Impact of Covid-19 on GVCs & Implications for the Second & Third Unbundling

By Mitsuyo Ando

Introduction

East Asia – including Northeast Asia and Southeast Asia – has led the world in aggressively using international production networks (IPNs), which are a sophisticated version of global value chains (GVCs). Machinery industries typically consist of multi-layered production processes with different technologies and diversified materials, involving many players domestically and internationally. Thus, machinery industries are at the center of IPNs or the second unbundling (the concept proposed by Baldwin, 2016[1]). Trade in machinery parts and components are, in general, active within a region, because such transactions require appropriately timed procurement, subtle coordination among production blocks, low services link costs, tight information and information and communication technology (ICT) connectivity, and reliable logistics connectivity. Machinery IPNs in East Asia, however, involve many countries at more widely different stages of development in the region and extend tighter trade and investment links with other parts of the world.

GVCs are prone to bring about the contagion of shocks through the supply chains. Hayakawa and Mukunoki (2021[2]), for instance, demonstrated the negative impact of the novel coronavirus (Covid-19) damage in countries supplying machinery parts and components on countries exporting final machinery products. The emergence of the Covid-19 pandemic became a trigger to increase concerns about globalization again. Although the vulnerability of GVCs has been often addressed, machinery IPNs, particularly those in East Asia, revealed their robust and resilient nature during Covid-19, as experienced in past shocks, regardless of whether they are demand shocks (e.g., the 1997 Asian Currency Crisis and the 2008-2009 Global Financial Crisis) or supply shocks (e.g., the 2011 Great East Japan Earthquake and the 2011 Thailand Floods).

This article reviews the impact of Covid-19 on trade in goods and services by shedding light on two kinds of international division of labor – machinery IPNs and digital-related services trade – and discusses the potential role of mega–free trade agreements (FTAs) such as the Regional Comprehensive Economic Partnership (RCEP).

Significance of Machinery IPNs in East Asia

Massive machinery IPNs have been formed in three regions: East Asia, North America, and Europe. *Chart 1* presents each country's machinery shares in the total exports and imports of major countries in the world in 2019 (Ando, Yamanouchi, and Kimura, 2021[3]). Machinery sectors here include general machinery (Harmonized System (HS) 84), electric machinery (HS85), transport equipment (HS86-89), and precision machinery (HS90-92). To focus on the degree of participation in IPNs, the Chart arranges countries with higher export shares of machinery parts and components from left to right.

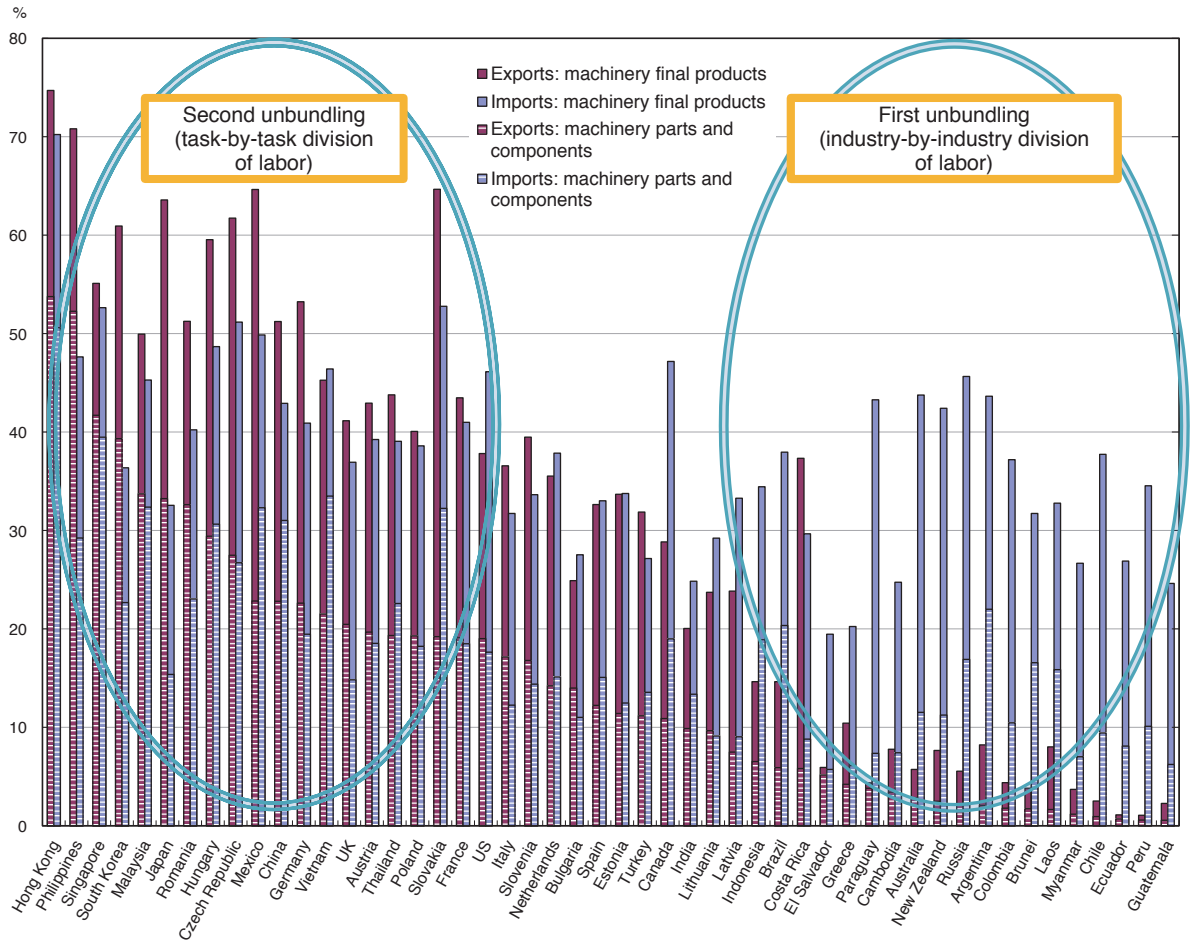
Apparently, many East Asian countries have high shares of parts and components for both exports and imports, suggesting the existence of back-and-forth transactions. In addition, export shares of parts and components are relatively high for these countries, indicating their export-oriented operations. These findings confirm the active participation of many East Asian countries in machinery IPNs. In the early 1990s, most countries with higher export shares of parts and components were developed countries. By 2000, in line with the expansion of the second unbundling, machinery parts and components trade became more active, and the shares of machinery trade rose in many countries. Reflecting the rapid development of machinery IPNs in East Asia since the 1990s, many East Asian developing countries moved to the left, with high export shares of parts and components in both absolute and relative terms. Now, most countries on the left side are these East Asian developing countries, in addition to some developing countries such as Mexico and Central and Eastern Europe countries, which are involved in IPNs in North America and Europe, respectively. In contrast, most countries on the right are those in Latin America with low shares of parts exports and high shares of parts imports, indicating their import-substituting operations.

Strong Intra- & Inter-Regional Linkages for East Asia

To evaluate the degree of East Asian machinery trade, considering the basic conditions such as economic size and the geographical distance, Ando, Kimura, and Yamanouchi (2022[4]) applied a traditional gravity equation to machinery trade and compared the actual trade value with the fitted value that is predicted by the model. *Table 1* summarizes the gap ratio for each country/region of the world, in which a ratio over 1 indicates that the actual value exceeds the predicted level. Their results clearly demonstrate that machinery trade is basically regional within Factory Asia, Factory America, and Factory Europe, but inter-regional linkages are also strong for Factory Asia. The gap ratios for intra-regional trade are 1.5 for East Asia (including the Association of South East Asian Nations (ASEAN) plus China, Japan and South Korea), 2.7 for ASEAN only, 1.0 for

CHART 1

Machinery shares in exports to & imports from the world: 2019



Source: Ando, Yamanouchi, and Kimura (2021[3])

TABLE 1

The gap between actual & predicted values of machinery trade: 2019

Exporter \ Importer	East Asia	China	Japan	South Korea	ASEAN	North America	Europe	Rest of the world	Total (World)
East Asia	1.5	1.6	0.8	1.1	2.7	2.1	1.5	1.6	1.6
China	1.2		0.6	0.9	2.2	1.8	1.4	1.5	1.4
Japan	1.4	1.1		0.9	2.8	2.0	1.1	1.2	1.4
South Korea	1.9	1.8	0.4		6.3	3.1	1.6	2.1	2.1
ASEAN	2.4	2.1	2.1	3.7	2.7	3.4	2.2	2.3	2.5
North America	0.7	0.6	0.4	1.2	1.0	1.0	0.6	0.5	0.8
Europe	1.1	1.2	0.6	1.4	1.3	0.9	1.2	0.8	1.0
Rest of the world	0.5	0.5	0.3	0.6	0.9	0.4	0.4	0.5	0.5
Total (World)	1.1	0.9	0.6	1.1	1.8	1.1	1.0	0.9	1.0

Source: Author's calculation, based on Ando, Kimura, and Yamanouchi (2022[4])

North America, and 1.2 for Europe. These figures suggest that intra-regional machinery trade is active in East Asia, particularly in ASEAN, and that ASEAN has been playing an important role in Factory Asia.

Moreover, inter-regional ratios of East Asia are as high as 2.1 for exports to North America and 1.5 for exports to Europe, and the ratios of ASEAN only become even higher, 3.4 and 2.2, respectively. Moreover, the corresponding ratios are high for both final products and parts and components. These findings indicate that Factory Asia has strong linkages as a supplier of intermediate goods as well as final products in these two regions. In contrast, inter-regional ratios

of North America and Europe are around the predicted level or much lower than predicted, unlike the case of East Asia. In addition, intra-regional ratios for two regions rose in the 2010s. Such a tendency may imply stronger regionalization and possibly regional reshoring for Factory America and Factory Europe.

The extent and depth of machinery IPNs in East Asia developed further in the 2010s. An outstanding change is observed for Vietnam; the ratios for intra-ASEAN trade increased from 1.4 to 3.2 for exports and from 3.9 to 7.3 for imports, together with the ratios for exports to the world (China, Japan, and South Korea only) that reached 4.6 (3.6) from 0.9 in 2010. This clearly demonstrates how rapidly Vietnam became involved in IPNs in the 2010s, turning into one of the core players in machinery IPNs in East Asia. Moreover, the export destinations of Cambodia and Myanmar were diversified among other East Asian countries, though their actual exports are still lower than predicted, and their ratios for imports significantly increased. This indicates their participation in IPNs has just started.

Note that machinery trades among China, Japan, and South Korea are not connected with each other as closely as we expected, after controlling for country size and geographical distance: China's exports to Japan and South Korea (0.6 and 0.9), Japan's to South Korea (0.9), and South Korea's to Japan (0.4) are lower than predicted. In other words, there is room for their trade expansion.

Three Types of Shocks on IPNs amid Covid-19

What has happened to machinery IPNs during Covid-19? *Chart 2* shows monthly machinery exports to the world in 2020 and 2021 until August by three sectors, as an index to each month of 2019 (Ando and Hayakawa, 2021[5]). Worldwide machinery exports recorded their lowest level in April and May 2020, but returned to reach or even exceed pre-pandemic levels by September 2020 in all three machinery sectors *(Chart 2 (a))*. Such a rapid V-shaped recovery in 2020 suggests the resilience of machinery IPNs in general.

As Ando, Kimura, and Obashi (2021[6]) demonstrate in their analysis using finely disaggregated machinery trade of Japan, the transactions of parts and components within machinery IPNs are unlikely to be disconnected because firms intend to optimize their supply chains, considering both cost reduction and risk management. In addition, the import diversity of inputs mitigated the harmful supply-side effects of Covid-19 – particularly during the early period of February-March 2020 when uncertainty due to Covid-19 suddenly increased – by allowing the flexible adjustment of transactions (Ando and Hayakawa, 2022a[7]). Moreover, e-commerce (EC) development in importing countries contributes to mitigating the negative effect of Covid-19 on trade (Hayakawa, Mukunoki, and Urata, 2021[8]). Furthermore, positive demand shocks due to Covid-19-specific demand for certain products related to teleworking, stay-at-home activities, and preventing infection, partially offset negative supply shocks and negative demand shocks (Ando, Kimura, and Obashi, 2021[6]).

Smaller Negative Impacts for East Asia

Importantly, the negative impacts were much smaller for machinery IPNs in East Asia *(Chart 2 (b))* than those in North America and Europe. In particular, exports of general and electric machinery final products and parts and components as well as exports of precision machinery final products returned to their pre-pandemic levels already in April 2020. In the case of East Asia, negative supply and demand shocks were relatively small because East Asia curbed the Covid-19 spread more successfully than North America and Europe and took government policy responses to the pandemic with an emphasis on IPNs, including the excepting treatment of their important areas from factory closures.

In addition, machinery IPNs in East Asia enjoyed great benefit from positive demand shocks. Among the top 20 countries of machinery exports in the world in 2019, East Asia occupies 10 countries/regions for both general and electric machinery and precision machinery parts and components (Ando, Kimura, and Yamanouchi, 2022[4]). Even for their final products, eight and six are those in East Asia, respectively. East Asia has established a strong position in the world as an important supplier of machinery goods, particularly of these final products and parts and components, and maintained its international competitiveness effectively utilizing IPNs. The positive demand shock products of these sectors, together with activated e-commerce for their purchases amid Covid-19, must have contributed to such a rapid recovery in East Asia by partially compensating for the effects of the negative supply and demand shocks.

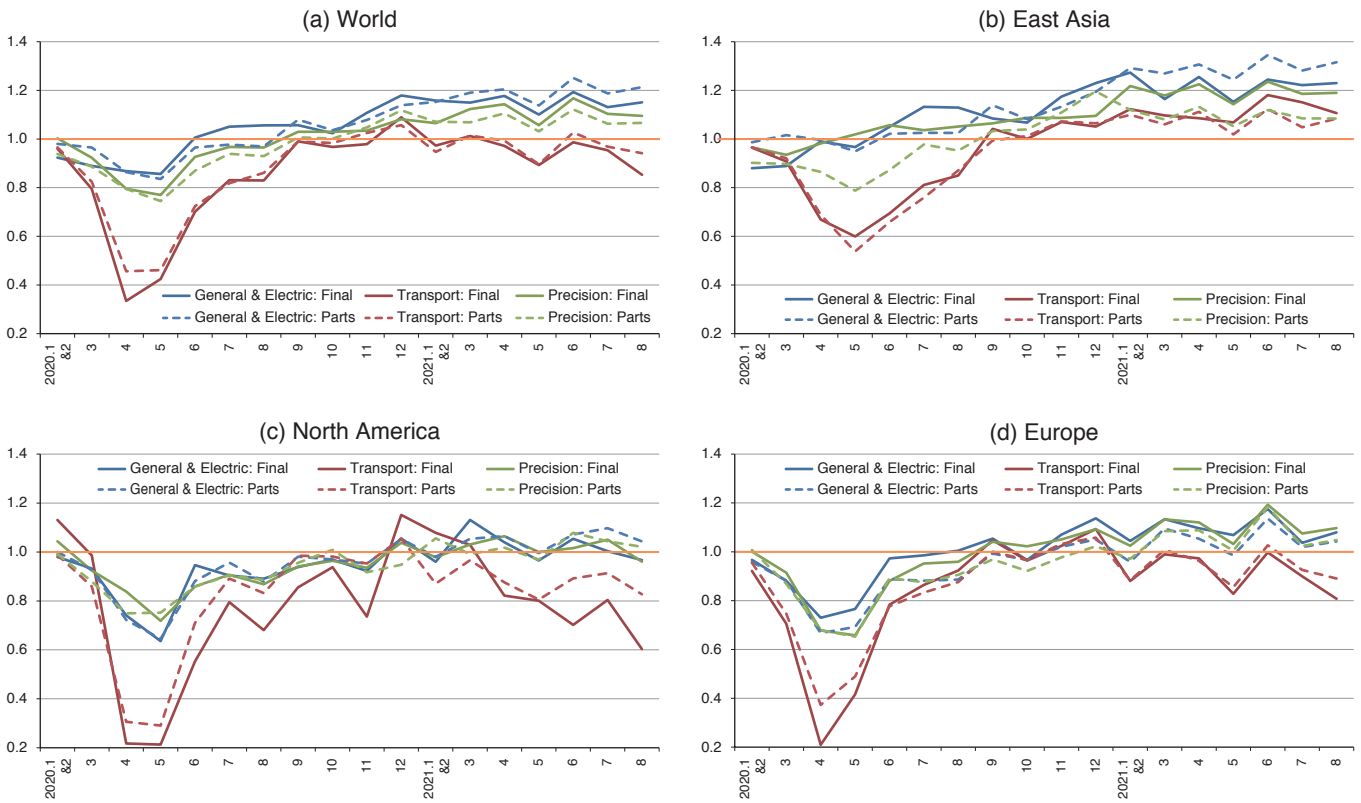
As *Chart 2* clearly shows, sectoral heterogeneity exists among machinery sectors. While general and electric machinery exports already returned to the pre-pandemic level in June 2020, transport equipment exports had a more prolonged influence, with a decline by more than 60%/50% for final products/parts and components in April 2020 *(Chart 2 (a))*. In particular, the negative effects on this sector were much more serious for North America *(Chart 2 (c))* and Europe *(Chart 2 (d))* than East Asia. The aforementioned increasing preference to EC and the Covid-19 specific demand became additional reasons behind the heterogeneity of the impacts across sectors or even among products in the same sectors.

New Challenges for Machinery IPNs in 2021

In 2021, machinery IPNs faced several new challenges, including a shortage of containers (and high transport costs), a shortage of semiconductors, and the emergence of the Delta variant of Covid-19. The shortage of semiconductors, for instance, is induced not only by the pandemic (e.g., the temporary closure of factories) but also by structural changes (e.g., an accelerated production shift toward electric motor vehicles (EV) and the rapidly expanded demand for 5G smartphones and solid-state drive laptops). Sectoral heterogeneity seems to have gradually expanded again in 2021 *(Chart 2 (a))*. The exports of the transport equipment sector reveal the declining trend, particularly for North America and Europe, which may partly reflect the negative supply shocks largely due to the shortage of semiconductors, the negative demand shocks on durable goods due

CHART 2

Machinery exports to the world (each month of 2019 = 1)



Notes: "General & Electric", "Transport", and "Precision" refer to general & electric machinery, transport equipment, and precision machinery, respectively. "Final" and "Parts" indicate final products and parts and components.
Source: Ando and Hayakawa (2021[5])

to prolonged Covid-19, and an accelerated EV production shift.

For East Asia, all three machinery sectors, including the transport equipment sector, maintained export levels beyond the pre-pandemic level at least at the regional level until August in 2021 *(Chart 2 (b))*. Some sporadic declines, however, have been recently observed for specific sectors in several countries (Ando and Hayakawa, 2021[5]). In the case of Japan, for example, while general and electric machinery and precision machinery sectors had no serious impact, exports of transport equipment final products in 2021 were slightly lower than the pre-pandemic levels and drastically declined in August and September, probably reflecting the shortage of semiconductors. As for ASEAN, which experienced much more serious impacts due to the Delta variant in 2021 than in 2020, machinery exports were fluctuating, but general and electric machinery goods as well as precision machinery final products tended to maintain the export levels beyond the pre-pandemic level in 2021. On the other hand, exports of transport equipment and precision machinery parts and components declined in July and August 2021. Although the whole of ASEAN's exports did not have a significantly serious negative impact in 2021 at least until August, we observe a severe export decrease in July for Indonesia and a drastic export decline in August and September in the transport equipment sector of several countries.

Impacts of Covid-19 on Services Trade

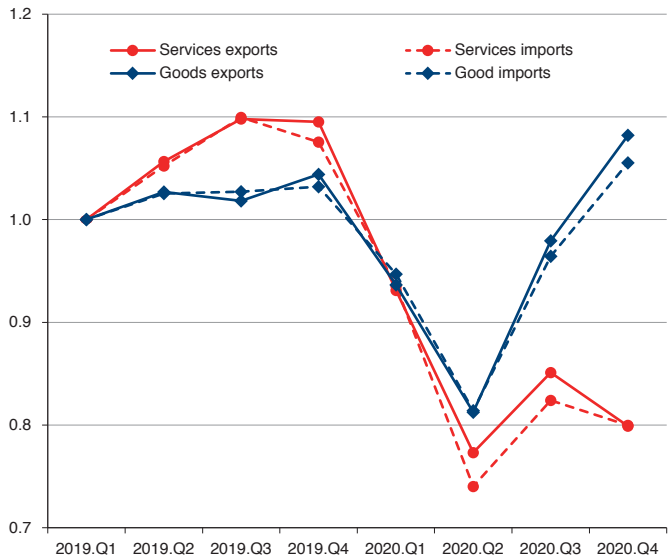
One of the distinctive features of Covid-19 is the introduction of mobility restrictions and social distancing measures. Among the four modes of supply for trade in services, which is defined by the WTO General Agreement on Trade in Services (GATS), modes 2 and 4 require cross-border mobility of consumers and suppliers, respectively, while mode 1 is typically provided online. Thus the impact of Covid-19 may vary among service sectors, reflecting the nature of services. *Chart 3 (i)* shows quarterly exports and imports in 2019 and 2020. While the 2nd quarter of 2020 (2020 Q2) recorded the lowest levels for both trade in goods and services, the latter half of 2020 witnessed a sharp contrast between them. In particular, the explosive spread of Covid-19 in 2020 Q4 seems to have made the gap larger. Apparently, travel services in mode 2 are much more seriously affected than other services *(Chart 3 (ii))*. In contrast, computer services, among ICT services, had double-digit positive annual growth of exports in many countries in the world in 2020, unlike other services sectors with negative growth.

Ando and Hayakawa (2022b[9]) quantitatively investigated the impacts of Covid-19 on trade in services, using quarterly data on a balance of payment (BOP) basis for 146 countries in 2019 and 2020. *Table 2* summarizes their results for the Covid variables. It also shows the major mode for each services sector. The major mode is

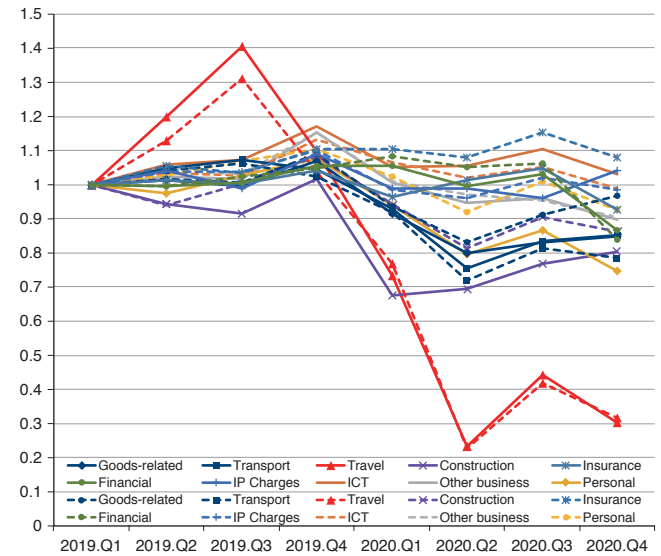
CHART 3

Quarterly global trade in services

(i) Services versus Goods



(ii) By-Sector Services



Notes: Services trade on the BOP basis. Straight lines and dotted lines express exports and imports, respectively.
Source: Author's calculation, based on data available from UNCTAD STAT and WTO Stats

TABLE 2

Summary of PPML results for the impact of Covid-19 on quarterly trade in services & their major modes

	Suggested major mode: BOP	Major mode: TISMOS	Export			Import		
			Case	Death	Index	Case	Death	Index
Total goods (PPML)			-0.023***	-0.010***	-0.400**	-0.010***	-0.004	-0.178***
Total goods (IV)			-0.044***	-0.038***	-0.530***	-0.041***	-0.035***	-0.506***
Total services (PPML)				-0.012*	-0.320**	-0.013*	-0.012***	-0.473***
Total services (IV)			-0.097***	-0.091***	-1.204***	-0.054***	-0.050***	-0.663***
Goods-related services	Mode 2	Mode 2						
Transport	Mode 1 (linked with Modes 2/4)	Mode 1		-0.022***	-0.541***	-0.015***	-0.010***	-0.306***
Travel	Mode 2	Mode 2	-0.066**	-0.045**	-1.056**	-0.091***	-0.060***	-1.854***
Construction	Mode 4	Mode 3	-0.063***	-0.039***		-0.029***	-0.018***	
Insurance	Mode 1	Mode 3				-0.026**	-0.013*	
Financial services	Mode 1	Mode 3				-0.020**	-0.024***	
IP charges	Mode 1	Mode 1				-0.030***	-0.022***	-0.259*
ICT services	Mode 1	Mode 3		-0.008*	-0.210*			
Other business services	Mode 1	Mode 3			-0.285***			
Personal services	Mode 1	Mode 3	-0.027**	-0.019*	-0.339**			

*Notes: Only coefficients with statistical significance are shown. The services sectors with larger negative effects than the goods sector are highlighted. As services trade based on the BOP basis do not cover mode 3,"suggested major mode: BOP" is the most major mode, other than mode 3. *** p<0.01, ** p<0.05, * p<0.1.*
Source: Author's preparation, based on Ando and Hayakawa (2022b[9])

based on data for 2017 in Trade in Services by Mode of Supply (TISMOS), which offers data for by-mode services trade for the 2005-2017 period, and "suggested major mode: BOP" is the most major mode, other than mode 3, because the BOP statistics do not sufficiently cover services via commercial presence (mode 3). Their results suggest that Covid-19 had a negative impact on services exports and imports, and such harmful effects tended to be larger for trade in services than trade in goods, particularly on the import side. Furthermore, we found heterogeneous effects among disaggregated services sectors. Specifically, travel services were the most affected, followed by transport and construction services. While trade in travel services, passenger transport services, and construction services mostly require, or are directly related to, the cross-border movement of people and explain a substantial portion of the negative effects on

the overall services trade, trade in services related to the cross-border movement of goods, such as freight transport services, also offers a partial explanation. Conversely, other services that are typically provided through mode 1 experienced less/no significant effect. In particular, ICT services had the smallest negative impact on exports, with no impact on the import side.

The Covid-19 pandemic became a trigger to accelerate the digital transformation of the whole economy. The results support the importance of digital technology for ICT services as well as other services and manufacturing sectors. The importance of such a form of international division of labor will increase probably in the coming decades. The expansion of services sectors and the utilization of digital technology will contribute to further developing IPNs or the third unbundling, i.e., the individual-level international division of labor.

Potential Role of Mega FTAs for 2 Kinds of International Division of Labor

At this moment, machinery IPNs, particularly those in East Asia tend to be robust and resilient amid the ongoing Covid-19. As discussed above, however, machinery IPNs are facing new challenges, and some sporadic declines have been recently observed for specific sectors in several countries even in East Asia, reflecting not only the pandemic but also structural changes. To lessen the possible negative effects in the future and make IPNs more robust and resilient, it is necessary to improve location advantages and reduce the services link costs. Moreover, with the Covid-19 pandemic as a trigger to accelerate the digital transformation of the whole economy, the servicification of the manufacturing sector or the third unbundling will be enhanced. Furthermore, given the heightening of US-China confrontation and geopolitical tensions, though the decoupling is likely to be limited in scope, it is important to keep the coverage governed by a rules-based trading regime as broadly as possible and to maintain a healthy regime in sectors not under intensified trade control.

In that sense, the utilization of mega FTAs would be useful. The RCEP, for instance, covers the whole East Asia region. Although the current RCEP agreement, with an emphasis on "ASEAN centrality", has various issues, including limited trade liberalization and insufficient rules, it must be meaningful to cover China, Japan, and South Korea within the same framework. As discussed above, China, Japan, and South Korea are not as closely connected as we expected in machinery trade, after controlling for country size and geographical distance, and thus there must be room for trade expansion among them by the RCEP-based tariff removals. More importantly, the cumulative rules of origin may expand the possibility of using preferential tariffs for bilateral trade within East Asia, to which preferential tariffs under FTAs such as ASEAN+1 FTA could not be applied before. Making less restrictive and user-friendly rules of origin is the crucial precondition, but RCEP-based tariff removals, though limited, as well as the cumulative rules of origin, may benefit the whole East Asia region and further activate IPNs in the region.

Moreover, the importance of creating new international rules such as electronic commerce is increasing because cross-border transactions are likely to expand according to the enhancement of the digital transformation of the whole economy, including the manufacturing sector, or the third unbundling. If the RCEP agreement is improved to be an effective one, it could be used to reduce policy risks throughout the region, covering all countries participating in IPNs including China, as well as to maintain a healthy rules-based trading regime, which should contribute to making IPNs more robust and resilient.

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