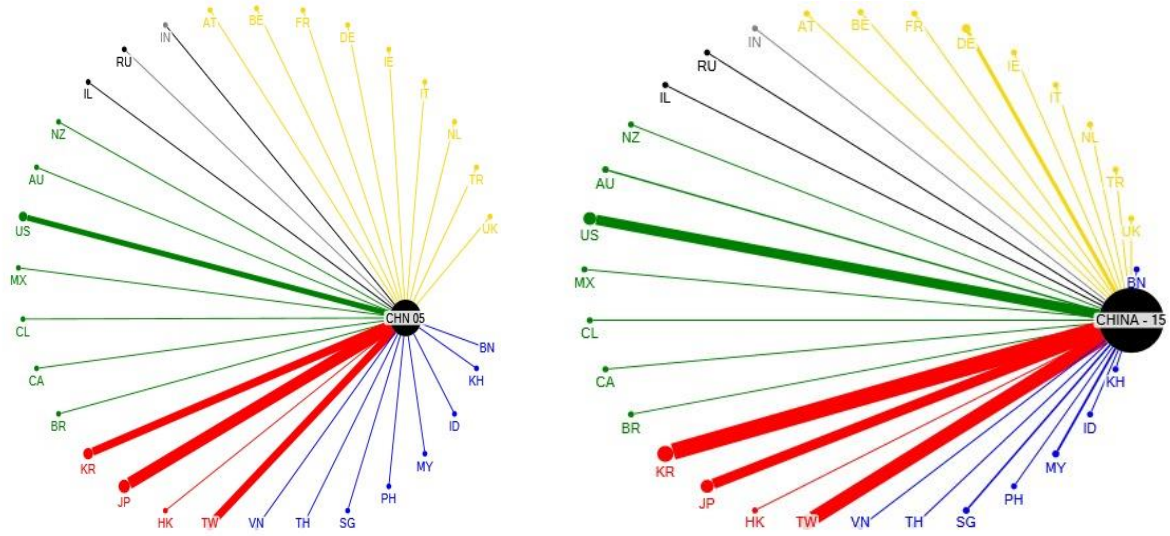
Figure 2: Origin of Total Value-added exported from China to the US, 2005 and 2015 (Total Exports)



Note. Nodal size is proportional to the value-added contributed by each Country on exports from China to the US. The edge width is proportional to the share of value-added flow. Country Postal Abbreviations.

Figure 2 illustrates the decrease of foreign value-added content embedded in Chinese goods exported to the US over time. In 2004, intermediate goods from East Asian partners embedded in Chinese exports to the US was nearly 12 percent, falling to less than 5.5 percent in 2014. In exports of CEE goods (Figure 3), China replaced foreign inputs (40 percent of foreign value-added in 2005) for domestic content (FVA in 2014, 30 percent). Mainly in sectors like the CEE foreign inputs remain extensive (Table 2). As noted by Bown (2019), a large number of Chinese exports to the US under CEE categories are subjected to large tariffs.

Figure 3: Origin of Value-added exported from China to the US, 2005 and 2015 (Computers, electronics, and electrical equipment)



Note. See Notes in figure 2. Country Postal Abbreviations.

To visualize the impact of a tariff of 25 percent on Chinese goods by the US, we consider a calibrated elasticity of 0.8 in line with (Huidrom et al., 2019; Liu & Woo, 2018). The 25 percent tariff on all goods from China will increase the price of final goods in the US, leading to a decrease in demand for Chinese products. Value-added exports of final goods from China to the US decreased by US$38.6 billion (Table 3). The effect of tariffs on intermediate goods is

more extensive, estimated at US$2.5 billion (Table 4). Countries sourcing intermediate inputs to China employed in producing exports to the US will also absorb a loss. East Asian countries will feel the largest indirect impact, i.e., South Korea, Japan, and Southeast Asia (Table 2 and Table 3). As for Indonesia, the total loss of value-added exports shipped to the US through China equals US$331 million. A total of US$150 million is a loss via value-added output embedded in final goods from China to the US and the difference, US$180 million, in the form of value-added intermediate goods exports.

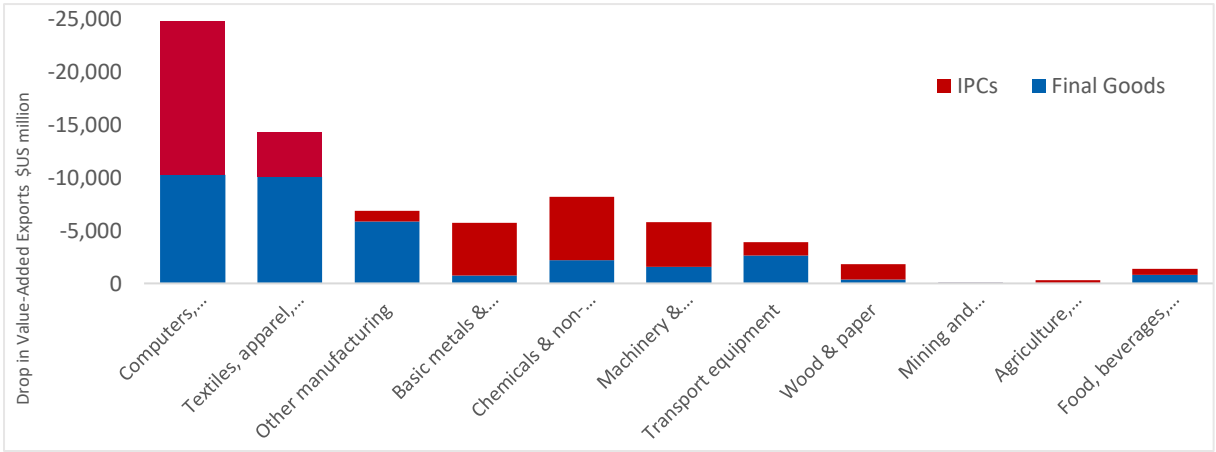
Table 2: Spillover from a tariff on Chinese goods in the US (distribution of effects in %)

	CHN	EASIA	JPN	KOR	AUS	IND	ASEAN	IDN	Other
Computers, electronic, electrical	69,9%	12,2%	3,3%	4,6%	1,0%	0,3%	3,8%	0,4%	4,6%
Textiles, apparel, leather	88,5%	2,3%	0,9%	0,8%	0,3%	0,5%	1,2%	0,3%	5,3%
Other manufacturing	84,3%	2,7%	1,2%	0,9%	1,0%	0,4%	1,5%	0,4%	7,6%
Chemicals and non-metallic	81,5%	3,2%	1,4%	1,2%	0,6%	0,3%	1,5%	0,4%	10,0%
Machinery & equipment	81,7%	4,0%	1,8%	1,3%	1,6%	0,2%	1,3%	0,3%	7,7%
Basic metals and fabricated	80,7%	2,7%	1,3%	0,9%	2,9%	0,2%	1,2%	0,4%	9,6%
Transport equipment	80,7%	4,2%	2,0%	1,3%	1,1%	0,2%	1,3%	0,3%	8,9%
Wood and paper products	85,4%	1,8%	0,8%	0,6%	0,5%	0,2%	1,3%	0,4%	9,1%
Food, beverages, tobacco	91,1%	0,8%	0,3%	0,3%	0,4%	0,1%	0,9%	0,2%	5,8%
Agriculture, forestry and fishing	93,1%	0,7%	0,3%	0,3%	0,3%	0,1%	0,6%	0,2%	4,4%
Mining & quarrying	86,7%	2,2%	0,0%	0,0%	2,2%	0,0%	0,0%	0,0%	8,9%
Manufacturing	**80,0%**	**6,0%**	**1,9%**	**2,2%**	**0,8%**	**0,3%**	**2,1%**	**0,3%**	**6,2%**
Total services	**92,7%**	**1,1%**	**0,4%**	**0,4%**	**0,2%**	**0,1%**	**0,5%**	**0,1%**	**4,5%**
TOTAL	**81,2%**	**5,5%**	**1,8%**	**2,0%**	**0,8%**	**0,3%**	**2,0%**	**0,3%**	**6,1%**

Note. China (CHN), East Asia (EASIA), Japan (JPN), South Korea (KOR), Australia (AUS), India (IND), Indonesia (IDN)

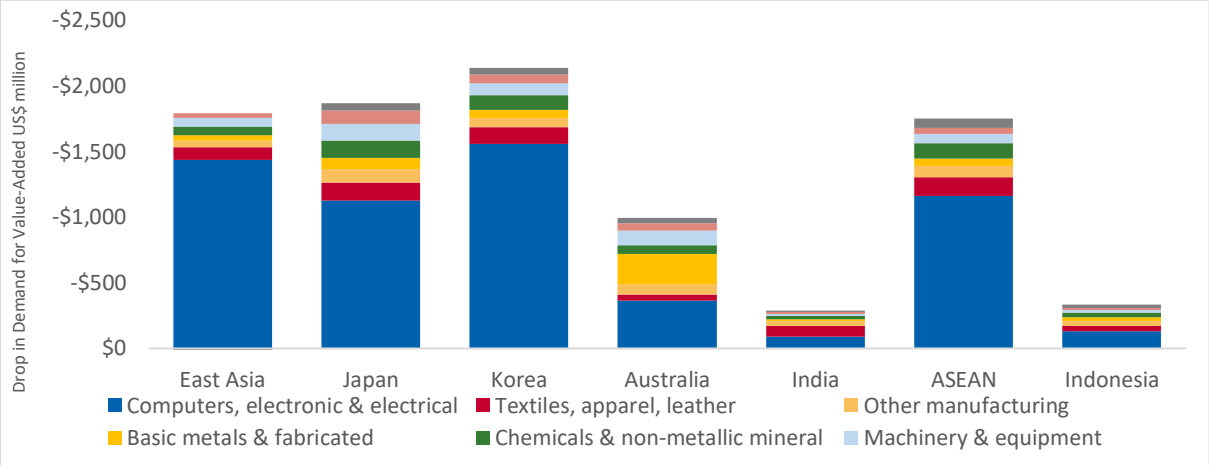
The 25 percent of tariffs' most enormous impact is within CEE goods, followed by textiles, other manufactures, and transportation equipment (Figure 4). While the decrease in demand for final Chinese goods is large (US$38 billion), the spillover effects to partners are small (Table 3) with few exceptions. Unusually large are the spillovers to South Korea and Japan, followed by other East Asian partners and ASEAN (as a region). As an illustration, nearly 30 percent of the value-added in final goods within CEE exported to the US are sourced by partners (Table 2). Korea and Japan add almost 8 percent of the total value-added content, and ASEAN countries 3.8 percent. Indonesia has a 0.4 percent value-added in exports of CEE from China to the US, which is a small share (Figure 8).

Figure 4*:* Impact of 25% Tariff on Total Chinese Exports to the US



Applying disaggregated data in a CGE model, Li et al. (2020) found that Machinery, chemicals, electronics, and textiles are the sectors with the largest losses after tariffs impositions from the US on China, similar to our findings. However, we employ different baselines on tariffs. Li et al. (2020) estimate that trade may divert to East Asian countries under a 30 percent tariff scenario. As a large exporter of electronics, Korea may see its exports to the US rose by 17.5 percent. Similarly, exports to China may divert to Asian countries to source the US (Aslam, 2019; Caceres et al., 2019). Our findings are in line with studies suggesting that negative spillovers to third countries are relatively low, with China absorbing most of the impact (Aslam, 2019).

Figure 5: Drop in Demand for Value-Added Exports for Asian countries (25% Tariff in Chinese goods in the US)



Note. East Asia (Excludes Japan and S Korea), ASEAN (Association of Southeast Asian countries)

Table 3: Impact on value-added exports from China and partners after a 25% tariff on Final Goods by the United States (US$ Million)

	China	KOR	JPN	IND	AUS	IDN	East Asia*	ASEAN*
Computers, electronic, electrical	-10.252,66	-675,24	-479,60	-38,70	-144,64	-53,88	-1.781,30	-502,74
Textiles, apparel, leather	-10.058,12	-89,84	-98,88	-54,02	-34,52	-31,60	-258,80	-100,64
Other manufacturing	-5.818,62	-61,84	-84,70	-30,34	-66,12	-27,74	-189,46	-73,98
Chemicals, non-metallic	-721,92	-7,84	-11,52	-2,16	-26,12	-3,50	-24,14	-7,26
Machinery and equip	-2.195,20	-31,42	-36,38	-6,90	-16,36	-10,10	-86,46	-31,38
Basic metals, fabricated	-1.575,40	-25,16	-34,44	-4,52	-31,18	-5,96	-77,20	-19,70
Transport equipment	-2.663,10	-44,30	-66,04	-7,98	-36,52	-9,24	-136,98	-32,58
Wood, paper	-354,98	-2,40	-3,40	-0,64	-1,92	-1,84	-7,54	-3,64
Food, beverages, tobacco	-0,78	0,00	0,00	0,00	-0,02	0,00	-0,02	0,00
Agriculture, forestry, fishing	-69,86	-0,20	-0,24	-0,08	-0,22	-0,12	-0,56	-0,36
Mining and quarrying	-830,82	-2,50	-3,02	-1,28	-3,84	-2,04	-7,54	-6,18
Manufacturing	-34.470,80	-940,56	-818,00	-146,56	-361,22	-145,92	-2.569,46	-778,52
Total services	-4.078,28	-16,72	-18,14	-4,14	-9,92	-4,64	-48,04	-18,02
TOTAL	-38.681,46	-957,82	-836,76	-150,84	-372,00	-150,98	-2.619,06	-796,92

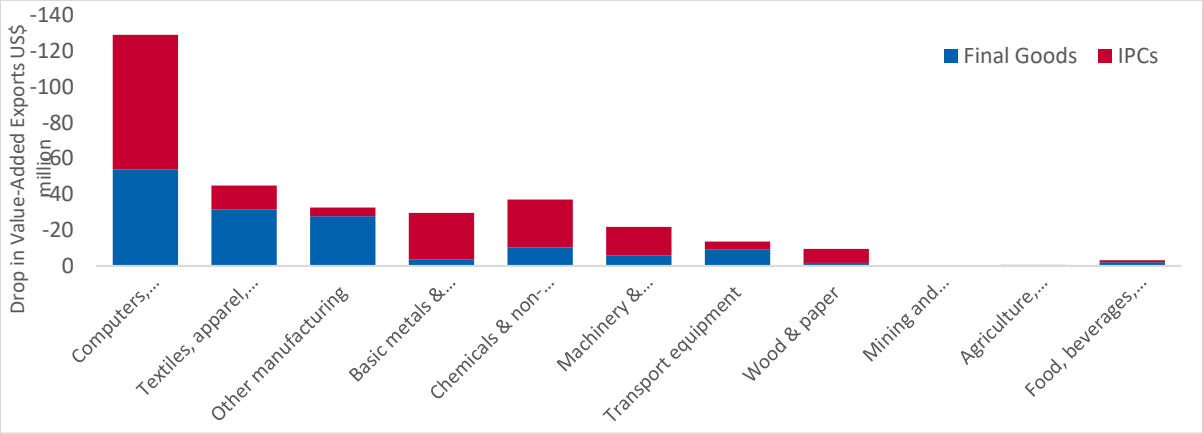
Note. Amounts in US$ million. Tariffs levied only on final goods from China to the US. See notation in Table 2

The negative impact on partners via exports of IPCs increases noticeably compared to final goods (see Table 4, Table 5, and Figure 3). For the case of Indonesia, the loss reaches US$331 million, as a share of Indonesian exports is employed for the production of IPCs that will be re-process and exported to the US via China. Similar cases are observed in other Asian countries. India has the lowest spillover effects among the sample.

It is worth noting that tariffs' effect on IPCs is larger than that of final goods. As indicated in Bown (2019), tariffs impositions under particular protection policies from the US to Chinese

goods had increased substantially within IPCs, estimated to cover more than 50 percent of total imports from China in 2018 (up from 7 percent in 2017), targeting flows equivalent to US$250 billion. Between April 2017 and February 2019, there were at least 26 escalation policies (or announcements) in which China and the US expanded the list of products under special protection (Bown, 2019). On China's side, some sort of protection has been levied in nearly 70 percent of goods originated from the US, partly as a retaliatory action (M. Li et al., 2020).

Figure 6: Impact of 25% Tariff on Chinese Goods in the US (spillover effects to Indonesia)



China's extended linkages with many countries suggest that higher tariffs levied on Chinese goods may reduce demand for intermediate goods from partner countries linked with China (Kumagai et al., 2019; Mao & Görg, 2020), following a rise in prices. A possible loss of competitiveness in Chinese goods may open the possibility of trade diverting from China to other Asian countries (Itakura, 2020; M. Li et al., 2020). Countries like Malaysia, Thailand, Singapore, and the Philippines can benefit to a larger extent than Indonesia. Mattoo et al. (2017) find that a 10 percent appreciation of Chinese goods may lead to a 1.5 to 2.5 percent increase in demand for exports from developing countries, depending on the extent of the pass-through of prices and elasticities substitution, and the level of competition against China. In sectors where Indonesia competes more closely with China in the US markets e.g., textiles, China's appreciation due to tariffs could lead to substitution effects.

Table 4: Impact on value-added exports from China and partners after a 25% tariff on Intermediate Goods by the United States (US$ Million)

	China	KOR	JPN	IND	AUS	IDN	East Asia*	ASEAN*
Computers, electronic & electrical	-14.529,66	-882,32	-646,02	-54,14	-217,70	-75,02	-809,96	-658,06
Textiles, apparel, leather	-4.234,66	-38,00	-41,78	-22,86	-14,60	-13,38	-29,66	-42,62
Other manufacturing	-1.005,80	-10,68	-14,64	-5,24	-11,42	-4,80	-7,42	-12,78
Chemicals & non-metallic	-5.970,88	-81,88	-96,74	-18,48	-47,08	-26,82	-49,32	-82,40
Machinery & equipment	-4.194,54	-67,00	-91,72	-12,04	-83,00	-15,90	-46,82	-52,42
Basic metals & fabricated	-5.001,56	-52,18	-76,70	-15,18	-207,38	-26,04	-31,80	-50,94
Transport equipment	-1.232,76	-21,16	-31,84	-3,72	-16,96	-4,30	-12,48	-15,26
Wood & paper	-1.473,54	-9,60	-13,26	-2,66	-8,16	-7,76	-6,84	-16,00
Food, beverages, tobacco	-513,46	-1,56	-1,88	-0,80	-2,36	-1,26	-1,22	-3,82
Agriculture, forestry, fishing	-228,82	-0,66	-0,78	-0,24	-0,72	-0,40	-0,42	-1,18
Mining and quarrying	-80,24	-0,54	-0,68	-0,14	-1,04	-0,24	-0,34	-0,56
Manufacturing	-38.156,88	-1.164,40	-1.014,56	-135,12	-608,68	-175,28	-995,52	-934,30
Total services	-4.004,82	-16,08	-17,48	-4,02	-9,40	-4,46	-12,92	-17,40
TOTAL	-42.594,00	-1.182,32	-1.034,28	-139,68	-621,08	-180,98	-1.009,74	-954,32

Note. Amounts in US$ million. Tariffs levied only on final goods from China to the US. See notation in Table 2

Table 5: Effects on Total Value-added exports from Chinese partners due to 25% tariff imposed on total goods originated from China (Spillover effects in US$ Million)

	JPN	KOR	AUS	IND	IDN	East Asia*	ASEAN*
Computers, electronic & electrical	-1125,6	-1557,56	-362,34	-92,84	-128,9	-1.436,46	-1160,8
Textiles, apparel, leather	-140,66	-127,84	-49,1	-76,88	-44,98	-99,74	-143,26
Other manufacturing	-99,34	-72,52	-77,56	-35,58	-32,54	-50,34	-86,76
Basic metals & fabricated	-88,22	-60,04	-233,5	-17,34	-29,54	-36,58	-58,18
Chemicals & non-metallic mineral	-133,1	-113,3	-63,46	-25,38	-36,92	-67,98	-113,78
Machinery & equipment	-126,18	-92,16	-114,18	-16,56	-21,86	-64,40	-72,12
Transport equipment	-97,88	-65,46	-53,48	-11,72	-13,54	-39,14	-47,84
Other	-60,06	-51,26	-39,46	-14,24	-23,68	74,08	-68,48
Wood, paper	-16,66	-12,02	-10,08	-3,3	-9,6	27,10	-19,64
Mining, quarrying	-0,68	-0,54	-1,04	-0,14	-0,24	-1,22	-0,58
Agriculture, forestry, fishing	-1	-0,86	-0,94	-0,32	-0,52	-10,36	-1,54
Food, beverages, tobacco	-4,9	-4,06	-6,2	-2,08	-3,3	-5.739,48	-10,02
Manufacturing	**-1832,56**	**-2104,96**	**-969,9**	**-281,66**	**-321,18**	**3.843,00**	**-1712,4**
Total services	**-35,6**	**-32,8**	**-19,32**	**-8,14**	**-9,1**	**-5.777,00**	**-35,42**
TOTAL	**-1871,04**	**-2140,14**	**-993,08**	**-290,54**	**-331,96**	**4.011,18**	**-1751,22**

Notes. See Notes in Table 2.

Figure 7: Impact of 25% Tariff on American Goods to China

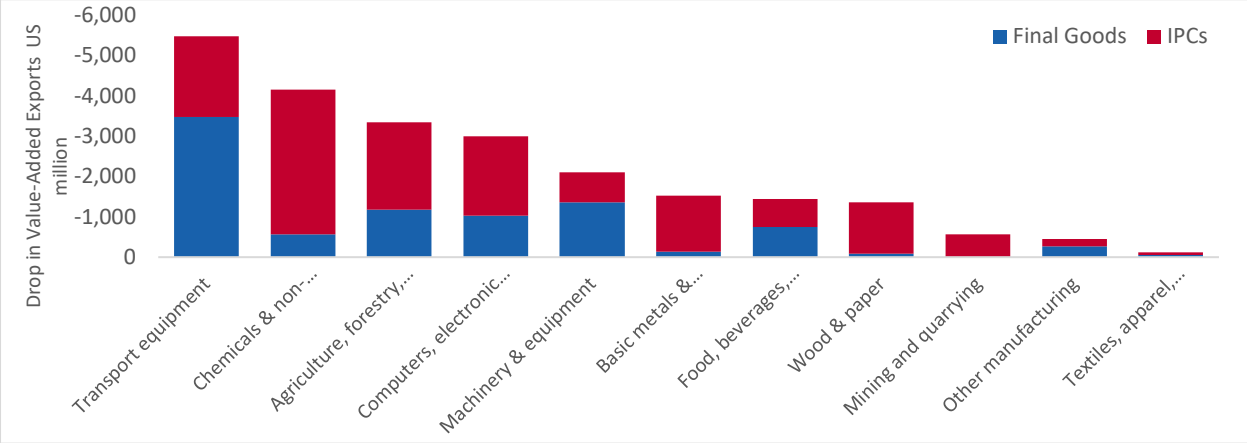
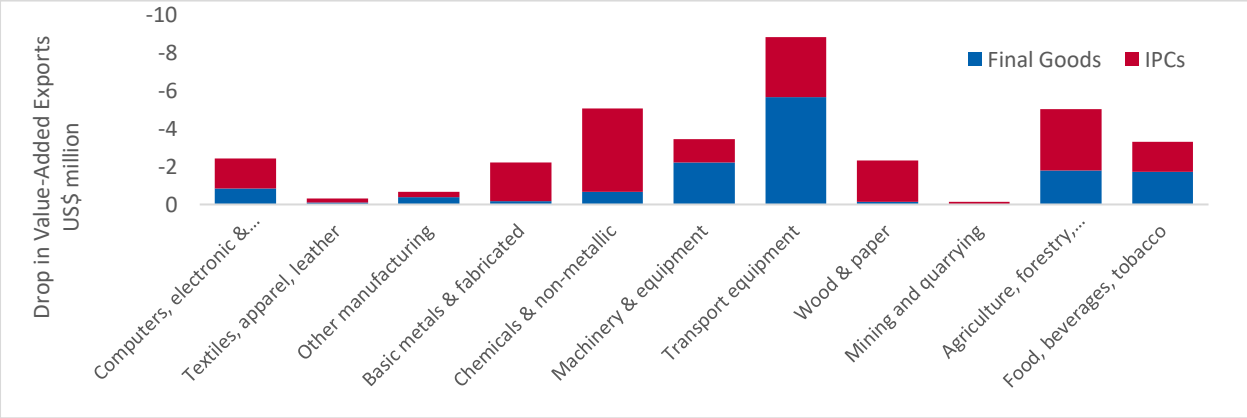


Figure 8: Impact of 25% Tariff on American Goods in China (spillover effects to Indonesia)



A.1 Effects in tariffs imposed by China on goods from the US

The US exports to China were valued US$226 billion in 2014. More than US$85 billion were final products and US$130 billion were intermediate parts and components. American exports

to China were substantially larger under services (US$88 billion) than the manufacturing goods. The principal exports of merchandise goods from the US originate from transport equipment, chemicals, agricultural products, and those under CEE sectors.

Table 6: Spillover effects of a 25% tariff on American Goods in China

	ASEAN	AUS	US	EAsia	IND	IDN	JPN	KOR	Other
Transport equipment	0,6%	0,2%	79,8%	4,3%	0,3%	0,1%	1,9%	0,9%	11,9%
Chemicals, non-metallic minerals	0,3%	0,1%	84,7%	1,5%	0,3%	0,1%	0,5%	0,2%	12,2%
Agriculture, forestry, fishing	0,3%	0,1%	90,1%	1,2%	0,2%	0,1%	0,4%	0,2%	7,3%
Machinery, equipment	0,6%	0,3%	79,9%	4,7%	0,3%	0,1%	1,7%	0,8%	11,6%
Food products, beverages, tobacco	0,5%	0,1%	88,8%	1,4%	0,3%	0,2%	0,4%	0,2%	8,1%
Computers, electronic, electrical	0,5%	0,1%	89,6%	3,4%	0,1%	0,1%	0,6%	0,5%	5,1%
Basic metals and fabricated	0,4%	0,3%	83,1%	3,2%	0,3%	0,1%	0,8%	0,6%	11,1%
Other manufacturing	0,4%	0,1%	87,1%	3,4%	0,3%	0,1%	0,5%	0,3%	7,6%
Textiles, apparel, leather	0,7%	0,1%	83,4%	6,0%	1,1%	0,2%	0,6%	0,4%	7,6%
Wood and paper	0,4%	0,1%	86,2%	3,1%	0,3%	0,1%	0,7%	0,4%	8,6%
Mining, quarrying	0,0%	0,0%	96,3%	0,3%	0,0%	0,0%	0,3%	0,0%	3,1%
Manufacturing	0,5%	0,2%	82,6%	3,8%	0,3%	0,1%	1,4%	0,7%	10,5%
Total services	0,2%	0,0%	95,0%	0,8%	0,1%	0,0%	0,3%	0,1%	3,3%
TOTAL	0,4%	0,1%	88,7%	2,3%	0,2%	0,1%	0,8%	0,4%	7,1%

Notes. See notation in table 2

Table 7: Effects on Total Value-added exports from US partners due to 25% tariff imposed on total goods originated from China (Spillover effects in US$ Million)

	East Asia	Japan	Korea	Australia	India	ASEAN	Indonesia
Computers, electronic & electrical	-77,84	-19,16	-15,24	-4,12	-4,24	-17,98	-2,44
Textiles, apparel, leather	-6,78	-0,76	-0,54	-0,14	-1,46	-0,88	-0,3
Other manufacturing	-13,16	-2,74	-1,74	-0,72	-1,8	-2,14	-0,68
Basic metals & fabricated	-24,90	-14,52	-9,98	-6,24	-5,76	-6,5	-2,22
Chemicals & non-metallic mineral	-36,34	-23,96	-11,02	-3,8	-11,84	-15,68	-5,08
Machinery & equipment	-58,68	-43,66	-20,58	-6,8	-8,76	-14,48	-3,44
Transport equipment	-106,14	-126,02	-61,18	-15,8	-22,66	-39,8	-8,82
Wood, paper	-34,46	-10,28	-5,94	-1,92	-4,4	-6,56	-2,32
Mining, quarrying	-1,28	-1,2	-0,48	-0,22	-0,34	-0,52	-0,14
Agriculture, forestry, fishing	-21,12	-15,88	-6,84	-3,8	-8,2	-12,52	-5,02
Food, beverages, tobacco	-13,98	-6,32	-3,3	-2,32	-4,22	-7,54	-3,3
Manufacturing	-372,34	-247,42	-129,48	-41,84	-65,14	-111,54	-28,62
Total services	-72,94	-49,12	-25,68	-8,14	-24,92	-32,92	-6,98
TOTAL	-467,76	-313,62	-162,46	-53,98	-98,6	-157,52	-40,76

Notes. See notation in Table 4

The imposition of a 25 percent tariff on final American goods by China is estimated to cause a decrease of US$17 billion on exports, with more than US$8 billion loss in manufacturing goods and US$7.6 in service-related activities. Still, the trade balance remains in favor of China, particularly within the merchandise. The trade surplus of China has increased over time (Liu & Woo, 2018). The US, on the other hand, has an ample surplus within services. As noted in Aslam (2019), trade policy from China towards the US has been more aggressive than the other way around, as indicated in the average tariffs levied by China on American goods and the coverage of goods under special protection (Bown, 2019).

As expected, due to distance, the value-added contribution of Asian countries in American goods exported to China is relatively small. The largest contribution via intermediate goods

comes from East Asian countries (China, Korea, and Japan), while ASEAN has little involvement. On the contrary, North American value-added content embedded in the US goods (US, Canada, and Mexico) is substantially larger than Asian content. For instance, the impact of a tariff levied on American goods by China has a considerably low effect on Indonesian value-added exports. Taxes imposed by China on American goods may decrease the value-added exports from Indonesia by US$40 million. The spillover effect is 12 percent compared to the impact of the US' tariff on Chinese goods. Our findings are in line with those of in (Aslam 2019), which pointed out that the US-China tensions or unilateral appreciation of prices in China are unlikely to have a large effect on the US-ASEAN trade.

Finally, since our model is static it does not capture possible trade diversion and reconfiguration in GVC as a response to the tariffs (Gereffi, Lim, & Lee, 2021). However, substitution and reshape in GVC is challenging in the short term as it is costly, taking longer periods of adjustment, and depending on the ability of countries and firms to respond to diversion prospects. The substitutability of goods will vary according to the sophistication (elasticity) of goods (World Bank, 2019) and the way firms engaged in GVC. Studies considering the diffusion of trade shocks suggest that although alternative countries may substitute Chinese exports to the US (and vice versa), impacts of the trade war on the Asian GVC are not expected to be large on the short run (Aslam, 2019; Caceres, 2019; Devarajan et al., 2020; Li et al., 2020; Lee, 2019; Mao & Görg, 2020). Although larger shocks are expected to take place through indirect channels and dynamic setting, this paper focuses on direct linkages that are likely to represent a main impact in most cases. Future research should consider dynamic models, indirect linkages, and potential scenarios under different assumptions to solve this short coming (Devarajan et al., 2020).

5. Conclusion

Indonesia's involvement in the GVC has expanded over time, as in 2014, nearly 40 percent of exports were linked to global production networks. Nearly 30 percent of Indonesia's total value-added exports are intermediate inputs that would travel through the GVC before reaching its final destination. Indonesia has strengthened its commercial ties with production networks across East Asia. The forward and backward linkages that Indonesia developed with China are extensive. Broad forward linkages hint that the US-China trade war could reduce the demand for value-added exports from Indonesia that are shipped to the US via production networks in China.

A network analysis using backward and forward linkages to measure the propagation effects of the US-China trade tariffs is applied. We consider a calibrated elasticity of 0.8 in line with previous studies and simulate the US-China bilateral tariffs of 25 percent. We use a global input-output framework, the TiVA dataset (OECD-WTO), covering the years 2000-2015.

The simulation of a 25 percent tariff on the US and China decreases Chinese exports by more than US$81 billion. CEE is the sector with the most losses, followed by textiles, chemicals, machinery, and transport. The effects of tariffs under IPCs is larger than the final goods. The spillover effects linked to Indonesia lowers its value-added exports by US$331 million. The impact of the US-China bilateral tariffs on Indonesian exports is relatively small, mainly because China has increased its domestic content on exports (lowering the foreign value-added). Countries like South Korea and Japan face a larger loss transmitted via the GVC, at US$2.6 billion and US$1.87 billion, respectively.

The 25 percent tariff imposed by China on the US goods decreases the US exports by nearly US$41 billion, half the loss of China. Almost 41 percent of the impact of tariffs would affect service exports. Transport equipment, chemicals, and agricultural goods are the most affected

sectors. The spillover effect decreases demand for Indonesian goods equivalent to US$40 million.

A substantial share of Indonesia's indirect impact derives from exports of intermediate goods between China and the US, where Indonesia's raw materials are involved. It suggests that exports of Indonesia may be relatively unsophisticated as they need to be re-process at least twice more. Additionally, the multiple cross-borders that Indonesian goods need to travel through before reaching their final destination decrease the cost competitiveness and increase the exposure to trade policies from any third countries.

Some trade diversion may take place as a result of trade restrictions. In the long run firms may alter supply by switching partners or upgrading GVC activities leveraging latest trade restrictions as noted in (Gereffi, Lim, & Lee, 2021). However, adaptation to new rules will take time and will depend on the way firms participate in GVC.

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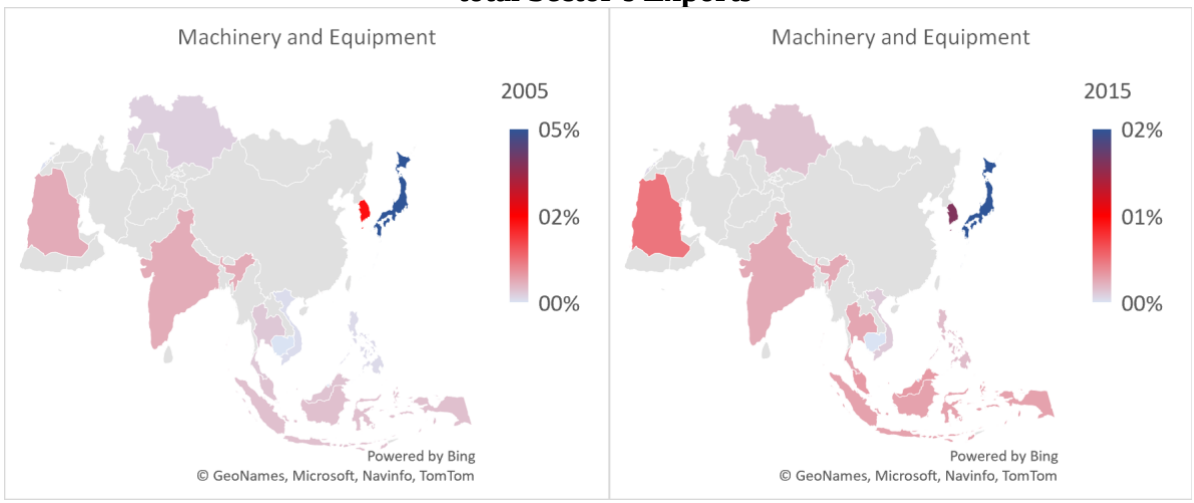
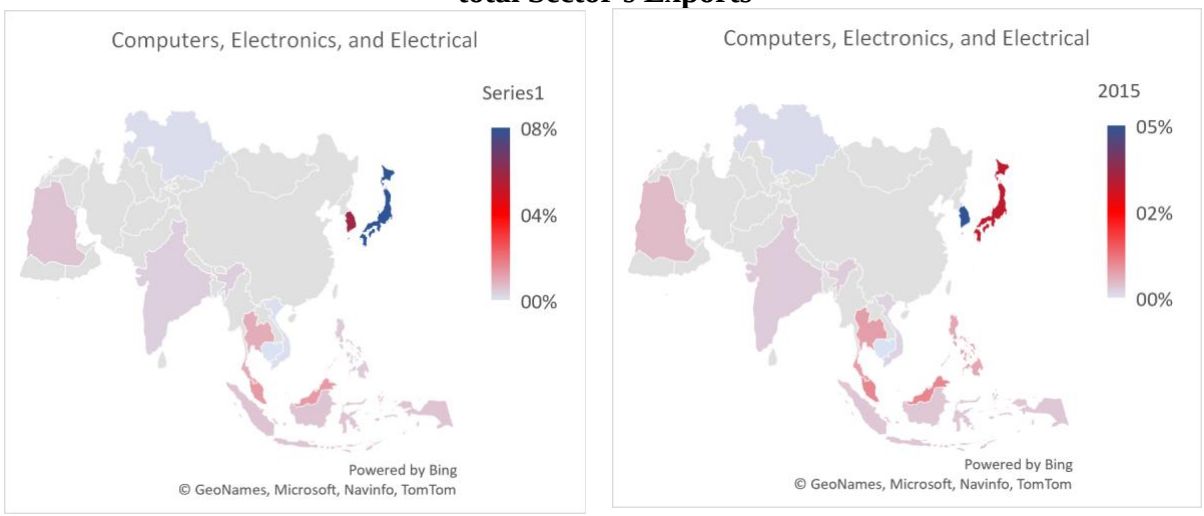
APPENDIX

Figure 9: Foreign Value-added (Asian) embedded in Chinese exports to the US in % of total Sector's Exports



Note. Total Chinese exports of Machinery and equipment, nec to the USA US$ 12.6 billion (2005) and US 36.5 billion (2015)

Figure 10: Foreign Value-added (Asian) embedded in Chinese exports to the US in % of total Sector's Exports



Note. Total Chinese exports of Computers, electronic and electrical equipment to the US US$ 73.9 billion (2005) and US 167.2 billion (2015)