Economics & Strategy

Understanding China

China-US: From trade war to tech war

Group Research

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- *China-US trade tensions may ease, but intense competition and confrontation between the two countries in the space of advanced technology will likely persist.*
- *A China-US tech war could lead to the relocation of parts of the electronics supply chain from China to other emerging Asian economies. Some shifting and localisation of supply chain would take place in any case, owing to recent developments in robotics, artificial intelligence, and 3D printing allowing for more nimble and customised product manufacturing, but pushback from the US would likely hasten the process.*
- *We evaluate the existing production capacity and potential to attract new FDI in the electronics sector. In Asia, Malaysia, Thailand, and Vietnam are best positioned to undertake the electronics work transferred from China.*
- *Impact on Asia's advanced economies will be complicated and double-edged. Tech war may reduce the competition pressures facing South Korea and Taiwan from China's rapid industrial upgrade. On the flip side, it could disrupt the China-centered electronics supply chain and therefore, hurt the upstream Korean and Taiwanese producers indirectly.*
- *China's responses to the tech war will also have profound implications. Southeast/South Asia will likely receive more Chinese FDI under the Belt and Road Initiative. Japan and South Korea would become China's new targets of overseas technology acquisition and receive a boost from Chinese M&A.*

While the China-US trade tensions have eased to some extent, competition between the two countries in the space of advanced technology remains intense and will likely persist for a long time. Considering the possibility that the trade war may eventually evolve into a tech war, we look at the potential impacts on the Asia region.

Supply chain relocation – Thailand, Vietnam and Malaysia stand out to benefit

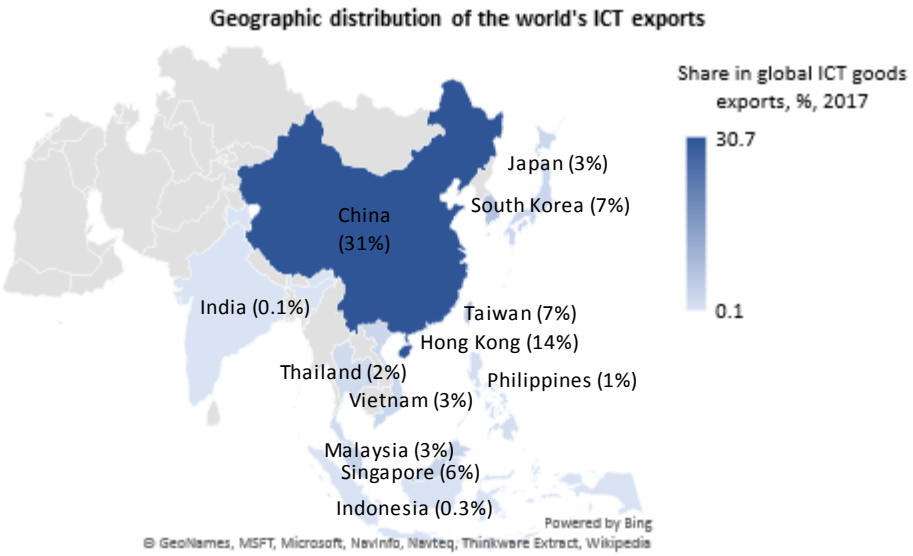
For Asia's emerging economies, a key question about the tech war is whether and how it will lead to a relocation of electronics supply chains. The US and its allies will likely use tariff and regulatory measures to encourage global tech companies to move their production out of China, to avoid intellectual property theft, forced technology transfer and cybersecurity issues. This could affect the manufacturing process of a variety of electronics products, including chips, servers, networks, computers, mobile phones, video/audio equipment, and other security-sensitive products.

Apple's contract manufacturers may well have started to increase their presence in other Asian countries to cope with the China-US tensions. Foxconn is reportedly considering setting up a new factory in Vietnam to assemble iPhones. The company has also been examining an expansion of existing facilities in India to produce the higher-end iPhones. Pegatron has been looking for opportunities in Vietnam and Indonesia.

Thailand and Vietnam are the region's second largest exporter of computers and mobile phones, respectively

The countries with existing production networks should be well positioned to receive the electronics work transferred from China. Presently, China is Asia's largest electronics production base, accounting for as much as 45% of global exports of information and communication technology goods (including Hong Kong). Elsewhere in Asia, Thailand, Vietnam and Malaysia also play a significant role in the electronics supply chain, each accounting for 2-3% of global ICT goods exports. Vietnam is the region's second largest exporter of communication equipment, thanks to strong investment from South Korea's Samsung to build the smartphone assembly factories. Thailand, meanwhile, is the second largest exporter of computers in the region, especially in the area of hard disk drives. Thailand, Vietnam and Malaysia are also the leading exporters of consumer electronics products in Asia, just after China and Japan.

Based on the existing production capacity, **Malaysia, Thailand, and Vietnam should be the priority destinations for multinational companies to relocate their electronics supply chains.** These three economies are in a good position to undertake the electronics work transferred from China in the lower value-added segments, such as the assembly of computers, mobile phones, and consumer electronics products.



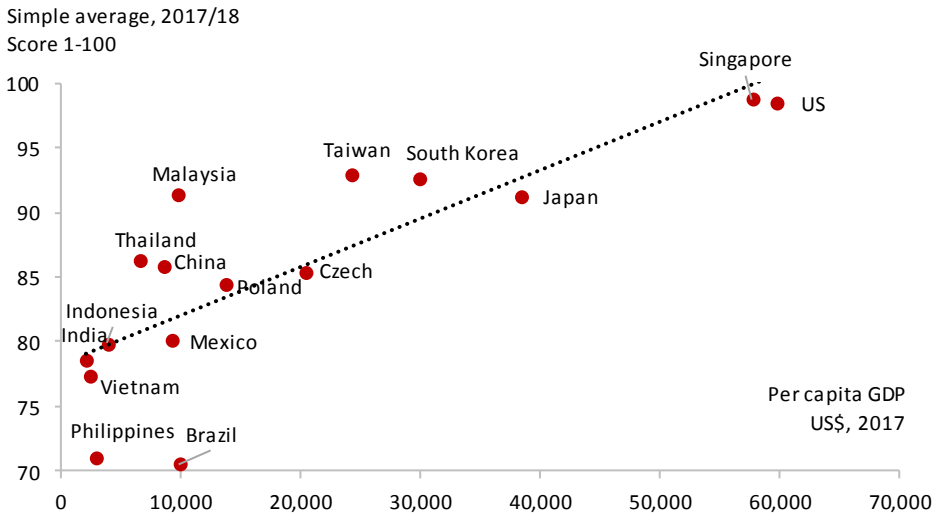
Source: UNCTAD, DBS

Another perspective is to look at the future potential for emerging Asian economies to attract new foreign direct investment in the electronics sector. A number of supply-side factors need to be considered, including not only wage costs, but also labour skills, infrastructure conditions, macroeconomic stability, institutional efficiency, tax policies, trade policies, among others. A well-trained and productive workforce, for instance, is critical for the electronics industry, which requires a high defect-free rate and strict

product quality control. Highly reliable and precise power supply is also essential, to avoid machine malfunctioning, data losses and other unwanted consequences.

We use international surveys on competitiveness and ease of doing business to capture the non-wage factors, while use per capita GDP to proxy wages. As showed in the chart below, lower-income economies are typically associated with lower wages, but they are also ranked lower in the competitiveness/EoDB surveys. Vice versa.

Chart 1: Global Competitiveness and Ease of Doing Business Indices



Source: World Economic Forum, World Bank, IMF, DBS

Thailand and Malaysia are most like China in terms of wages, competitiveness and ease of doing business

Our finding is that **Thailand and Malaysia are most like China in terms of the overall supply-side conditions to attract FDI.** India, Indonesia, the Philippines, and Vietnam are cheaper than China on the wage front (20-40% of China's wage level). But they rank behind China in education, infrastructure, macroeconomic conditions, contract enforcement, and other related areas. Multinational companies venturing into these markets will need to cope with various structural challenges, such as the high costs associated with labour training, logistics, risk management, and legal disputes.

While investment diversification from China to other emerging Asian economies could be well expected, a substitution of the Chinese supply chain remains very unlikely. Despite rising wages, China outperforms many emerging Asian economies in the key areas like education and infrastructure. Given that a large-scale electronics supply chain is already well established in China today, the industrial clustering effect and economies of scale effect would help to dissuade foreign companies from exiting the Chinese market. China's huge consumer demand, meanwhile, should also help to retain the foreign companies that target at opportunities in its domestic market.

Outside of Asia, it may not be easy to identify a perfect production base to substitute China. Mexico, Brazil, Poland and Czech Republic are either more expensive, less competitive, or less investor-friendly than China. Notwithstanding US President Trump's call for the American tech companies to return to the US to invest, the high labour costs in the US will likely remain an important hurdle in the near future.

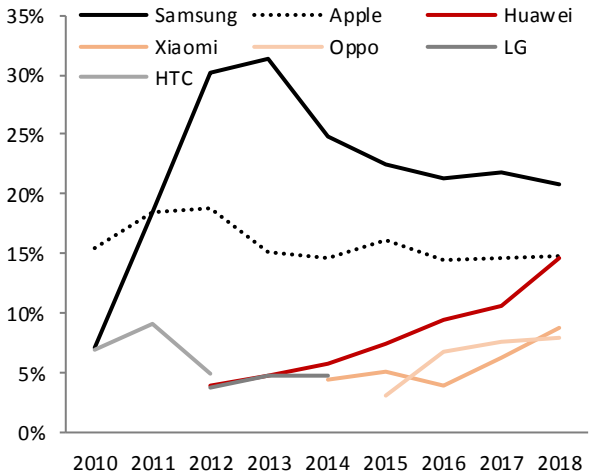
Double-edged impact on South Korea and Taiwan

For Asia's advanced economies like South Korea and Taiwan, discussions about the impact of China-US tech war are not confined to supply chain relocation. Given that South Korea and Taiwan are the world's leading producers of electronic components, they should have the capacity to undertake the high value-added electronics work transferred from China. Meanwhile, tech war may also positively affect South Korea and Taiwan through reducing the competition pressures resulting from China's rapid industrial upgrade. On the other hand, however, tech war could disrupt the China-centered electronics supply chain and therefore, hurt the upstream producers in South Korea and Taiwan indirectly. The overall picture is especially complicated for Taiwan, which is highly involved in the Chinese supply chain and meanwhile, operates as a contract manufacturer for the upstream US tech companies.

"Made in China 2025" plan has the potential to erode South Korea's and Taiwan's competitiveness edge

Tech war may reduce the competition pressures facing South Korea and Taiwan from China's industrial upgrade. Chinese tech companies like Huawei, Oppo, and Xiaomi have been rapidly gaining shares in the global smartphone market in recent years, challenging the Korean and Taiwanese counterparts like Samsung, LG and HTC (Chart 2). The "Made in China 2025" plan now sets an ambitious goal of achieving 70% self-sufficiency ratio in chip production. This could be a new and direct threat to South Korea and Taiwan, which are global leaders in IC foundry currently (Table 1). A possible slowdown in China's pace of industrial upgrading, as a result of technology protectionism by the US, may provide some relief for South Korea and Taiwan – buying more time for them to further move up the value chain and maintain competitiveness.

Chart 2: Worldwide smartphone market share



Source: IDC, Statista, DBS

Table 1: The world's top 10 foundries

2017 Rank	Company	Headquarters
1	TSMC	Taiwan
2	GLOBALFOUNDRIES	US
3	UMC	Taiwan
4	Samsung	South Korea
5	SMIC	China
6	TowerJazz	Israel
7	Powerchip	Taiwan
8	VIS	Taiwan
9	Hua Hong Semi	China
10	Dongbu HiTek	South Korea

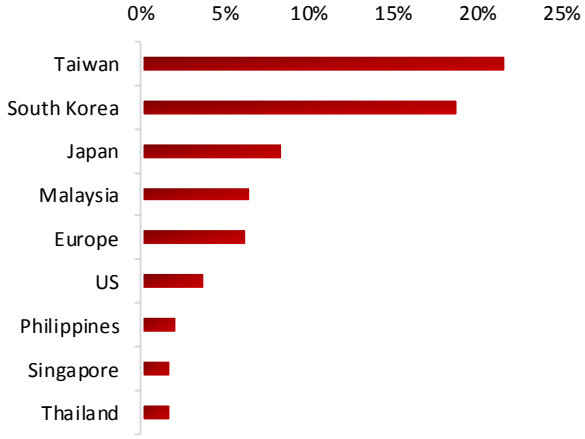
Source: TrendForce, DBS

South Korea and Taiwan are China's largest suppliers of electronic components

Tech war could hurt South Korea and Taiwan through disrupting the China-centered electronics supply chain. A possible direction of the tech war is for the US and its allies to further restrict the access of Chinese tech companies to the western markets. For instance, officials from the "Five Eyes" nations (US, Canada, UK, New Zealand and Australia) have expressed concerns or taken actions to block Huawei from installing 5G networks within their borders. These trade restrictive measures would indirectly harm the upstream Korean and Taiwanese firms supplying chips, semiconductors and other

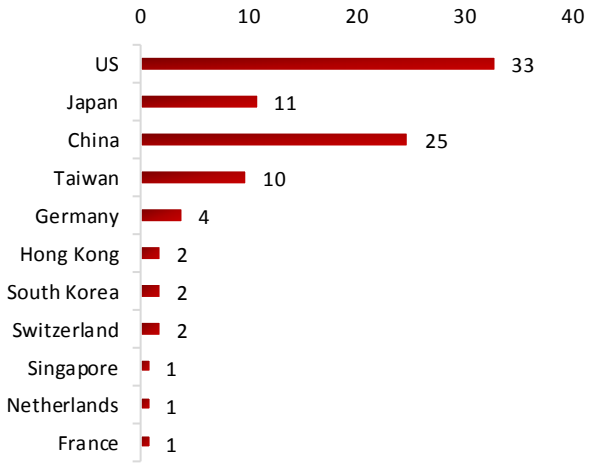
components to the Chinese tech companies. South Korea and Taiwan are currently China's two largest import sources of electrical machinery and equipment, each accounting for a share of about 20% (Chart 3). As far as Huawei's core suppliers are concerned, 10 out of 92 are from Taiwan (Chart 4).

Chart 3: China's imports of electrical machinery and equipment, by source



Source: CEIC, DBS

Chart 4: Huawei's 92 core suppliers, by source



Source: Various news reports, DBS

IC design and IT software are dominated by the US

Another direction of the tech war is for the US to further control the exports of key components and technology to China. For example, the US Department of Commerce temporarily banned the sales of Amercian components to China's telecom equipment manufacturer ZTE and chipmaker Fujian Jinhua last year. As Chinese companies look for alternative sources of supply, it may bring some opportunities for the Korean and Taiwanese producers. Nonetheless, the very upstream IC design is still largely dominated by the US today (Table 2). Taiwanese semiconductor companies like TSMC and UMC largely act as contract manufacturers for the American fabless companies like Qualcomm and Nvidia. The field of IT software, such as the operating systems of computers and mobile phones, is also dominated by the US (Table 3). If the US were to cut the upstream technology supply, it would carry the risk of disrupting the entire electronics supply chain, and creating collateral damage on South Korea and Taiwan.

Table 2: The world's top 10 fabless companies

2017 Rank	Company	Headquarters
1	Qualcomm	US
2	Broadcom	Singapore
3	Nvidia	US
4	MediaTek	Taiwan
5	Apple	US
6	AMD	US
7	HiSilicon	China
8	Xilinx	US
9	Marvell	US
10	Unigroup	China

Source: IC Insights, DBS

Table 3: The world's top 10 software companies

2017 Rank	Company	Headquarters
1	Alphabet	US
2	Microsoft	US
3	IBM	US
4	Accenture	Ireland
5	Facebook	US
6	Oracle	US
7	SAP	Germany
8	Tencent	China
9	TCS	India
10	Baidu	China

Source: Forbes, DBS

China's tech war responses and implications for Asia

Last but not the least, China's responses to the tech war could also have profound implications for Asia. In order to offset falling demand from the western markets, Chinese tech companies will likely further expand their access to emerging markets. **This could drive Chinese FDI in Southeast/South Asia under the Belt and Road Initiative**. India, Thailand and Vietnam have seen rising investment from China in telecom infrastructures in the past five years since the BRI was launched (Table 4). Investment in electronics hardware should also have the potential to pick up.

Table 4: Chinese investment in Asia in the technology sector (2013-17)

	Chinese entity	Transaction party	Quantity in millions	Subsector	Country
2013	CDH	Mobile World	US$110	Telecom	Vietnam
2014	Alibaba	One 97	US$200	Telecom	India
2014	China Mobile	True Corp	US$880	Telecom	Thailand
2015	Jiangsu Changjiang, SMIC, IC Fund	STATS ChipPAC	US$1,660		Singapore
2015	Huawei		US$170		India
2015	Phicomm		US$100	Telecom	India
2015	Alibaba	One 97	US$680	Telecom	India
2015	China Mobile	KT Net	US$280	Telecom	South Korea
2015	Nantong Fujitsu	AMD Penang	US$370		Malaysia
2016	Lenovo	NEC	US$200		Japan
2017	Wangsu S&T	KDDI	US$190	Telecom	Japan
2017	Lenovo	Fujitsu	US$220		Japan

Source: The American Enterprise Institute and the Heritage Foundation, DBS

Meanwhile, to secure the supply of advanced technology, Chinese companies will likely redirect their strategy of overseas technology acquisition from the US to other developed economies. Among Asia's advanced economies, Japan, South Korea and Singapore have been open to Chinese capital in the high-tech sector in recent years, while Taiwan has been imposing strict scrutiny due to political reasons (Table 5). **Japan and South Korea are most likely to become the new targets of China's overseas technology acquisition and receive a boost from Chinese M&A**, in our view.

Table 5: Chinese investment in Asia in the technology sector: troubled transactions (2013-17)

	Chinese entity	Transaction party	Quantity in millions	Subsector	Country
2013	China Mobile	FareasTone	US$600	Telecom	Taiwan
2016	Tsinghua Unigroup	Siliconware Precision	US$1,700		Taiwan
2016	Luxshare Precision	Merry Electronics	US$120		Taiwan
2016	Tsinghua	ChipMOS	US$370		Taiwan
2017	Tsinghua	Powertech	US$600		Taiwan

Source: The American Enterprise Institute and the Heritage Foundation, DBS

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Sources: Data for all charts and tables are from CEIC, Bloomberg and DBS Group Research (forecasts and transformations).