

The 3rd Vietnam-Japan International Business Conference
“Business Adaptation to Global Uncertainties”
(March 17, 2023 @Hanoi, Vietnam and online)

How to Cope with Global Uncertainties? The Case of East Asian Production Networks

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1. East Asian production networks

- East Asia has led the world in utilizing the mechanics of international production networks (IPNs) or the second unbundling (task-by-task division of labor) in the past three decades (Ando and Kimura 2005, Baldwin 2016).
 - Machinery industries are major players.
 - Developing East Asia proposes a new development strategy.
 - Prerequisites: freer trade/investment, rules-based trading regime, long-lasting peace
- Vietnam has quickly caught up with neighboring countries in the 2010s.

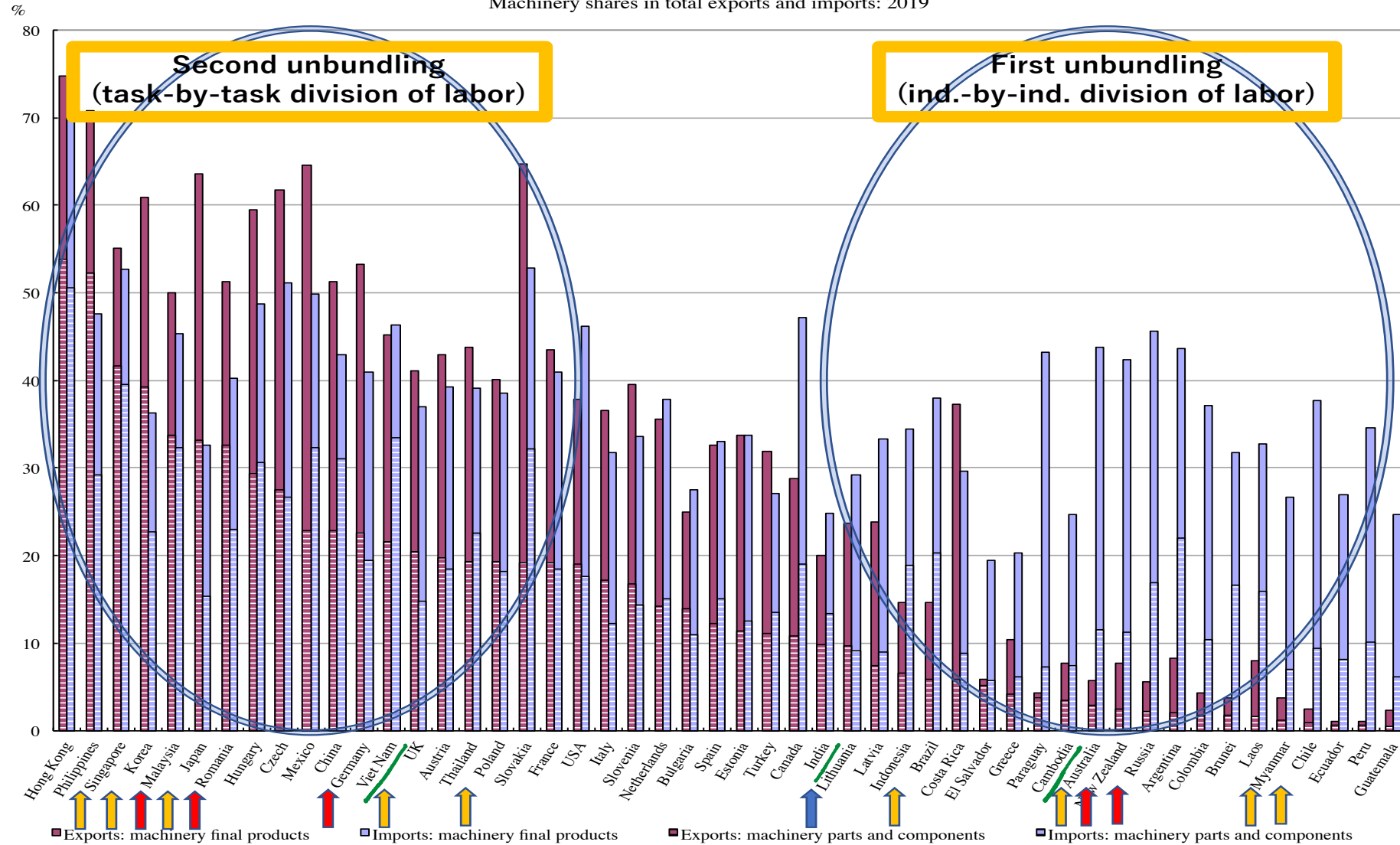
Three modes of unbundling and digital technology

	The first unbundling	The second unbundling	The third unbundling
International division of labor	Industry-wise (prod. and cons. are unbundled)	Task-wise (an industry is unbundled); international production networks (IPNs)	Person-wise (a task is unbundled)
What moves?	Goods	+ Ideas (capital, technology, managerial ability, bus. persons)	+ Data
Typical industries	Agriculture/fishery/food, mining, labor-intensive industries, tourism	Machinery industries and industries in global value chains	Service outsourcing
Institutional connectivity	Tariff removal of specific industries, GSP [WTO-based liberalization]	Overall tariff removal, trade facilitation, TBT, B2B services lib., FDI lib. in manu. [FTAs]	SPS, standards and conformance, regulatory coherence, overall services lib., movement of people, IPR, flow of data [mega-FTAs]
Physical connectivity	Medium-grade logistics infrastructure (roads, ports/airports), infrastructure services	High-grade logistics infrastructure (full-scale ports/airports, multimodal), urban/sub-urban development (logistics, mass-scale infra. Services)	Digital connectivity, urban amenities (urban transport, living environment, varieties of possible consumption of goods and services), smart cities
Digital technology as a game changer	Problem solving Enhance productivity Upgrade to the second unbundling	Further widening and deepening of international production networks	Explore frontiers of new businesses

Source: ERIA (2022).

Machinery share in total exports and imports, 2019

Machinery shares in total exports and imports: 2019



Source: authors' calculation, using data available from UN comtrade.

Source: Ando, Yamanouchi, and Kimura (2022).

Actual and predicted machinery trade, 2019

Exporter/Importer	Value (millions US\$, %)	China	Japan	Korea	ASEAN	Australia and New Zealand	India	North America	Europe	Rest of the world	Total (World)
China	Actual (A)		75,889	58,515	161,657	7,708	37,831	296,546	249,381	476,571	1,364,100
	Predicted (B)		118,568	65,893	72,285	9,463	50,069	163,984	177,079	295,714	953,054
	(A)/(B) (%)		64	89	224	81	76	181	141	161	143
Japan	Actual (A)	81,031		20,245	59,962	2,582	5,817	126,272	64,669	110,199	470,778
	Predicted (B)	74,293		22,386	21,715	3,928	7,176	64,147	60,411	84,697	338,752
	(A)/(B) (%)	109		90	276	66	81	197	107	130	139
Korea	Actual (A)	84,679	9,161		54,181	744	6,551	66,569	36,682	77,051	335,618
	Predicted (B)	45,860	24,865		8,639	1,307	2,996	21,772	22,348	35,613	163,400
	(A)/(B) (%)	185	37		627	57	219	306	164	216	205
ASEAN	Actual (A)	83,070	39,456	24,559	122,552	4,107	17,733	117,662	83,934	151,101	644,176
	Predicted (B)	39,799	18,528	6,644	45,225	2,846	8,388	34,797	38,940	65,409	260,576
	(A)/(B) (%)	209	213	370	271	144	211	338	216	231	247
Australia and New Zealand	Actual (A)	114	57	66	373	11	45	1,215	930	8,395	11,206
	Predicted (B)	2,694	1,766	531	1,521	300	540	7,916	5,269	13,322	33,859
	(A)/(B) (%)	4	3	12	25	4	8	15	18	63	33
India	Actual (A)	1,971	792	566	9,107	228		13,273	11,687	27,601	65,224
	Predicted (B)	56,238	12,864	4,836	18,953	2,042		32,905	45,745	87,819	261,402
	(A)/(B) (%)	4	6	12	48	11		40	26	31	25
North America	Actual (A)	63,106	28,621	23,338	43,379	5,678	9,328	617,230	161,678	177,220	1,129,577
	Predicted (B)	105,297	65,732	20,088	42,259	15,982	18,806	591,802	291,501	327,579	1,479,047
	(A)/(B) (%)	60	44	116	103	36	50	104	55	54	76
Europe	Actual (A)	144,804	37,144	30,659	64,599	8,846	24,562	286,773	1,517,637	428,107	2,543,132
	Predicted (B)	122,616	66,879	22,266	51,213	11,851	27,976	318,751	1,298,753	542,040	2,462,344
	(A)/(B) (%)	118	56	138	126	75	88	90	117	79	103
Rest of the world	Actual (A)	92,501	22,859	16,508	60,029	8,727	21,201	95,207	180,288	192,063	689,382
	Predicted (B)	137,665	59,758	23,082	55,204	17,478	38,627	227,839	380,672	360,433	1,300,757
	(A)/(B) (%)	67	38	72	109	50	55	42	47	53	53
Total (World)	Actual (A)	551,277	213,978	174,456	575,838	38,631	123,069	1,620,747	2,306,885	1,648,311	7,253,193
	Predicted (B)	584,462	368,959	165,726	317,013	65,196	154,578	1,463,914	2,320,719	1,812,625	7,253,192
	(A)/(B) (%)	94	58	105	182	59	80	111	99	91	100

Notes: ‘Actual (A)’ denotes the actual values of specific country/region pairs, ‘Predicted (B)’ denotes the corresponding predicted values, and ‘(A)/(B) (%)’ denotes the ratio of actual to predicted values in percentage. North America refers to Canada, Mexico, and the United States; Europe refers to the 27 European Union member countries and the United Kingdom; and ‘Rest of the world’ refers to 128 countries and regions, including Hong Kong, Macao, and Taiwan. The predicted values for regions are calculated by totalling the member countries’ predicted values.

Source: Ando, Kimura, and Yamanouchi (2022).

Actual and predicted machinery trade for ASEAN Member States, 2019

Exporter/Importer	Value (millions US\$, %)	Singapore	Brunei	Malaysia	Thailand	Indonesia	Philippines	Vietnam	Laos	Cambodia	Myanmar	ASEAN	China, Japan, and Korea	Total (World)
Singapore	Actual (A)		393	13,234	3,955	5,543	4,543	3,470	30	338	815	32,321	34,364	156,011
	Predicted (B)		128	5,444	678	1,469	274	210	34	59	150	8,446	6,468	34,514
	(A)/(B) (%)		309	243	583	377	1,657	1,653	88	572	543	383	531	452
Brunei	Actual (A)	90		55	4	2	0	4	0	0	0	155	42	250
	Predicted (B)	74		70	25	38	19	10	1	2	6	245	327	1,416
	(A)/(B) (%)	122		79	15	5	1	38	2	0	0	63	13	18
Malaysia	Actual (A)	19,879	110		6,593	1,785	1,609	2,958	8	97	86	33,125	27,355	147,174
	Predicted (B)	8,476	188		1,486	2,124	269	214	36	62	161	13,015	6,308	38,377
	(A)/(B) (%)	235	59		444	84	598	1,384	22	156	54	255	434	383
Thailand	Actual (A)	3,786	49	4,377		3,574	3,860	4,798	915	1,581	827	23,768	22,145	113,417
	Predicted (B)	1,310	82	1,844		1,114	435	513	231	283	538	6,348	11,006	44,997
	(A)/(B) (%)	289	59	237		321	888	935	397	559	154	374	201	252
Indonesia	Actual (A)	3,471	40	1,210	2,311		3,226	1,851	21	91	147	12,367	4,551	30,530
	Predicted (B)	3,323	150	3,087	1,305		691	455	71	109	171	9,361	16,248	70,177
	(A)/(B) (%)	104	26	39	177		467	407	30	83	86	132	28	44
Philippines	Actual (A)	5,852	2	1,497	2,189	473		1,061	0	10	6	11,090	17,663	62,111
	Predicted (B)	608	74	383	499	678		239	32	44	65	2,623	9,235	27,307
	(A)/(B) (%)	962	3	391	438	70		445	0	23	9	423	191	227
Vietnam	Actual (A)	1,718	20	1,493	2,535	1,122	1,073		105	295	244	8,606	40,332	131,657
	Predicted (B)	492	40	322	623	472	252		225	162	85	2,674	11,129	28,431
	(A)/(B) (%)	349	51	464	407	238	425		47	182	286	322	362	463
Laos	Actual (A)	6	0	8	397	4	0	27		1	0	444	82	770
	Predicted (B)	45	3	30	159	42	19	127		17	19	462	814	2,460
	(A)/(B) (%)	13	0	28	250	9	0	21		8	1	96	10	31
Cambodia	Actual (A)	8	0	16	202	1	62	47	1		2	341	346	1,403
	Predicted (B)	91	6	62	225	74	30	107	19		10	624	658	2,906
	(A)/(B) (%)	9	0	27	90	2	206	44	7		18	55	53	48
Myanmar	Actual (A)	133	0	13	113	6	11	60	0	0		336	205	852
	Predicted (B)	304	19	209	564	153	60	74	30	13		1,426	2,777	9,993
	(A)/(B) (%)	44	0	6	20	4	19	81	0	1		24	7	9
ASEAN	Actual (A)	34,944	614	21,904	18,299	12,510	14,385	14,276	1,082	2,412	2,126	122,552	147,085	644,176
	Predicted (B)	14,723	690	11,451	5,563	6,163	2,050	1,948	679	752	1,205	45,225	64,971	260,576
	(A)/(B) (%)	237	89	191	329	203	702	733	159	321	177	271	226	247
China, Japan, and Korea	Actual (A)	49,071	427	34,230	41,200	31,174	25,148	86,404	995	2,485	4,664	275,800	329,520	2,170,496
	Predicted (B)	18,495	1,609	11,602	16,517	20,509	11,853	14,692	1,893	1,236	4,234	102,639	351,865	1,455,207
	(A)/(B) (%)	265	27	295	249	152	212	588	53	201	110	269	94	149
Total (World)	Actual (A)	154,458	1,729	86,621	81,632	58,174	57,501	119,042	2,257	6,313	8,112	575,838	939,711	7,253,192
	Predicted (B)	72,025	5,168	47,512	50,633	65,241	27,378	28,933	4,342	4,069	11,713	317,013	1,119,147	7,253,192
	(A)/(B) (%)	214	33	182	161	89	210	411	52	155	69	182	84	100

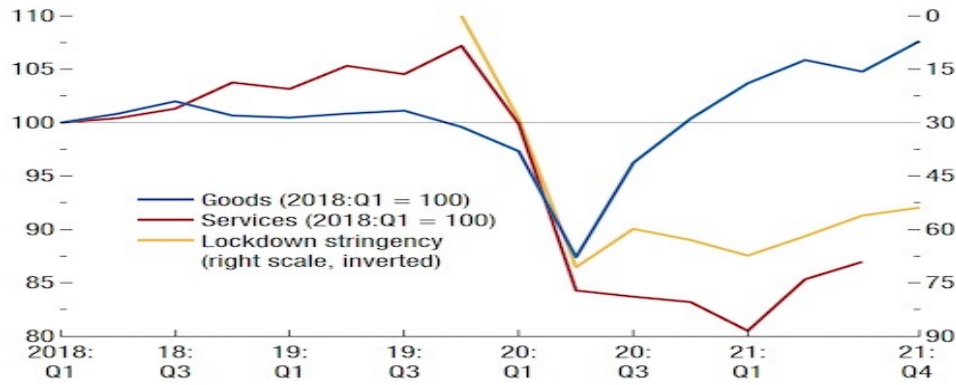
Source: Ando, Kimura, and Yamanouchi (2022).

2. Robustness and resilience against shocks

- IPNs may work as shock transmission channels.
- However, with various sudden shocks, IPNs in East Asia have presented robustness (less prone to interruption) and resilience (faster in recovery even if interrupted) compared with other international trade (Ando and Kimura 2012).
 - E.g., Asian Currency Crisis (1997-1998), Global Financial Crisis (2008-2009), East Japan Great Earthquake (2011), flooding in Thailand (2011)
 - IPNs includes relation-specific transactions that require sunk cost.
- With COVID-19, East Asian IPNs again presented the robustness/resilience.
 - Negative supply shocks, negative demand shocks, positive demand shocks.

Figure 4.1. Global Import Volume and Lockdown Stringency (Index)

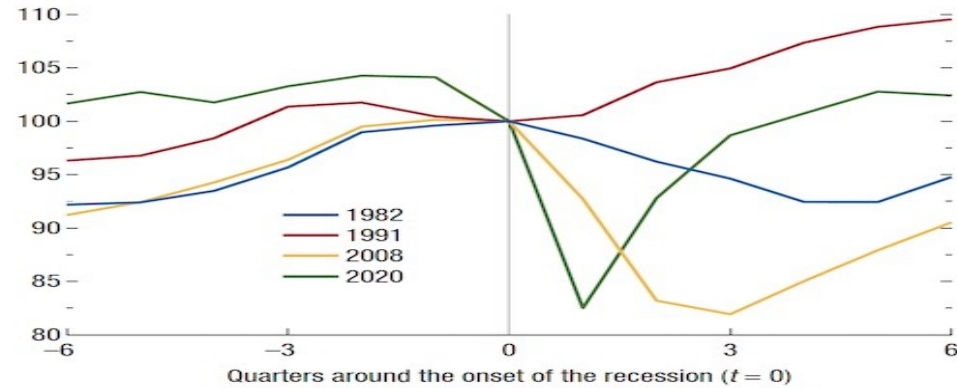
Goods trade recovered rapidly, although services trade remains sluggish.



Sources: CPB World Trade Monitor; Hale and others (2021); and IMF staff calculations.
 Note: The lockdown stringency index is the world import-weighted average of the Oxford COVID-19 Government Response Stringency Index.

Figure 4.2. Trade Patterns around Global Recessions: Goods and Services Import Volume (Index)

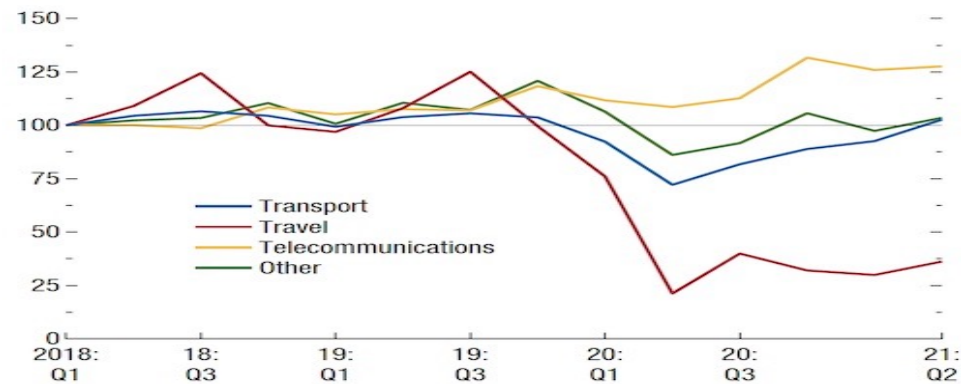
The recovery in goods trade was more rapid than in previous recessions.



Sources: Kose, Sugawara, and Terrones (2020); and IMF staff calculations.
 Note: The goods and services import volume index is normalized to 100 at the onset of the recession ($t = 0$).

Figure 4.3. Imports of Commercial Services by Main Sectors (Index, 2018:Q1 = 100)

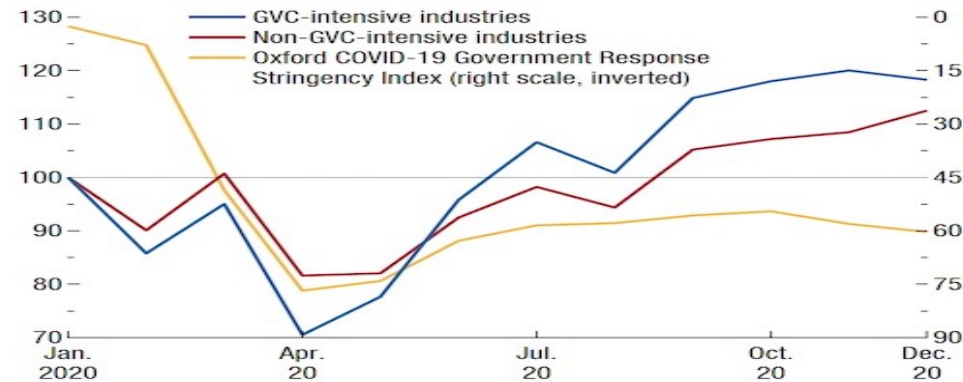
The decline in services trade has mainly been due to that in travel services.



Sources: World Trade Organization; and IMF staff calculations.
 Note: "Telecommunications" comprises telecommunications, computer, and information services. "Other" comprises commercial, goods-related, construction, financial, insurance and pension, intellectual property, other business, personal, cultural, and recreational services.

Figure 4.4. Volatility of Trade in GVC-Intensive Industries versus Non-GVC-Intensive Industries Early in the Pandemic (Index)

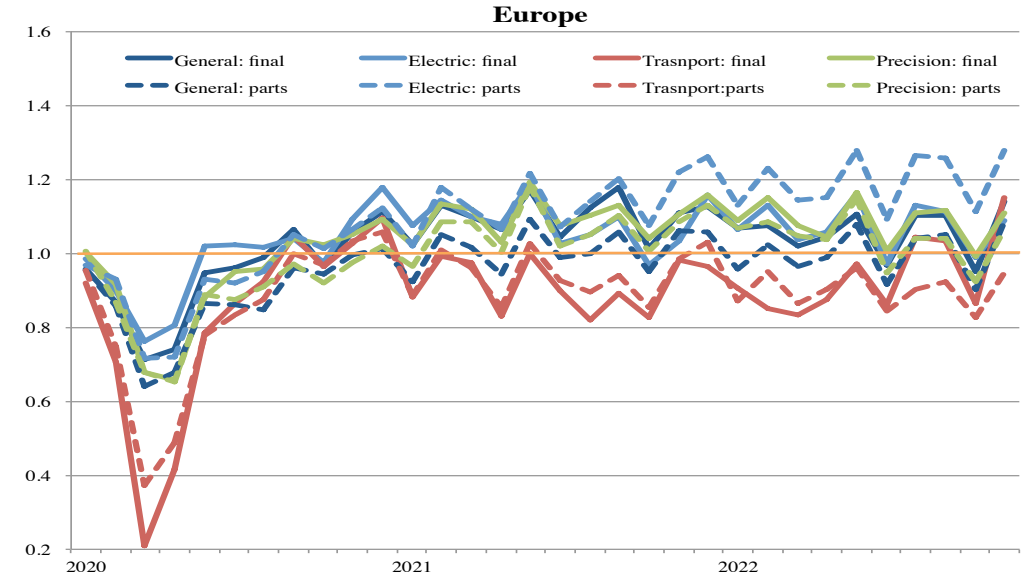
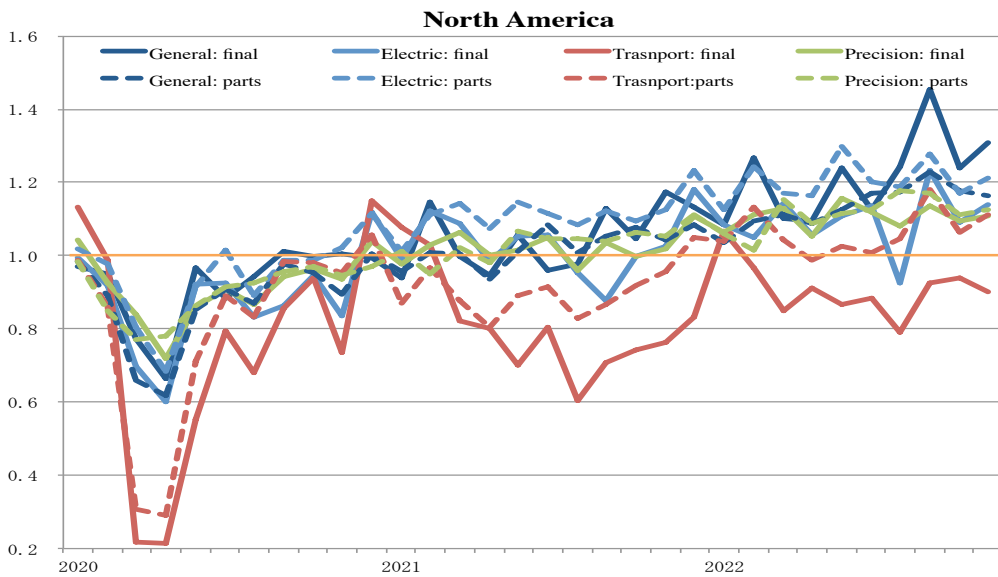
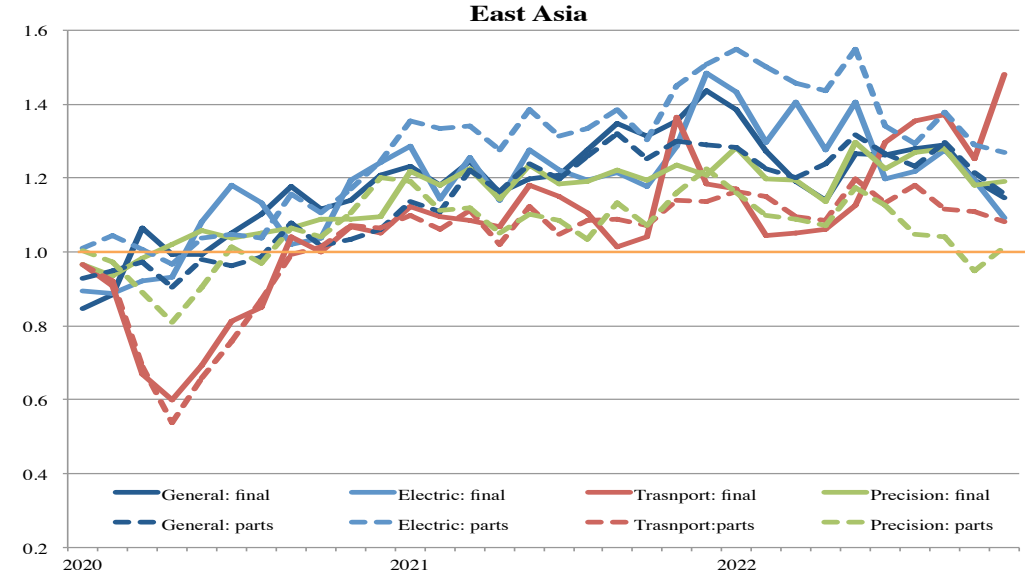
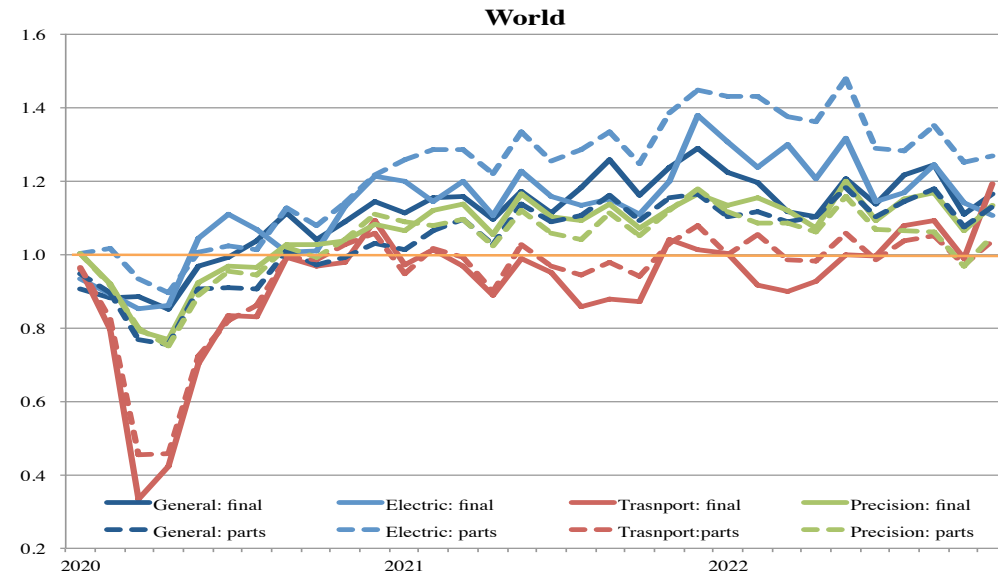
Trade in GVC-intensive industries was relatively more volatile than trade in non-GVC intensive industries.



Sources: Hale and others (2021); Trade Data Monitor; and IMF staff calculations.
 Note: GVC = global value chain.

Source: IMF (2022).

Machinery IPNs: Machinery Exports to the World (each month of 2019 = 1)



Source: Ando, Hayakawa, and Kimura (2023).

3. Geopolitical tensions

- The US-China confrontation has escalated from a tariff war to strategic confrontation between the superpowers.
- Supply chain decoupling includes “defensive” and “offensive” ones.
- Offensive decoupling by the US
 - Export control on high-end semiconductors and other high-tech products
 - Items/tech./targeted firms => all with the end-use for supercomputers
 - Import control on human rights-related products
 - Private sector faces a lot of uncertainties.
- However, supply chain decoupling is still likely to be “partial.”
 - Even the US firms find a lot of business chances in/with China.

- How far can trade/investment diversion be utilized?
 - Tariff war was relatively easy to respond.
 - Vietnam was successful in attracting more production activities.
- Offensive decoupling would be a bit more complicated to take advantage of.
 - Together with multinationals, the management over technologies would become important.
 - However, complete decoupling will not be requested; keep economic ties with both superpowers.
- At the same time, we should retain the rules-based trading regime as widely as possible.
 - Policy measures for offensive decoupling often violate the WTO commitment or conventional trade norms, which would weaken the rules-based trading regime (but we cannot stop superpowers).
 - The role of East Asian countries becomes crucial.

4. Concluding remarks

- While new types of international division of labor (the 3rd unbundling) emerges, Machinery IPNs in East Asia will remain important in coming years.
- Vietnam and ASEAN may want to get involved with IPNs to retain rapid economic growth and enhance innovation.
- To do so, the rules-based trading regime must be retained as widely as possible, which will reduce uncertainties faced by the private sector.

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