

Who, where, what?

Mapping Asian supply chains

Economics Asia

- ◆ Mainland China is now by far the largest component supplier in global value chains, becoming even bigger since the trade war
- ◆ Asia's reliance on imported inputs for exports has fallen, while that of many other economies has increased in recent years
- ◆ Mainland China continues to raise its global market share as a component supplier in electronics, pharmaceuticals, and autos

Unravellin' it all

Supply chains are again in focus. COVID-19 has exposed the vulnerabilities of far-flung production networks. Meanwhile, tensions between mainland China and the US have also shone a light on potential supply chain disruptions, while also prompting a gradual relocation of some manufacturing facilities and sourcing patterns.

Headline trade data, however, is a poor guide to understanding these trends, not accounting fully for the dependence of one economy's manufacturing sector on another's. This note provides a comprehensive look at production networks using data on value added.

The main conclusions are:

- ◆ **Mainland China** has, by a substantial margin, become the **dominant component supplier** to local manufacturing sectors across geographies, **eclipsing the US**.
- ◆ **Trade tensions** between mainland China and the US appear to have **raised**, not lowered, the **reliance of third markets on inputs from mainland China**.
- ◆ **Japan** remains the **second most important** input supplier in Asia, but its share has been falling rapidly, mirrored by the rise of **mainland China**, which is now **the largest component supplier** to every single economy in the region.
- ◆ **Korea** is the **largest input supplier** to manufacturing in **mainland China**, followed by the **US**, though **Japan** is the **biggest component supplier for exports** from mainland China.
- ◆ Most of **emerging Asia** has **reduced its reliance on imports** for export processing in recent years, while it has increased elsewhere, highlighting a growing **regional 'self-sufficiency' in manufacturing**.
- ◆ **Mainland China** has raised its market share as a **supplier of export components** in major sectors like **electronics, autos, chemicals & pharmaceuticals, and machinery & industrial equipment**, primarily at the **expense of the US and Japan**.

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What goes in, what goes out

- ◆ Mainland China dominates global supply chains, supplying on average almost double the input to manufacturing elsewhere relative to the US
- ◆ Japan is still the second-highest input provider for economies in Asia, though its share has been falling, while mainland China's is surging
- ◆ Manufacturers in Vietnam, Malaysia, Thailand, Taiwan, Korea, and Singapore are most dependent on components from the rest of Asia

Stitchin' it together

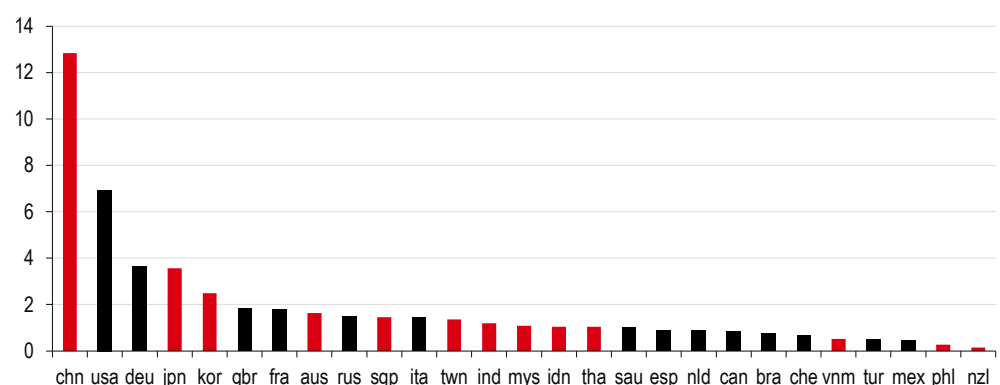
Input-output tables offer deeper insight into global production linkages

That the world economy has become highly inter-dependent is hardly news. But tracing out exactly how interconnected production is across markets is fiddly stuff. One way to approach this is with the use of input-output (IO) tables that show what share of manufacturing output in one economy uses components, or inputs, from others.

The analysis in this chapter is based on IO tables produced by the OECD. Although the latest set is only available for 2015 (it takes time to compile this massive database) it still provides a useful snapshot of the inter-linkages in global manufacturing. And comparing the 2015 numbers to, say, 2009, also gives us a useful idea of the underlying trajectory.

The analysis and data presented in this chapter are in part based on the excellent analysis done by academic economists Richard Baldwin and Rebecca Freeman (see, for example, *Supply-chain contagion waves: thinking ahead on manufacturing 'contagion and reinfection from the COVID concussion*, vox.eu.org, 1 April 2020; and *Trade conflict in the age of COVID-19*, vox.eu.org, 22 May 2020).

Chart 1: Average contribution to manufacturing value added elsewhere (%), 2015



Source: Baldwin and Freeman (cited in text and data from authors), HSBC; NB: chn refers to mainland China; for key to economy codes please see appendix

Take a look at our first Chart. This shows the average contribution of individual economies to manufacturing value added elsewhere in 2015. Components from mainland China, for instance, account on average for over 12% of manufacturing output in other (major) economies. This is almost double the share of the US and highlights mainland China's overwhelming importance for global supply chains. In Asia, Japan and Korea are next (slightly behind Germany). At the other end of the spectrum, New Zealand's average contribution is tiny, just below the Philippines', while inputs from Vietnam, say, play a somewhat greater role than those from Mexico in the manufacturing output of other economies.

Mainland China, the US, Japan, and Germany are the largest component suppliers globally

At first glance, some of these results may be surprising: Mexico, after all, is a major exporter for instance to the US, yet it ranks low as a contributor of manufacturing value added in other markets. The reason for this, in a nutshell, is that we are measuring the importance of components that flow from one economy into another's manufacturing output. This excludes, for example, final products that are consumed, rather than used for onward processing. Economies ranking relatively low in this chart, therefore, are not necessarily small exporters; rather they ship fewer components used for manufacturing elsewhere and are thus less important for global processing supply chains.

Mainland China provides by far the largest share of inputs to manufacturing in Korea

Table 1 shows the complete matrix for a sub-set of economies. Pick Korea as an example: along the row, you'll find the share of inputs feeding into its manufacturing sector from different sources. Note that the US and Japan contribute roughly an equal share (6.6% and 6.7%, respectively), but that imports from China account for over 22% of Korean manufacturing output.

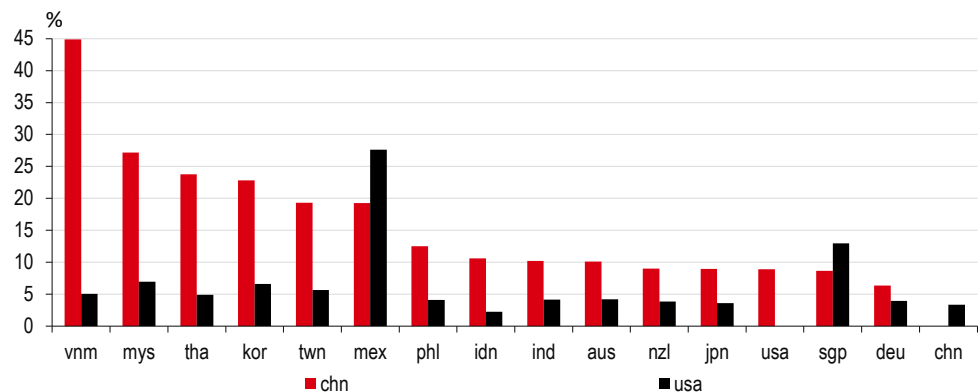
Another point is worth mentioning. The manufacturing sector inter-dependence is generally higher for economies in closer proximity. For economies in Europe, for instance, the contribution from other EU members is generally higher than from elsewhere. Another 'cluster' is in Northeast Asia, linking mainland China, Korea, Japan, and Taiwan. The clear exceptions to this are the US and China, whose contributions are relatively high across geographies, underlining their importance to supply chains globally.

Table 1: Share of manufacturing input from column economy in row economy's output (% , 2015)

		Factory North America		Factory Europe				Factory Asia												Total foreign inputs from
		usa	mex	deu	gbr	fra	ita	aus	jpn	chn	ind	idn	kor	mys	phl	sgp	tw	tha	vnm	Asia ex Japan
Factory North	usa		2.6	1.6	0.9	0.6	0.7	0.3	1.8	8.9	0.7	0.3	1.3	0.3	0.1	0.3	0.7	0.3	0.2	13.2
	mex	27.6		2.7	0.7	0.9	1.0	0.4	3.3	19.3	1.1	0.3	3.3	1.0	0.3	0.6	1.4	0.8	0.3	28.3
Factory Europe	deu	3.9	0.3		2.8	4.1	3.3	0.3	1.4	6.3	0.7	0.2	0.8	0.3	0.1	0.6	0.4	0.3	0.3	10.1
	gbr	5.6	0.2	6.3		3.5	2.2	0.4	1.2	6.7	1.0	0.2	0.8	0.2	0.1	0.4	0.4	0.3	0.2	10.5
	fra	4.9	0.3	9.1	3.2		4.1	0.2	1.1	5.7	0.7	0.2	0.6	0.2	0.1	0.5	0.3	0.3	0.2	8.9
	ita	3.0	0.3	7.7	2.2	4.9		0.2	0.8	6.5	0.9	0.3	0.9	0.2	0.1	0.3	0.3	0.2	0.2	9.9
Factory Asia	aus	4.2	0.3	1.6	1.1	0.7	0.8		3.2	10.1	0.9	1.0	1.9	1.2	0.1	1.3	0.7	1.6	0.7	19.7
	jpn	3.6	0.2	1.1	0.6	0.5	0.4	2.8		8.9	0.4	1.3	1.7	0.9	0.3	0.7	0.9	0.9	0.7	17.0
	chn	3.3	0.2	1.5	0.5	0.6	0.5	2.2	2.9		0.5	0.5	3.8	0.9	0.3	0.8	2.5	0.7	0.4	10.8
	ind	4.2	0.3	1.6	1.3	0.7	0.6	2.5	1.5	10.2		1.9	2.0	1.1	0.1	1.1	0.7	0.6	0.3	18.3
	idn	2.3	0.1	0.9	0.4	0.5	0.4	1.4	3.3	10.6	1.1		2.5	2.3	0.2	3.3	1.0	1.8	0.7	23.8
	kor	6.6	0.5	3.0	1.3	1.1	0.9	2.9	6.7	22.8	1.1	1.4		1.2	0.5	1.6	2.4	0.8	1.0	33.2
	mys	7.0	0.3	3.1	1.4	1.2	0.9	3.6	7.3	27.1	2.9	3.2	5.0		0.8	7.8	4.3	3.9	1.7	57.6
	phl	4.1	0.1	1.5	0.5	0.5	0.3	0.8	4.2	12.5	0.8	1.5	3.1	1.9		3.0	2.8	2.3	0.9	29.2
	sgp	13.0	0.4	3.0	3.4	2.3	0.9	2.4	8.3	8.6	3.8	4.1	3.0	4.5	1.0		2.3	2.0	1.4	32.0
	tw	5.7	0.3	2.3	0.8	0.8	0.6	2.8	10.3	19.3	1.1	3.2	4.5	2.2	0.5	2.5		1.0	0.6	35.3
	tha	4.9	0.3	2.3	1.1	1.0	0.9	3.1	10.7	23.8	1.4	2.3	3.7	3.3	0.7	2.5	2.7		1.3	42.1
	vnm	5.0	0.3	2.2	0.9	1.0	1.1	2.2	7.9	44.9	2.1	2.0	15.0	2.3	0.5	3.2	6.0	4.6		81.1

Note: chn refers to mainland China.
 Source: Baldwin and Freeman (2020), OECD, HSBC

Chart 2: Share of manufacturing value added contributed by mainland China and US (2015)



Note: chn refers to mainland China.
Source: Baldwin and Freeman (2020), OECD, HSBC

Therefore, let's delve a little deeper into their relative importance. Chart 2 shows the value added contribution (or "share of components") from mainland China and the US to local manufacturing output. In almost all cases, with the exceptions of Mexico and Singapore, the former has a higher share than the latter. From this perspective, the US is also more 'reliant' on mainland China than vice versa (note, though, that we are defining 'reliance' in terms of the share of contribution to total value added in manufacturing, which doesn't really say anything about the importance of any particular component: mainland China, for instance, may be reliant on semiconductors only the US produces, while the US might be able to source some of its current purchases from mainland China elsewhere, or even do without them entirely in a pinch).

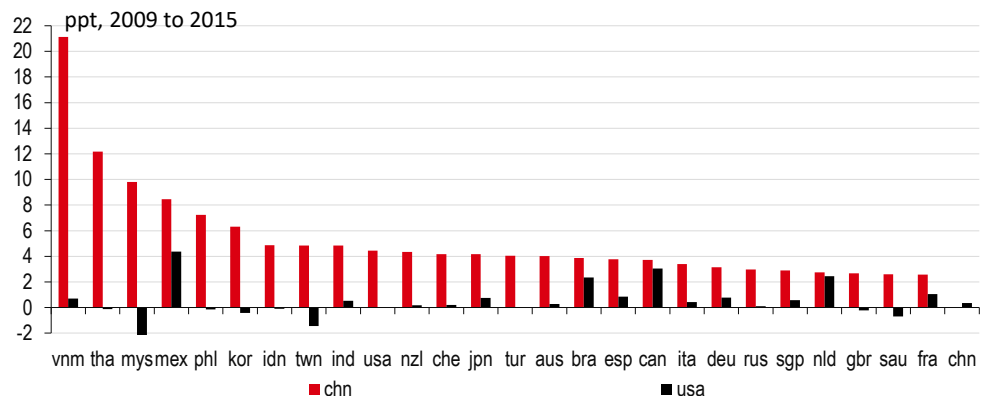
The US is a larger component supplier than mainland China only in Mexico and Singapore

Components from mainland China account for over ten percent of manufacturing output in Vietnam, Malaysia, Thailand, Korea, Taiwan, Mexico, the Philippines, Indonesia, India, and Australia. And almost everywhere, mainland China accounts for well over double the share of the US in output.

Table 2: Change in share of manufacturing input from column economy in row economy's output (ppt, 2009 to 2015)

		Factory North America		Factory Europe				Factory Asia												Total foreign inputs from
		usa	mex	deu	gbr	fra	ita	aus	jpn	chn	ind	idn	kor	mys	phl	sgp	twm	tha	vnm	Asia ex Japan
Factory North	usa		0.1	0.1	-0.1	0.0	0.1	0.0	-0.3	4.5	0.2	0.0	0.3	0.1	0.0	0.0	0.2	0.0	0.1	5.4
	mex	4.4		0.4	0.0	0.1	0.1	0.0	0.1	8.5	0.6	0.0	-0.4	-0.1	0.1	-0.1	-0.1	0.2	0.2	8.7
Factory Europe	deu	0.8	0.0		-0.2	0.2	0.2	0.0	-0.1	3.2	0.1	0.0	0.1	0.1	0.0	0.3	0.1	0.1	0.2	4.1
	gbr	-0.2	0.0	-0.1		-0.5	-0.2	-0.1	-0.4	2.7	0.1	0.0	0.1	-0.1	0.0	-0.2	-0.1	-0.1	0.1	2.4
	fra	1.1	0.2	1.5	0.6		-0.1	0.0	-0.1	2.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.1
	ita	0.4	0.1	1.1	0.1	0.6		0.0	-0.2	3.4	0.3	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.1	4.4
Factory Asia	aus	0.3	0.1	-0.3	0.0	-0.1	-0.1		-0.4	4.0	0.3	-0.1	0.3	-0.1	0.0	-0.2	0.0	-0.2	-0.1	4.0
	jpn	0.7	0.1	0.2	0.1	0.0	0.1	0.6		4.2	0.1	0.0	0.4	0.2	0.1	0.2	0.1	0.2	0.4	5.9
	chn	0.4	0.1	-0.2	0.1	0.0	0.0	-0.2	-1.8		-0.2	-0.2	-0.5	-0.2	0.0	0.0	-0.7	-0.2	0.2	-1.8
	ind	0.5	0.1	-0.3	0.0	-0.3	-0.2	-3.9	-0.1	4.8		0.4	0.3	0.1	0.0	0.1	0.0	0.0	0.2	5.8
	idn	-0.1	0.0	-0.1	0.0	-0.1	0.0	0.1	-0.5	4.9	-0.1		0.3	-0.1	0.0	-0.1	-0.1	0.2	0.3	5.1
	kor	-0.4	0.2	0.1	0.1	-0.2	0.0	-0.7	-5.5	6.3	-0.2	-0.9		-0.5	-0.1	-0.8	-0.4	-0.1	0.5	3.6
	mys	-2.2	0.0	-1.0	-0.3	-0.3	-0.3	0.5	-5.3	9.8	0.3	-1.1	-1.2		0.1	-0.3	-0.2	-0.8	0.2	6.4
	phl	-0.1	0.0	0.5	0.1	0.0	0.0	-0.1	-1.2	7.2	0.2	-0.2	-0.2	0.3		0.1	-0.1	0.2	-0.1	7.2
	sgp	0.6	0.2	0.0	-0.5	-0.3	-0.1	-0.6	0.5	2.9	-0.3	0.9	0.0	-0.5	0.3		0.2	-0.6	-0.1	2.6
	twm	-1.4	0.0	-0.3	-0.1	-0.2	-0.3	-0.9	-6.1	4.8	-0.3	-0.2	-2.3	-0.5	-0.1	-0.3		-0.3	0.1	0.9
	tha	-0.1	0.1	0.0	-0.1	-0.1	-0.2	-0.4	-2.3	12.2	-0.1	0.1	-0.5	-0.6	-0.1	-0.2	-0.2		0.5	10.5
	vnm	0.7	0.1	-0.1	-0.1	-0.2	0.0	-0.6	-1.5	21.1	-0.5	-0.6	4.4	-1.3	-0.1	-0.2	-2.8	-1.3		18.1

Note: chn refers to mainland China.
Source: Baldwin and Freeman (2020), OECD, HSBC

Chart 3: Change in manufacturing value added contributed by mainland China and the US


Note: chn refers to mainland China.
 Source: Baldwin and Freeman (2020), OECD, HSBC

Table 2 shows the *change* in manufacturing input shares between 2009 and 2015. This provides a view of the underlying trajectory of supply chains: which economies are becoming more important suppliers, which less so; and which economies are becoming more reliant on foreign inputs, and from where, and which less so.

Japan's role as a component supplier has fallen in almost all economies since 2009

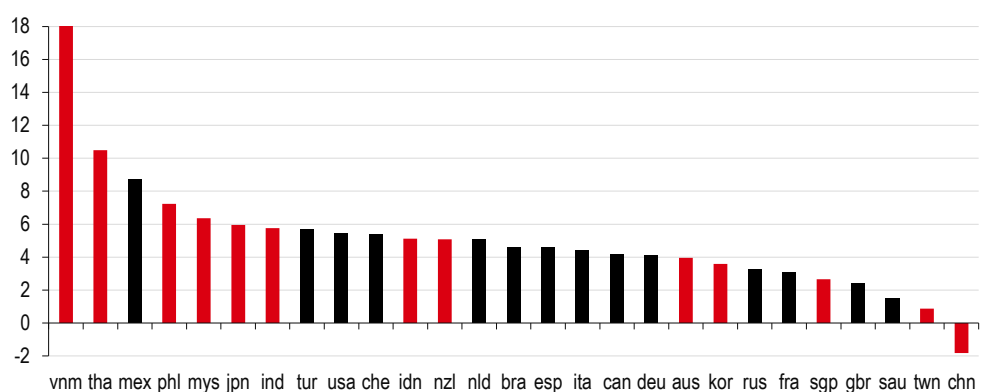
First, note the growing importance of mainland China across geographies, led by Vietnam, Thailand, Malaysia, Mexico, and the Philippines. Second, supply chain integration with the US has been mixed: up in Mexico, France, Germany, and Japan, for instance, but down in Malaysia, Taiwan, and Korea. Third, Japan's role has fallen nearly across the board. Fourth, in Vietnam, whose manufacturers are more reliant on foreign components than others, all Asian economies have become less important suppliers, except mainland China (in a big way), and Korea.

As mentioned, the rising importance of mainland China stands out. Chart 3 shows the change in input share of mainland China and the US. Only in Mexico, Brazil, Canada, and the Netherlands has the latter been able to meaningfully raise its supply chain connectivity.

All major global economies have seen the share of inputs from Asia rise sharply since 2009, except mainland China

What also emerges from the table is the growing importance of inputs from Asia for manufacturing globally. For convenience, this is also reproduced in Chart 4. Only mainland China has over time become less reliant on components from the region (in effect, becoming more self-sufficient in its production).

Not surprisingly, the sharpest rise in regional inputs has occurred in many Asian markets (Vietnam, Thailand, the Philippines, Malaysia, Japan, and India). But note that Mexico has also become a lot more integrated with Asia, faster, in fact, than many economies within the region.

Chart 4: Change in manufacturing inputs from Asia in local output (ppt, 2009 to 2015)


Note: chn refers to mainland China.
 Source: Baldwin and Freeman (2020), OECD, HSBC

All about trade

- ◆ Asia's reliance on foreign inputs for export manufacturing has fallen over time, and for many regional economies is lower than in the West
- ◆ China's importance to global export supply chains has soared since 2012, vastly eclipsing nowadays the US and Japan, especially in Asia
- ◆ Even since the start of the trade war with the US, China has sharply raised its supply chain 'dominance', gaining global export market share

The finer points

While input-output tables, on which the analysis in the previous chapter is based, provide the most comprehensive view of manufacturing sector inter-dependence, the data comes out with a quite a lag. Moreover, it provides only an indirect view of trade flows, capturing the value added embedded in goods produced, both direct and indirect rather than exports and imports per se.

This chapter, therefore, uses an alternative data-set, one specifically designed to analyse value-added shares in trade, or so-called global value chains (see Bruno Casella, et al., *Improving the analysis of global value chains: the UNCTAD-EORA database*, in Transnational Corporations, vol. 26, No 2., 2019, UNCTAD, pp. 115-42). For example, this data helps us to map out the reliance of an economy's export sector on imported inputs.

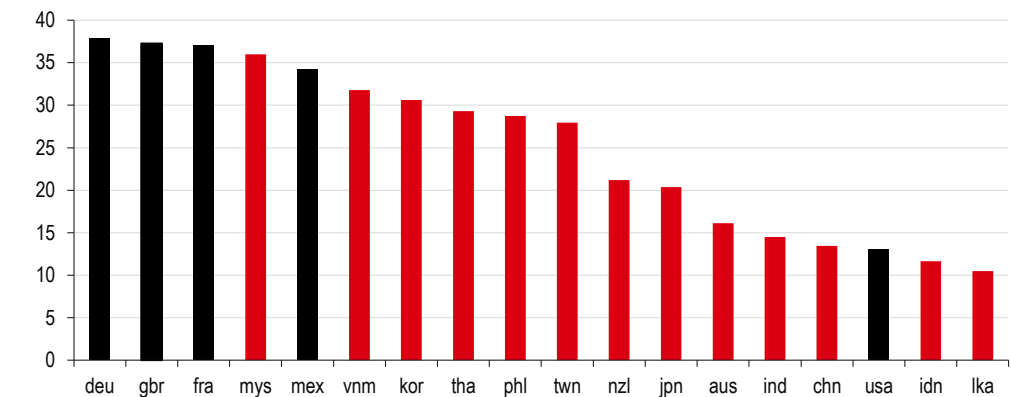
Emerging Asia's reliance on inputs from outside the region for export manufacturing has fallen steadily

Let's start with a bird's-eye view. Chart 1 shows the share of inputs from outside the region that are embedded in exports from Asia ex-Japan: for example, a car shipped from Korea that might include brake-lights made in Germany, or a hard-disk drive exported from Thailand that was made with a specialized chemical previously imported from the US. For Asia ex-Japan overall, the reliance on inputs from outside the region has dropped from nearly 24% in the mid-1990s to below 14% today, implying that more and more of the needed components are made locally. But, how reliant on imports are individual economies, really, in the production of their exports?

Chart 1: Asia ex-Japan exports: Share of non-regional value added embedded (%)



Source: UNCTAD-EORA, HSBC

Chart 2: Foreign value-added share in exports (% , 2019)


Note: chn refers to mainland China.
 Source: UNCTAD-EORA, HSBC

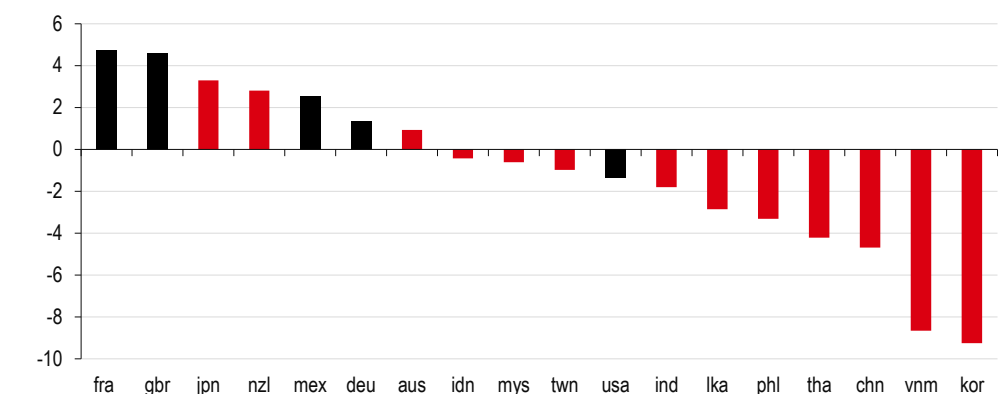
Chart 2 shows estimates for 2019 for individual economies. Note that Germany, Great Britain, and France have a higher share, in some cases much higher, of import content in their exports. Next is Malaysia, followed by Mexico. Also note that mainland China is no longer very reliant on imports for its export manufacturing: only barely more so than the US. Indonesia is among the least import reliant economies given it exports a lot of natural resources, which are produced without many foreign inputs.

Germany, Great Britain, and France are more reliant on imported inputs for export assembly than emerging Asia

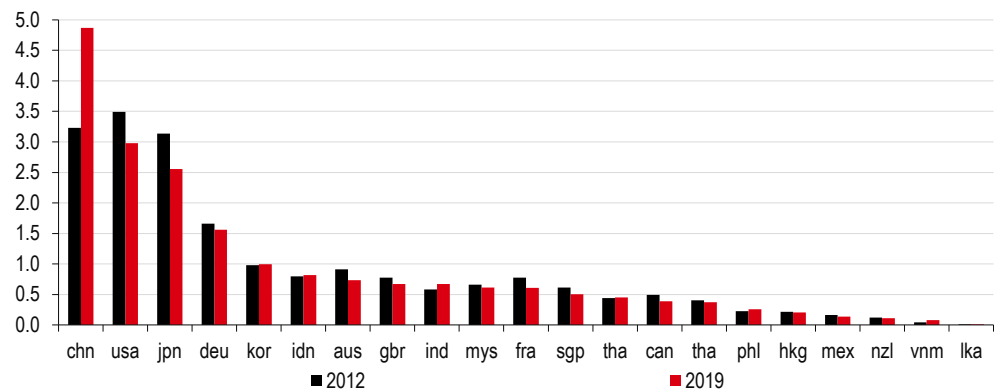
Interestingly, in the last several years, the import dependence of most economies' exports has fallen, suggesting that global supply chains are being 'shortened' (see also, *Excuse me, globalization's been stuck already*, 22 May 2020). Although this is not universally the case. Chart 3, for instance, shows the change in the use of foreign inputs in export manufacturing between 2012 and 2019. In France, Great Britain, Japan, New Zealand, Mexico, Germany, and Australia, the share increased, but it was down elsewhere, notably in Korea, Vietnam, mainland China, and Thailand. Overall, exports from emerging Asia have become less reliant on imports for assembly.

The other angle

From a different perspective, the data also allows us to gauge which economies are the largest providers of inputs to export manufacturing elsewhere. Take a look at Chart 4. This shows the average share of an economy's products in exports originating from another market.

Chart 3: Change in foreign value added share in exports (ppt, 2012 to 2019)


Note: chn refers to mainland China.
 Source: UNCTAD-EORA, HSBC

Chart 4: Average share of value added contribution to exports elsewhere (%)


Note: chn refers to mainland China.
 Source: UNCTAD-EORA, HSBC

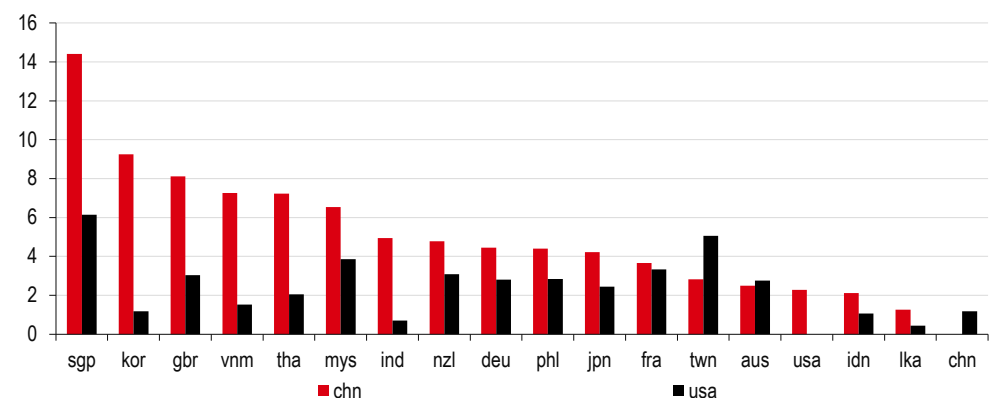
In 2012, the US was the pre-dominant supplier of components to global supply chains, ahead of mainland China. However, by last year, the two had swapped places, with the latter now outstripping the former. In fact, the US lost 'market share' almost as much as Japan. Note that Germany is nowhere near as tied into export supply chain manufacturing as the top three economies, though still significantly more so than Korea. Meanwhile, most economies have slipped in their importance in terms of providing inputs to export manufacturing elsewhere: apart from mainland China, which took the lion's share, only India, Vietnam, the Philippines, Indonesia, Korea, and Thailand made marginal gains -- all of which are located in Asia.

Again, it's worth focussing a little more on the US and mainland China, the largest contributors to global supply chains, at least when measured by their average contribution to output elsewhere.

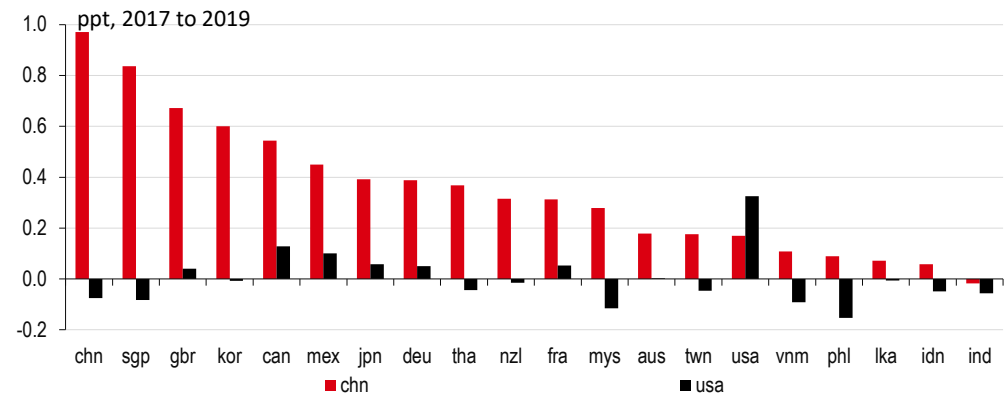
Only in Taiwan and Australia is the US still a larger input supplier for export assembly than mainland China

Chart 5 shows the share of components from mainland China and the US embedded in exports from other economies last year. Only in Taiwan and Australia does the latter outstrip the former. Overall, the reliance on inputs from mainland China is especially high in Singapore, Korea, Great Britain, Vietnam, Thailand, and Malaysia (above 6% of export value added). In relative terms, the ratio of mainland Chinese to US components is the highest in Korea, India, Vietnam, Sri Lanka, and Great Britain.

Although this, as mentioned in the previous chapter, doesn't fully account for an economy's exposure to potential import disruption from mainland China or the US, with particular components potentially being available from alternative sources, the data does underline the importance of supplies from mainland China in global export value chains.

Chart 5: Share of inputs from mainland China and the US in economy's exports (% , 2019)


Note: chn refers to mainland China.
 Source: UNCTAD-EORA, HSBC

Chart 6: Change in share of inputs from mainland China and US in economy's exports


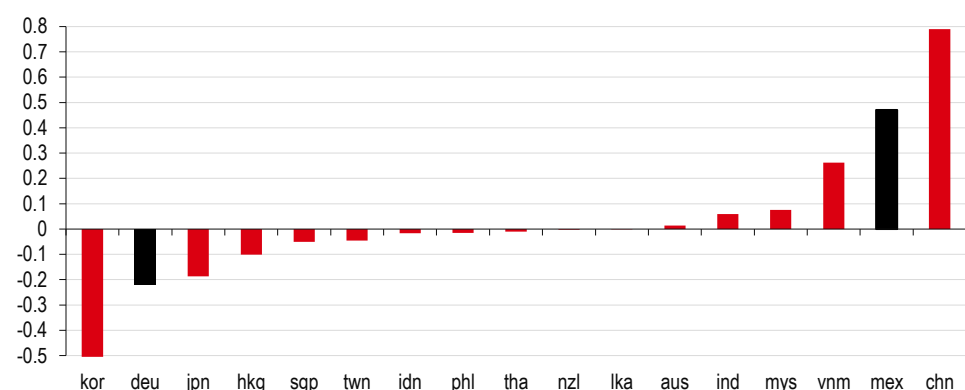
Note: chn refers to mainland China.
 Source: UNCTAD-EORA, HSBC

The dataset also allows us to assess the impact of the trade war between the US and mainland China on export supply chains (although the data for recent years is still preliminary). The imposition of tariffs especially of the former on the latter, as one might have expected, may actually have *raised* the input dependence of third economies on mainland China. In part, this is explained by the fact that while mainland China lost direct market share in the US, other economies that gained market share did this in part with inputs purchased from mainland China.

The trade war between the US and mainland China may have raised the input reliance of third economies on the latter

This becomes evident in Chart 6, which shows the change in the share of inputs from mainland China and the US in an economy's exports between 2017, before the trade war took off, and 2019, the latest year available. Meanwhile, as a result of the trade war, it's also notable that both the US and mainland China raised the share of their local components in their exports. However, and even more noteworthy: the reliance on mainland Chinese components in US exports continued to climb, while the share of US inputs in shipments from mainland China actually fell.

This is consistent with an observation that we made elsewhere (see *Two years of US-China tariff tussles*, 19 June 2020). When it comes to the impact of US tariffs on exports from mainland China, these have certainly 'succeeded' in reducing the latter's market share in the US. However, globally, mainland China still greatly increased its export market share between 2017 and 2019, at double the pace of Mexico and triple that of Vietnam, the next best performers (Chart 7). This is because mainland China more than compensated for its direct market share loss in the US through a big increase in market share elsewhere, whether directly or via the sale of inputs for exports ultimately bound for US.

Chart 7: Change in nominal global export market share between 2017 and 2019 (ppt)


Note: chn refers to mainland China.
 Source: ITC, HSBC

This sector and that

- ◆ Mainland China is for many economies the most important supplier of electronics components for export manufacturing, followed by Japan
- ◆ Mainland China has raised market share as an input provider in nearly all economies and sectors, while that of Japan and the US has fallen
- ◆ Local value added of machinery and industrial equipment exports in mainland China is above Korea's, indicating lower supply chain reliance

At another level

The preceding chapters offered a high-level view. But how exactly are individual sectors connected? For example, are electronics exports more dependent on foreign inputs than shipments of auto parts? Are pharmaceutical supply chains more 'extended' than those for industrial equipment?

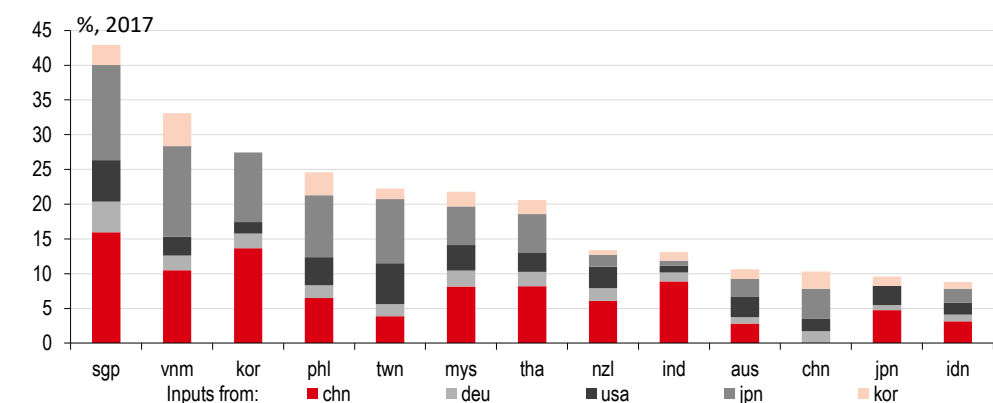
Let's look more closely at these examples, and focus on five key suppliers of inputs: mainland China, Germany, the US, Japan, and Korea. In particular, how important are components from these economies for exporters elsewhere?

Mainland China and Japan are the largest suppliers of inputs for electronics exports

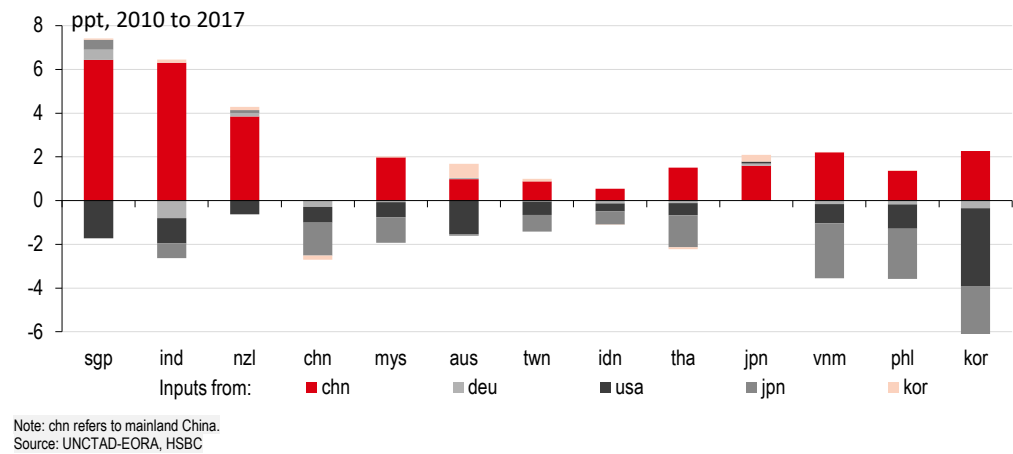
Start with electronics. Chart 1 shows the share in total export value added for all major Asian markets that originates in the 'big five'. Singapore's overall exposure is the highest, with over 40% of the value added of its electronics shipments originating from the larger economies. Next is Vietnam. Note that Korea, though itself one of the 'big five', uses quite a few components from the other four suppliers. Interestingly, electronics exports from mainland China use relatively few inputs from the US, Japan, Germany, or Japan (though they presumably contain quite a large share from Taiwan, Singapore, and others, though this is not shown).

Also note that mainland China is usually the largest contributor of the five to other economies' electronics exports, followed by Japan, with the US playing a role comparable to Korea's, with

Chart 1: Share of inputs by origin in electronics exports



Note: chn refers to mainland China.
 Source: UNCTAD-EORA, HSBC

Chart 2: Change in the share of inputs by origin in electronics exports


the exception of Singapore and Taiwan. Germany is generally the least important contributor to electronics exports from other economies, though not far behind Korea.

Mainland China greatly raised its electronics input share in exports from other economies

As before, it is also worth keeping an eye on the *change* in these contributions over time. Here, we look at the change between 2010 and 2017. Chart 2 shows that components from mainland China have become more important for the production of electronics exports everywhere, while those from the US, Germany, and Japan generally lost out.

This suggest, at least at the surface, that mainland China has taken market share from the other 'big five' (although, in practice, the sourcing of particular components may also have shifted to other markets, or more and more may now be produced locally). For an even more in-depth look at electronics supply chains in Asia, and the regional trade networks in general, see also D. Lippoldt and S. Rajanayagam, *Asian trade prospect: navigating turbulent seas*, 13 August, 2019.

Japan is still a major supplier of automotive inputs in Asian supply chains

Let's turn to the automotive sector, which includes complete vehicles as well as parts. Chart 3 shows the contribution of the 'big five' to individual economies' exports. In practice, of course, not all of these markets will be major exporters of automotive products, but it is still worth keeping a broad view. Note, again, that mainland China is an important supplier, but in Vietnam, Malaysia, Taiwan, and Indonesia Japan is more important. Interestingly, in Thailand, a major exporter, mainland China and Japan provide roughly an equal share to the value added embedded in shipments (even though the dominant producers in the country are Japanese companies). Germany, a major global powerhouse when it comes to car exports, is roughly on par with the US as a supplier of inputs used in export manufacturing in Asia. Germany's surprisingly small role, compared to Japan and mainland China, is

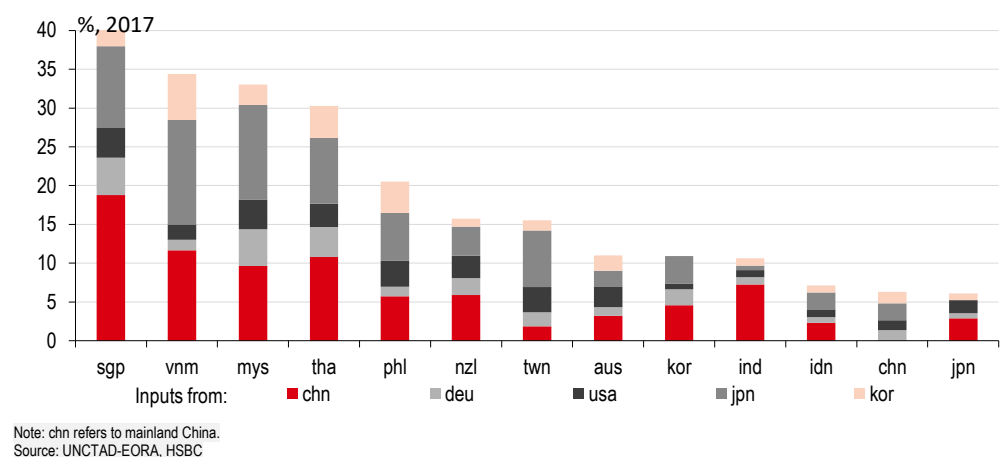
Chart 3: Share of inputs by origin in auto exports


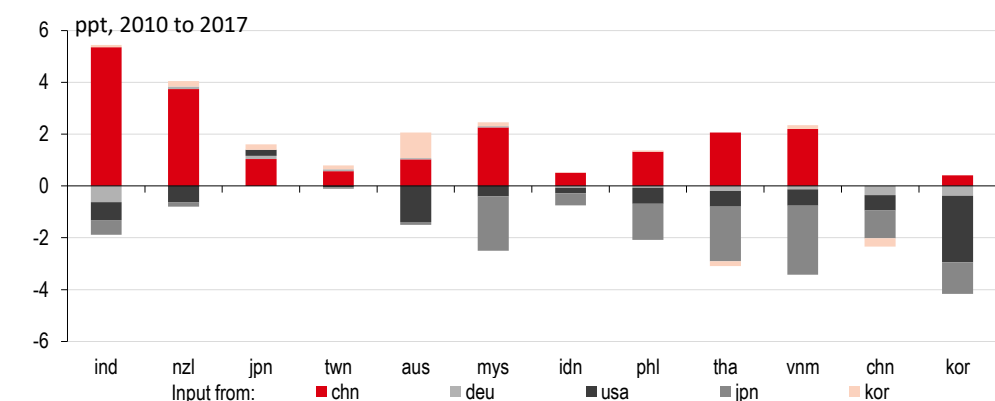
Table 1: Change in the share of inputs by origin in auto exports (ppt, 2010 to 2017)

inputs from:	exports from:												
	aus	nzl	jpn	chn	ind	idn	kor	mys	phl	sgp	tw	tha	vnm
chn	1.0	3.7	1.0	5.0	5.4	0.5	0.4	2.3	1.3	13.4	0.6	2.1	2.2
deu	0.1	0.1	0.1	-0.4	-0.6	-0.1	-0.4	0.0	-0.1	1.2	0.1	-0.2	-0.1
usa	-1.4	-0.6	0.2	-0.6	-0.7	-0.2	-2.6	-0.4	-0.6	-1.5	0.0	-0.6	-0.6
jpn	-0.1	-0.2	-3.4	-1.1	-0.6	-0.5	-1.2	-2.1	-1.4	3.1	-0.1	-2.1	-2.7
kor	1.0	0.2	0.2	-0.3	0.1	0.0	9.2	0.1	0.0	0.1	0.2	-0.2	0.1

Note: chn refers to mainland China.
Source: UNCTAD-EORA, HSBC

possibly because the country still exports a relatively higher number of finished vehicles itself, rather than rely on a more extensive network of local producers in Asia.

Chart 4: Change in the share of inputs by origin in auto exports



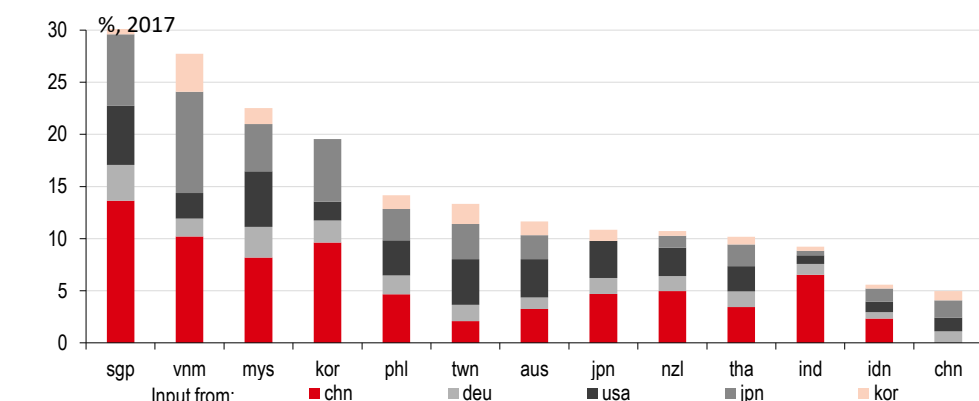
Note: chn refers to mainland China.
Source: UNCTAD-EORA, HSBC

Mainland China and Korea localized auto production, while Japan internationalized

Chart 4 shows how contributions evolved over time. Again, China has gained market share across the board, while the US, Japan, and Germany generally lost and Korea's performance was mixed. Table 1 shows the same information, though here the change in three of the 'big five' economies own value added contribution to its exports are included as well (green cells): note that mainland China and Korea have 'localized' part of the production of auto exports, while Japan has internationalized.

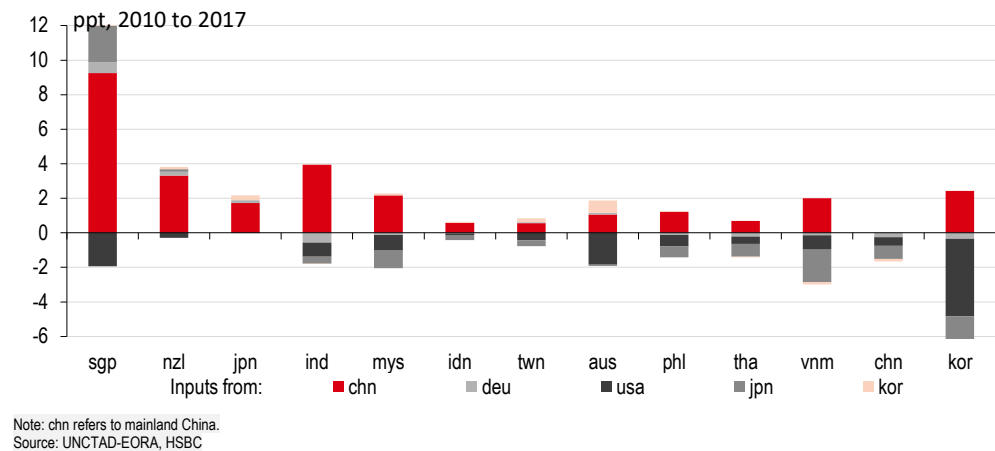
Next: chemicals and pharmaceuticals. Again, Singapore, Vietnam, and Malaysia are among the most reliant on inputs from the 'big five', though Korea also uses a large share of inputs. Note also

Chart 5: Share of inputs by origin in chemicals and pharma exports



Note: chn refers to mainland China.
Source: UNCTAD-EORA, HSBC

Chart 6: Change in the share of inputs by origin in auto exports



the rather low share of imported inputs (at least from the other 'big five') in mainland China's exports. The US holds a relatively large share in Singapore, Malaysia, the Philippines, Taiwan, Australia, and Japan (Chart 5). As before, Chart 6, shows changes in input shares over time. China has gained throughout, but the US has slipped nearly everywhere, as have Japan and Germany, with Korea's performance a little more mixed.

ASEAN is the most reliant on imported inputs for machinery and industrial equipment exports

Lastly, machinery and industrial equipment. Chart 7 shows the overall input shares of the 'big five' for 2017. The ASEAN economies lead the way in terms of being more reliant on imported inputs for export processing. Japan and mainland China generally provide a similar share, followed by Korea.

Chart 7: Share of inputs by origin in machinery and industrial equipment exports

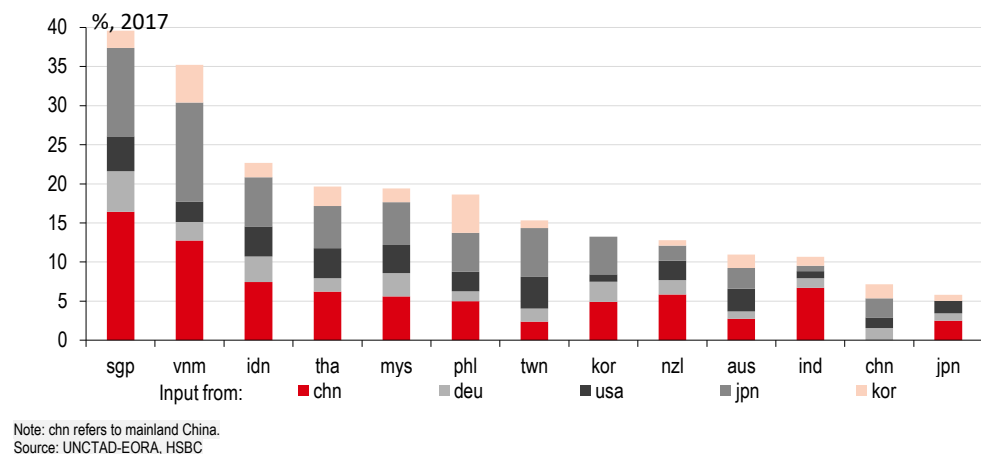


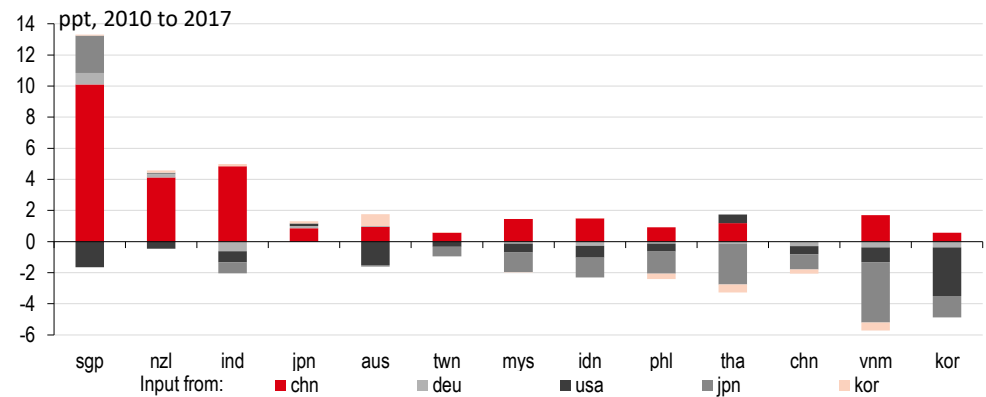
Table 2 shows the same data in table format. But it also includes the local value added content in the machinery and industrial equipment exports for Japan, mainland China, and Korea (green cells).

Table 2: Share of inputs by origin in machinery and industrial equipment exports (% 2017)

inputs from:	exports from:												
	aus	nzl	jpn	chn	ind	idn	kor	mys	phl	sgp	twn	tha	vnm
chn	2.8	5.9	2.5	84.2	6.7	7.4	4.9	5.6	5.0	16.4	2.4	6.2	12.7
deu	0.9	1.8	1.0	1.6	1.2	3.3	2.6	3.0	1.2	5.2	1.7	1.7	2.4
usa	2.9	2.5	1.6	1.3	0.9	3.8	0.9	3.6	2.5	4.4	4.0	3.8	2.6
jpn	2.7	1.9	87.2	2.4	0.7	6.3	4.8	5.5	5.0	11.3	6.3	5.4	12.7
kor	1.7	0.7	0.8	1.8	1.1	1.9	78.6	1.7	4.9	2.2	1.0	2.5	4.8

Source: UNCTAD-EORA, HSBC; NB: chn refers to mainland China

Chart 8: Change in the share of inputs by origin in machinery and industrial equipment exports



Note: chn refers to mainland China.
 Source: UNCTAD-EORA, HSBC

Note that mainland China produces more value added onshore than Korea, implying a lower import reliance (although, again, this doesn't say anything about the criticality, or fungibility of sourcing, of particular components). Also of note is the relatively high share of mainland Chinese components for exports of machinery and industrial equipment from India (even if the latter is not a major exporter in its own right of these goods).

Chart 8, as before, shows the change in input shares between 2010 and 2017. Mainland China has raised its share of inputs that feed into exports of machinery and industrial equipment from all economies. The US, by contrast, has broadly lost (except in Japan and Thailand, as has Japan (except in Singapore and New Zealand).

Appendix

Among the most relevant references are:

Richard Baldwin and Rebecca Freeman, *Supply-chain contagion waves: thinking ahead on manufacturing 'contagion and reinfection from the COVID concussion*, voxeu.org, 1 April 2020

Richard Baldwin and Rebecca Freeman, *Trade conflict in the age of COVID-19*, voxeu.org, 22 May 2020

Bruno Casella, et al., *Improving the analysis of global value chains: the UNCTAD-EORA database*, in *Transnational Corporations*, vol. 26, No 2., 2019, UNCTAD, pp. 115-42

UNCTAD-EORA Global value chain database: <https://worldmrio.com/unctadgvc/>

OECD Inter-Country Input-Output (ICIO) Tables: <http://www.oecd.org/sti/ind/inter-country-input-output-tables.htm>

OECD Trade in Value Added (TiVA) Tables: <http://www.oecd.org/sti/ind/measuring-trade-in-value-added.htm>

Table A. 1: Economy abbreviations

aus	Australia	fra	France	kor	Korea	sau	Saudia Arabia
bra	Brazil	gbr	Great Britain	mex	Mexico	sgp	Singapore
can	Canada	hkg	Hong Kong	mys	Malaysia	tha	Thailand
che	Switzerland	idn	Indonesia	nld	Netherlands	tur	Turkey
chn	Mainland China	ind	India	nzl	New Zealand	twm	Taiwan
deu	Germany	ita	Italy	phl	The Philippines	usa	USA
esp	Spain	jpn	Japan	rus	Russia	vnm	Vietnam

Source: HSBC

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