Swiss Re Institute

No 6/2020

sigma

De-risking global supply chains: rebalancing to strengthen resilience

Executive summary

The COVID-19 crisis has put the spotlight on global supply chain risks...

A fundamental reshaping of global supply chains (GSCs) is all but imminent and a key macro trend already in the making pre-COVID-19. The pandemic has exposed very clearly the risks that globalised production processes face from disruption to the flow of intermediate goods and services. At the height of the pandemic, lockdowns brought international exchange to a near halt. Businesses that do survive this year's ensuing pandemic-induced global recession will be increasingly aware of the many supply chain risk factors inherent in what have become very complex and specialised GSCs. In the three largest economies (the US, China and Japan), 45-48% of exports are integrated in GSCs. As the world's largest supplier of intermediate goods, China will remain core to many GSCs, alongside the formation of parallel production operations in other locations. These changes will have important implications for the global economy and insurance industry.

...prompting businesses to re-think their production and sourcing strategies.

There has been some tempering of globalisation fervour over the last decade. For one, China has been gradually losing its cost competitiveness. In addition, the rising frequency of natural catastrophes resulting in costly disruptions to production, and new, digital technologies that can simplify and shorten supply chains, have also prompted global manufacturers to rethink their production and sourcing strategies.

We expect the development of duplicate production workflows, mostly in markets in southeast Asia.

The ramping-up of US-China trade tensions since 2018 and COVID-19 have instilled greater urgency for GSC restructuring. We expect to see parallel supply chains develop as businesses seek to strengthen their operational resilience and react to the geopolitical forces at play. Markets in southeast Asia will likely be the preferred alternative destinations for duplicate production activities, given their strong growth potential and competitive labour costs. Countries with similar industry composition to China's export sector, and/or free trade agreements with the US, the EU and Japan, stand to benefit. Vietnam and Mexico are prominent among these

Our model scenario estimates the changes will generate additional exports and investment value of close to USD 1 trillion...

To model global economic impacts, we ran a quantitative scenario, assuming that China loses 20% of value-added exports to 20 lower-wage emerging markets and another 10% to reshoring to advanced markets over a 5-year period. During that transition period, we estimate that the additional exports and investment of close to USD 1 trillion. This would boost annual gross domestic product (GDP) growth in the new host export markets by 0.7%, and by 0.2% in the reshoring countries. In China, the government will likely enact additional fiscal stimulus to boost demand at home to compensate for the loss of some production activities to alternative markets, and to further the desired transition from an export-oriented to a domestic demand-led growth strategy.

...and also insurance demand. We estimate new premium volumes of USD 63 billion over five years.

Insurance plays a key role in supply chain risk management. Supply chain, contingent business interruption and non-physical damage covers can compensate for losses resulting from incidents at suppliers. Further, construction of manufacturing facilities and associated infrastructure will generate demand for commercial insurance in the alternative production locations. We estimate that the overall income effect from the higher growth in our model scenario would generate additional global premium volumes of around USD 63 billion over five years. This includes a one-time boost of USD 1.2 billion for engineering covers during the construction, and USD 9 billion for commercial insurance in the operational phases of the new facilities over the period.

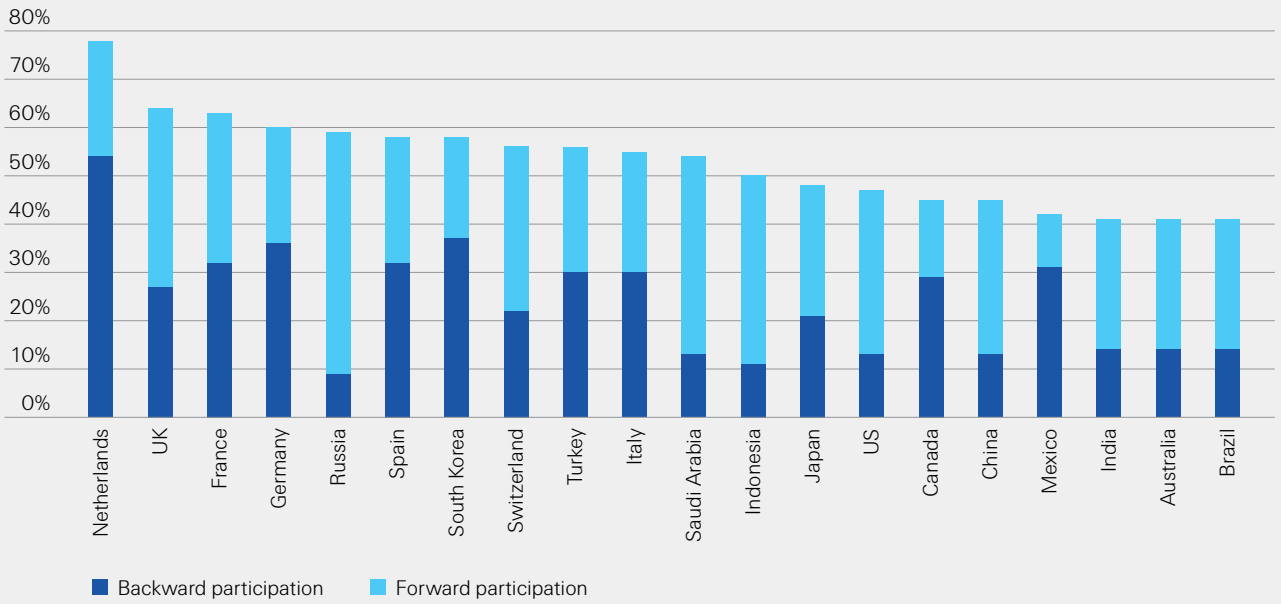
However, GSC restructuring could lead to higher prices and lower efficiency.

For all the rationale of GSC strengthening, there are also trade-offs. Globalisation yields a cost-efficient solution, with labour-intensive manufacturing taking place in low-wage countries. Relocation or reshoring on the grounds of supply chain resilience and sustainability could entail less cost-efficient production, higher prices for final products, lower corporate profits for shareholders and, ultimately, a lower global growth potential in the longer run due to efficiency losses.

Key takeaways

Global economy vulnerability to supply chain disruptions

In the world's largest 20 economies, 40–80% of exports are integrated into GSCs (% of total exports value-added) 2018

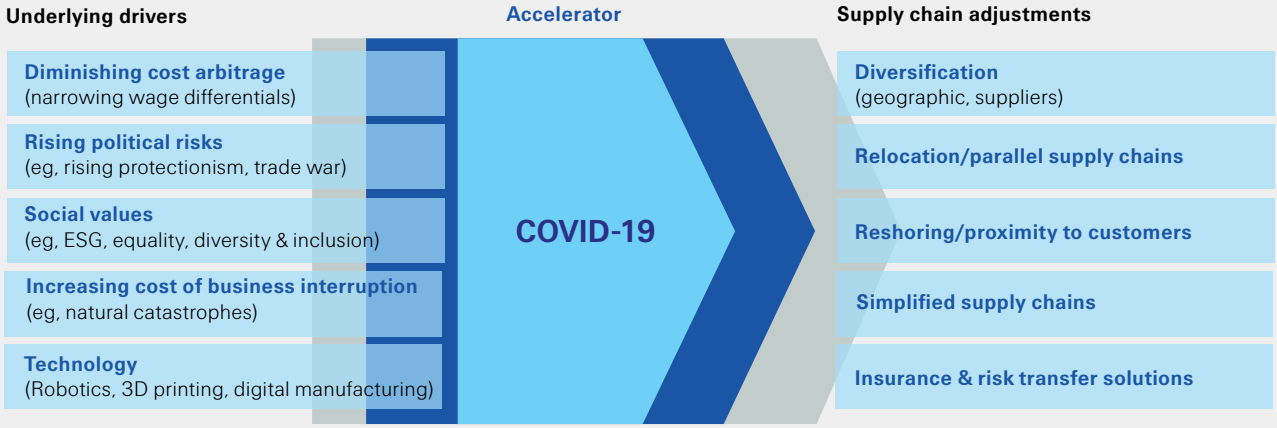


Note: Backward participation is foreign value-added content embodied in a country's exports as a percentage of total exports. Forward participation is defined as a country's domestic value-added content embodied in intermediate exports that are further re-exported to third countries, as a percentage of total exports.

Source: UNCTAD-Eora database, Swiss Re Institute

COVID-19 has instilled new urgency for a restructuring of global supply chains on the grounds of operational resilience

Other underlying drivers of change that have prompted global manufacturers to rethink their production and sourcing strategies include diminishing cost arbitrage benefits, frequent occurence of costly disruptions to production due to natural catastrophes, and new technologies that can simplify and shorten supply chains.



Source: Swiss Re Institute

Potential winners of relocation and reshoring...

Markets in southeast Asia are set to benefit most as new host locations for parallel production activities. Advanced markets will benefit from reshoring.

	Relocation to	Reshoring
1	Vietnam	US
2	Cambodia	Germany
3	Malaysia	France
4	Thailand	Italy
5	Philippines	UK

Note: Relocation countries are ranked by relative attractiveness; see Table 2 "Production relocation scorecard" in the *sigma* report. Reshoring countries are ranked by 2018 volumes of intermediate goods imports.
Source: Swiss Re Institute

...and globally, industry sectors most likely to move

	Economic factors	Non-economic factors	Share of exports (%) with shift potential		Market capitalisation, USD bn
			Low	High	
Pharmaceuticals	◔	●	38	60	6 044
Apparel	●	◔	36	57	868
Communication equipment	◔	●	34	54	2 720
Medical devices	◑	◕	37	45	2 760
Transportation equipment	◕	◔	29	43	564
Textiles	●	○	23	45	113
Furniture	●	○	22	45	90
Aerospace	◔	◑	25	33	1 137
Computers & electronics	◕	◔	23	35	111
Electrical equipment	◕	◔	23	34	1 519
Machinery & equipment	◑	◔	19	25	1 332
Automotive	◔	◑	15	20	1 611
Semiconductors and components	○	●	9	19	2 570
Chemicals	○	◔	5	11	2 477

○ Low ● High

Note: Non-economic factors include policy-driven shifts (eg, essential goods for national security). Market capitalisation as of 13 August 2020.
Source: *Risk, resilience and rebalancing in global value chain*, McKinsey, 6 August 2020, Thomson Reuters, Swiss Re Institute

Insurance solutions available for supply chain disruptions

	Incidents at policyholder	Incidents at suppliers
Physical damage	Business interruption (BI)	Contingency business interruption (CBI)
Non-physical damage	Cyber Non-damage business interruption (NDBI)	Supply chain insurance NDBI Political risk

Source: Swiss Re Institute

Quantifying the impacts of supply disruptions

During a 5-year transition period, we estimate that supply chain restructuring could yield close to USD 700 billion in additional investments to support relocation and reshoring, boosting global economic growth by 0.2% annually. However, global growth potential will be lower in the long run due to efficiency losses. Associated new insurance demand over the five years would increase global insurance premium volumes by an estimated USD 63 billion.

USD billion	Trade effect	Investment effect	GDP effects per annum	Insurance premiums
Relocation (to) countries	200	287	+0.70%	26
Reshoring countries	100	406	+0.20%	37
World*	**300**	**694**	**+0.21%**	**63**

Note: we assume China will lose 20% of value-added exports, of which 10% will go to a group of lower-wage emerging markets, and another other 10% reshored to advanced markets. *This outcome assumes China implements fiscal response to boost domestic demand and fully offsets the impact of loss of production value.
Source: Swiss Re Institute

Supply chains: complex production networks

Global supply chains are complex, specialised processes spanning many borders. At the centre of today's supply chains is China, the world's leading supplier of intermediate goods. In recent times, ongoing US-China trade tensions and the COVID-19 pandemic have exposed more obviously the risks inherent in supply chains, adding to a dampening of the popular globalisation fervour evident since 2011. A fundamental reshaping of global supply chains is underway.

Gone global

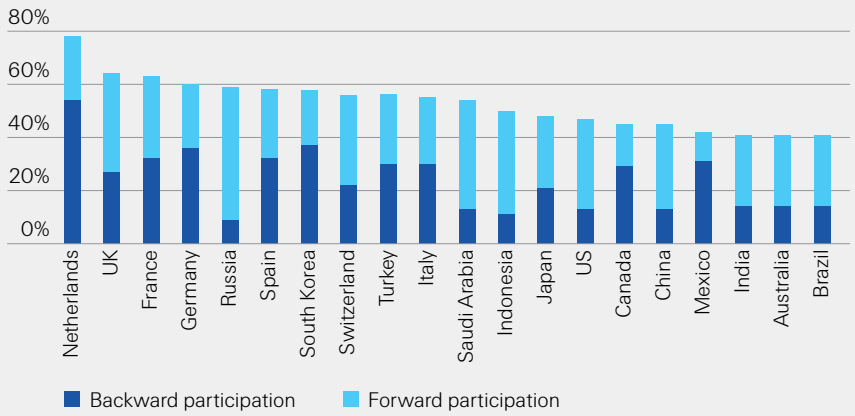
Today's products are the output of specialised supply chains crossing multiple borders.

A global supply chain (GSC) is the cross-border network of producers, corporations, information and other resources involved in the production and movement of intermediary and final goods.[1] The perennial search for efficiency gains sparked the mass transfer of manufacturing production to emerging markets in the 1980s and 1990s. The formation of GSCs has flourished since, supported by developments in containerisation, the lowering of tariffs and other non-trade barriers, improvements in global trade governance (eg, the establishment of the World Trade Organization (WTO) in 1995) and the rapid development in information and communications technology. Today's products are mostly the output of intricate supply chains spanning multiple and highly-specialised markets.

Between 40–80% of export value added of the world's 20 biggest economies are derived from GSCs.

The level of integration of markets into GSCs varies depending on relative production costs, closeness to end user, national industrial policies and others. A common measure of participation is share of a country's exports in value-added terms. Based on this measure, between 40–80% of exports' value-added from the world's largest 20 economies are derived from GSCs. Figure 1 shows that the exports of several European economies have the highest degree of participation in, and therefore most exposure to, GSCs. This is in large part due to the high degree of integration of businesses in the European Union (EU). Of the largest 20 economies, Brazil has the smallest share of GSC trade, reflecting the large share of commodity exports. An economy's vulnerability to supply chain interruptions is larger than exposures to disruptions in commodity trade, since there are fewer alternatives in highly specialised GSCs. However, this measure may not adequately capture a country's true vulnerability as in some cases, where one input is not available, a whole supply chain can grind to a halt, leading to disproportionate disruption of production flows.

Figure 1
Participation of the 20 largest economies in GSCs (% of total exports values added) 2018



Note: Backward participation is foreign value-added (FVA) content embodied in a country's exports as a percentage of total exports. Forward participation is defined as a country's domestic value-added (DVA) content embodied in intermediate exports that are further re-exported to third countries, as a percentage of total exports.
Source: UNCTAD-Eora database, Swiss Re Institute

[1] The concept of global value chain (GVC) also includes economic activities like marketing, branding and product development. This report considers GSC and GVC as synonymous.

Cost arbitrage has been the most important driver shaping the GSC for decades.

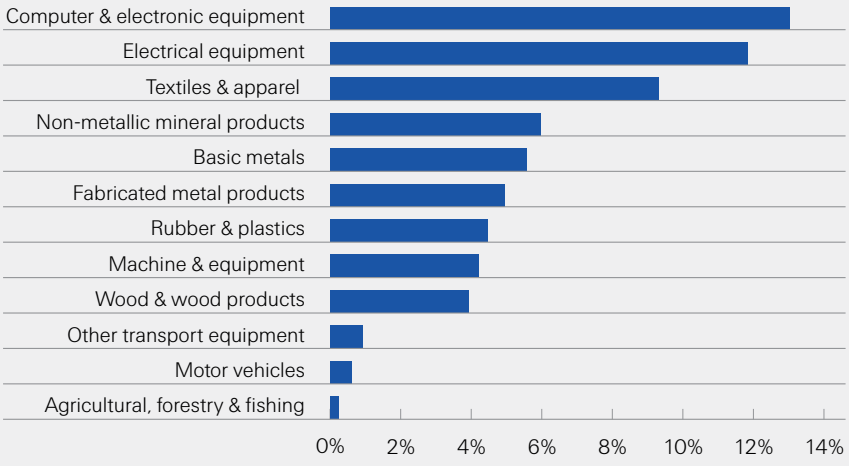
Cost arbitrage has been the main force shaping GSCs. For decades, supply chains have been built around countries' comparative cost advantages such as wage differentials, transport costs and/or preferential treatment of trading bloc agreements. This has resulted in increased offshoring of operations, characterised by the cross-continental supply of materials, increased product complexity, increased importance of operational and security efficiency, and the rise of China as the world's largest supplier of intermediate goods.

China, as the world's largest supplier of intermediate goods, is the focal point of many GSCs.

China: the world's largest production hub

At 45%, the participation of China's exports in GSCs is at the lower end relative to that of the world's largest economies. This masks, however, that China is the focal point of GSCs from the input and production perspective, as globalisation has turned it into the world's largest manufacturing hub in actual market value terms. According to OECD data, China is also the world's largest exporter of intermediate goods, accounting for 13% of the total in 2015. Disruptions to supply chains in China mean reduced capacity and output of intermediate products, impacting production and exports in many other markets. For instance in 2015, the Asia Pacific region imported 16.5% of its intermediate goods from China, 11.2% from North America and 5.3% from Europe.[2] By industry, the computer and electronic equipment sector is most vulnerable, with 13% of intermediate inputs coming from China (see Figure 2). For example, Chinese companies account for 41 of the top 200 suppliers in Apple's supply chain.[3]

Figure 2
Chinese intermediate inputs as a percentage of total global output excluding China, by industry, 2015



Source: OECD TiVA, Swiss Re Institute

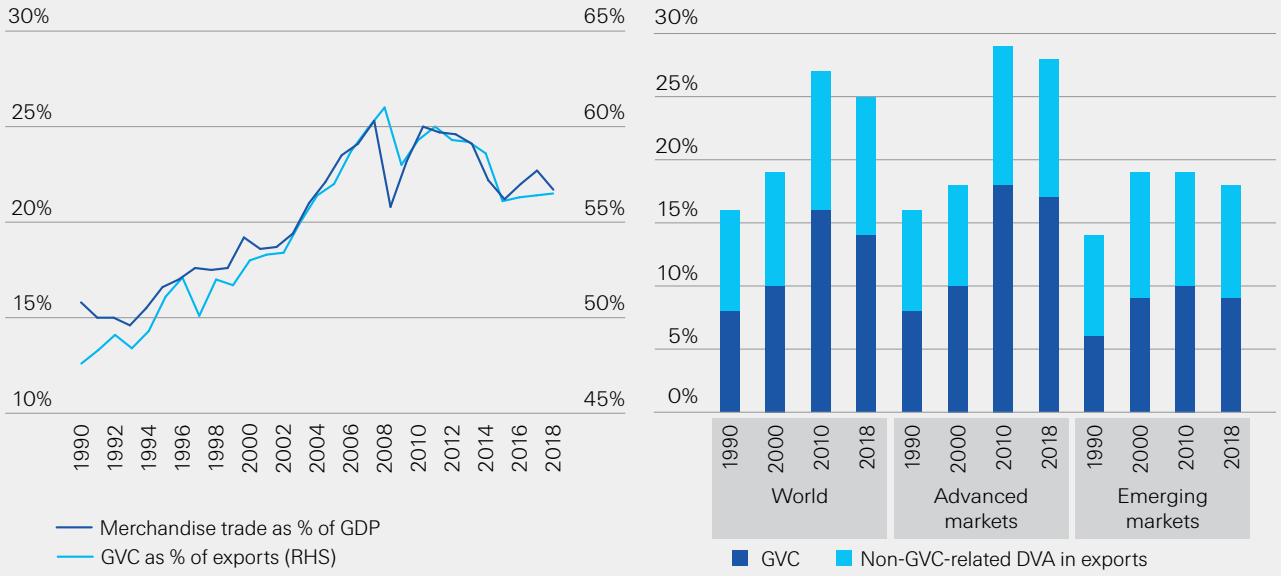
Globalisation has peaked and many manufacturers are rethinking their supply chain strategy.

As part of the overall fallout from the global financial crisis (GFC) of 2008–09, there has been some tempering of the globalisation "spirit" over the last decade. Globalisation has fuelled economic inequalities in advanced economies and contributed to populist shifts in the political landscape of many countries. Many governments have implemented protectionist measures in the form of non-tariff barriers.[4] Large free trade agreements such as the Trans-Pacific Partnership (TPP) and Transatlantic Trade and Investment Partnership (TTIP) have not closed or ratified due to protectionist shifts in politics. This resulted in a peaking of global trade relative

[2] OECD data.
[3] See "Apple's Chinese suppliers overtake US for first time", *Nikkei Asian Review,* 18 March 2019.
[4] Non-trade barriers are not clearly defined and can incorporate a variety of measures, including import controls, state aid and subsidies, as well as public procurement and localisation policies. See for example Kinzius et al. "Global trade protection and the role of non-tariff barriers", *VoxEU.org,* 16 September 2019.

to GDP and a slowdown in GSC participation. As Figure 3 shows, there has since been a decline in GSC embedded in exports from both advanced and emerging markets. The ramping up of US-China trade tensions in 2018 and prospect of a global trade war heightened concerns about dependencies on GSCs. This year's COVID-19 crisis has further exposed potential vulnerabilities to supply chain disruptions, and we believe will accelerate a fundamental reshaping and restructuring of GSCs in the next years.

Figure 3
Global trade/supply chain participation (LHS), and decomposition of exports in global value chain, % of GDP (RHS)



Note: This report considers global value chain (GVC) as synonmous with the GSC. Strictly speaking, GVC is a broader concept that also includes design, branding, marketing and other after-sales services.
Source: UNCTAD-Eora database, World Trade Organization

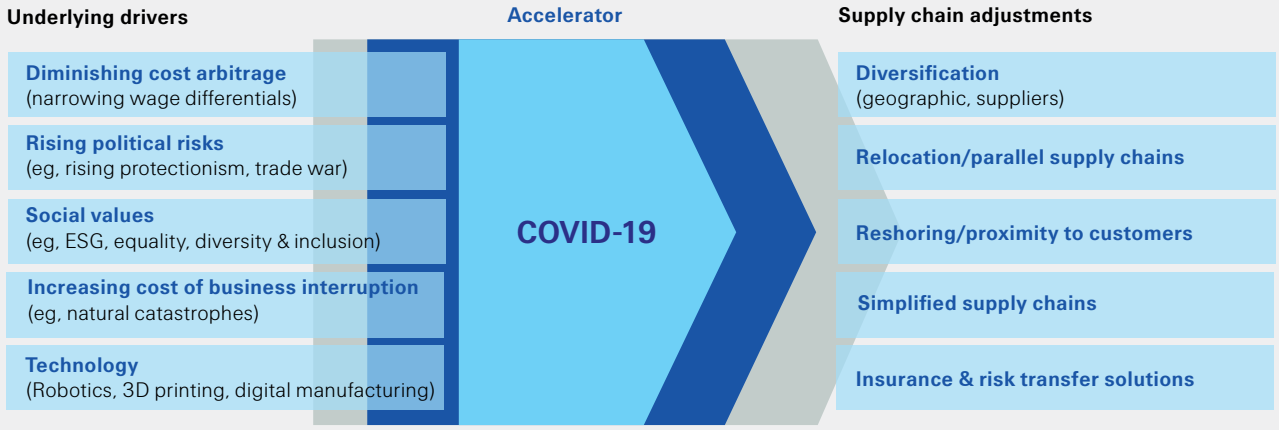
Drivers of change

This year's COVID-19 crisis has instilled greater urgency for a restructuring of GSCs on the grounds of supply chain resilience and sustainability. Underlying drivers such as diminishing cost arbitrage benefits, frequent occurrence of natural catastrophes resulting in costly disruptions to production, and new technologies that can simplify and shorten supply chains, have prompted global manufacturers to rethink their sourcing strategies. We expect healthcare (on account of the pandemic), and also the technology, consumer staples, textiles, and electrical and electronic sectors to be at the forefront of supply chain restructuring.

Underlying factors

GSCs respond dynamically to changes in economic and non-economic factors, geopolitical tensions, and changing socio-economic values and norms. Figure 4 depicts the key underlying drivers of change: diminishing cost arbitrage, rising social and political risk, increasing costs of business interruption and new technologies.

Figure 4
Supply chain risk and drivers of change



Source: Swiss Re Institute

China has lost its labour cost advantage over other Asian markets.

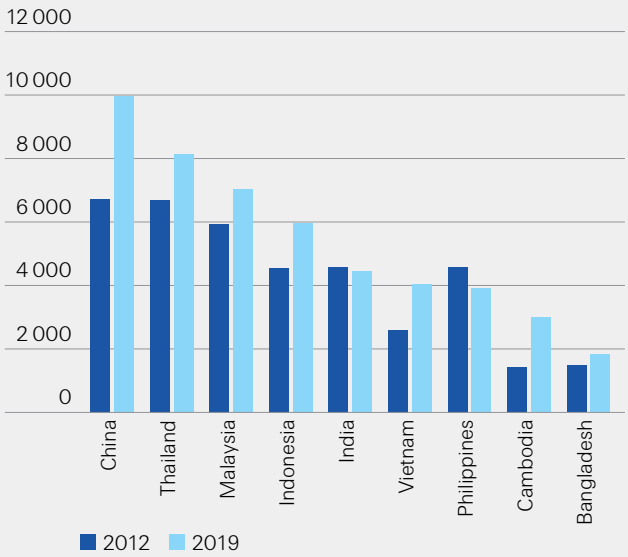
Diminishing cost arbitrage advantages, particularly in China

A main reason China has become the world's biggest production hub is its "demographic dividend". However, that dividend began to diminish as of 2011 when the working age urban population peaked and then began to decline, which has exerted upward pressure on wages. At the same time, the government has raised minimum wages to support income growth and encourage consumption. In comparison, countries in south and southeast Asia have benefited from labour cost arbitrage given their younger populations. According to a survey by Japan External Trade Organization (JETRO), the monthly cost of manufacturing labour in China (USD 830 in 2019) was more than double that of Vietnam (USD 337, see Figure 5, LHS).[5] The upshot of China's diminishing cost arbitrage relative to others is that firms have been relocating production from, and also developing duplicate manufacturing operations outside of China, a shift that began more than a decade ago.

[5] *Survey on Business Conditions of Japanese Companies in Asia and Oceania*, JETRO, November 2019.

Figure 5

Annual cost of manufacturing workers in emerging Asia, in USD (LHS), and ranking of emerging Asian markets in terms of logistics, ease of doing business and local procurement rates (RHS)



Country	Logistics (2018)	Doing Business ranking (2019)	Local procurement rate (2018)
China	26	31	66%
India	44	63	56%
Indonesia	46	73	42%
Malaysia	41	12	36%
Philippines	60	95	29%
Thailand	32	21	57%
Vietnam	39	70	36%
Cambodia	98	144	6%
Bangladesh	100	168	24%
Myanmar	137	165	32%

Source: JETRO, World Bank, Swiss Re Institute

There have also been improvements in ease of doing business in Asia.

The capacity of south and southeast Asian markets to attract foreign manufacturing investment has also improved over the years, particularly in areas like quality of infrastructure, logistics competence, institutional factors (bureaucratic "red tape") and the availability of local supplier support (see Figure 5, RHS). Many heavy industries require a large amount of initial lock-in investment, a long gestation period to get new facilities up to speed, and cooperation with local government in areas like land acquisition, customs clearing and intellectual property (IP) protection. Over the years, Thailand, Malaysia and Vietnam in particular have improved in the areas of "ease of doing business". Indonesia and the Philippines lag on this front.[6]

Increasing costs of business interruption

Major disaster events have disrupted global supply chains.

In the early years of the globalisation movement, large supply chain disruptions were considered tail risks. In the last decade, however, major natural catastrophe events have impacted the international flow of goods. For example, the March 2011 Tohoku earthquake in Japan badly affected global semiconductor production. At the time, Japan produced 20% of the world's semi-conductors, which are critical components for various kinds of electronic devices. It took more than nine months before global semiconductor production picked up again (see box on next page, *Impact of 2011 Tohoku earthquake and Thai floods on GSCs*).

[6] *Doing Business 2020*, The World Bank, 24 October 2019.

Impact of 2011 Tohoku earthquake and Thai floods on GSCs

The global supply of semiconductors was disrupted by the Tohoku earthquake in 2011.

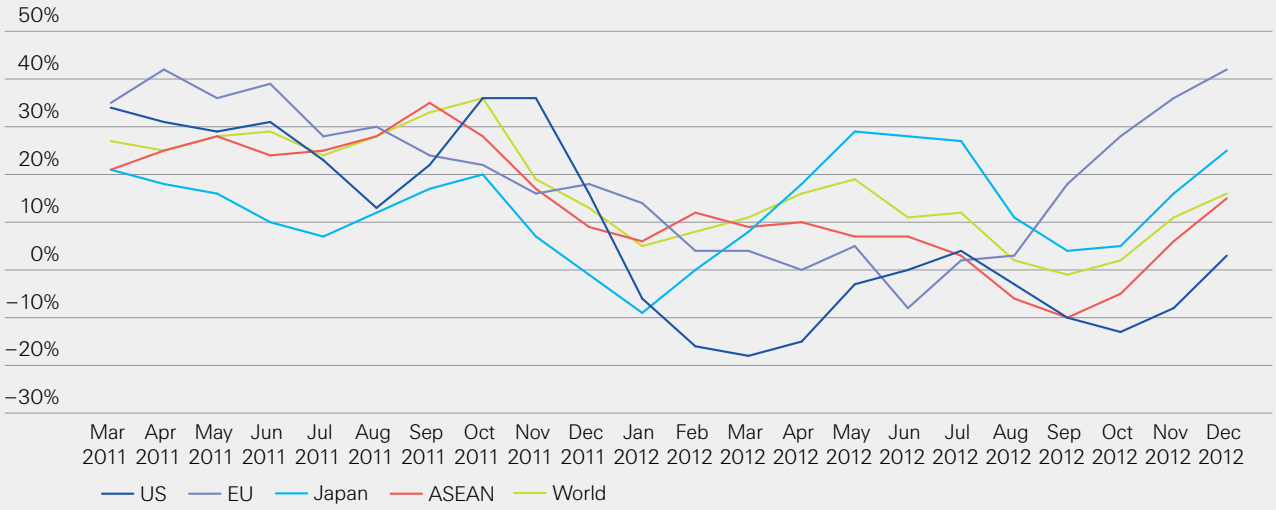
With specialisation and concentration of upstream production, Japan accounted for one-fifth of global output of semiconductors at the time of the Tohoku earthquake and subsequent tsunami disaster, in March 2011. Business interruption was triggered not so much by physical destruction of production facilities but factory closures due to power shortages. In September of the same year, 13% of Japan's energy capacity was still offline.[7] Quantifying the impact of supply chain disruption is a challenge, not least because of the complexity of chains but also the effect of government and firm-level responses. An assessment by the IMF in mid-2011 suggested that the global impact of the Tohoku earthquake and tsumani would be short-lived, and other studies similarly pointed to limited direct impact.[8,9] However, it took more than nine months for global semiconductor production to pick up again. More recent studies point to high aggregate economic losses. A study by the Research Institute of Economy, Trade and Industry of Japan suggested that the direct supply chain disruption from the Tohoku earthquake cut national GDP by 0.41% in 2011.[10] Taking into consideration the vertical (indirect) propagation effects (ie, impact on suppliers' suppliers), researchers from the Policy Research Institute of the Ministry of Finance indicated a 1.2% drag on Japan's economic growth in 2012.[11]

Huge floods in Thailand did the same to the automotive and electronic components sectors.

Later the same year, heavy flooding in Thailand interrupted production of everything from cars to computer disk drives. Thailand has become a manufacturing base for Japanese and US carmakers, and also global technology companies. At the time, approximately 19% of Thailand's manufacturing firms were part of global production networks, a main driver being the emergence of industrial clustering and agglomeration in Thailand itself. Firms and suppliers were concentrated in few locations to benefit from lower transportation costs, well-developed infrastructure and more efficient coordination.[12] Seven industrial estates in Ayutthaya, Nonthaburi and Pathum Thani provinces bordering Bangkok were closed due to the flooding, disrupting international supply chains.[13] The most affected sector was automotive, in which exports contracted more than 50% in November 2011. Exports in the electronics and electrical appliances industries were down 47% and 22%, respectively.[14] Although the most affected industrial estates accounted for just 0.5% of all production in Thailand, the overall economic impact was much wider-reaching. The estates were a major source of intermediate inputs for manufacturing in the EU, Japan and the US. Assembly lines in Thailand, for instance, were unable to produce the parts and components required to manufacture final vehicle units in Japan.[15]

7 "Lessons from Tohoku", *Wharton Magazine*, Winter 2012.
8 *Japan: Spillover Report for the 2011 Article IV Consultation and Selected Issues*, IMF, 19 July 2011.
9 See for example A. Leckcivilize, "The Impact of Supply Chain Disruptions: Evidence from the Japanese Tsunami", *Job Market Paper*, December 2012.
10 J. Tokui, K. Kawasaki and T. Miyagawa, *The Economic Impact of Supply Chain Disruptions from the Great East Japan Earthquake*, The Research Institute of Economy, Trade and Industry, July 2015.
11 This takes into consideration the impacts on demand- and supply-disrupted firms, as well as indirect effects on customers' customers and suppliers' suppliers. See V. M. Carvalho, M. Nirei, Y. U. Saito, A. Tahbaz-Salehi, "Supply Chain Disruptions: Evidence from the Great East Japan Earthquake", *Policy Research Institute Discussion Paper Series* (No.16A-15), Japan Ministry of Finance, December 2016.
12 A. Chongvilaivan, *Harnessing production networks: impacts and policy implications from Thailand's manufacturing industries*, Institute of Southeast Asian Studies, 2011.
13 "Thai floods crimp global supply chains", *Reuters*, 28 October 2011.
14 Chongvilaivan, op. cit.
15 A. Chongvilaivan, "Thailand's 2011 flooding: Its impact on direct exports and global supply chains", *Asia-Pacific Research and Training Network on Trade*, 2012.

Figure 6
Exports from Thailand to main trading partners, 3-monthly averages (year-on-year)



Source: Bank of Thailand, Customs Department

Technology-induced shifts in supply chains

3D printing allows for small-quantity production...

3D printing (3DP) technology has emerged as one of the most disruptive innovations for the logistics industry and GSCs.[16] Advances in industrial 3D printers can handle rapid prototyping and small-scale orders without sacrificing quality. In contrast to economies of scale for mass production, 3DP allows for small-quantity production and easier product differentiation. Less mass production reduces the benefits of offshoring, and manufacturing can be closer to the customers. As 3DP production can take place with a minimum amount of labour involved, human capital is less of an issue in overall production costs. The same is true for location of production.

...and more simple supply chains.

Another potential advantage of 3DP is that the technology can simplify some production processes (eg, a module can be printed in one process rather than involving the assembly of several components, each fed by separate supply chains), and sharply reduce the number of suppliers. Some large shipping companies and port authorities have started to encompass 3DP technology in their supply chains. For example, since 2014 Maersk has installed 3D printers on its ships to allow immediate replacement of spare parts before reaching port to ensure smooth continuity of logistics operations.[17] Similarly, GE Aviations uses more than 300 3D printers to manufacture additive parts.[18] Mass-scale applications of 3DP have yet to take place, with cost remaining a key barrier to implementation. However, a fundamental restructuring of GSCs may accelerate adoption of 3DP manufacturing.

Robotics can tilt the cost-benefit analysis against low-wage locations.

Another area of innovation is robotics. The comparative advantage of emerging markets in low-skilled, low-labour cost production is eroding as routine low-skill tasks are increasingly automated. Investment in robots reduces the contribution of labour in the value chain and tilts the cost-benefit analysis against offshoring to low-wage locations. Advanced-economy firms have been using robots since the

[16] H. K Chan, J. Griffin, J. Lim, F. Zeng, A.S.F. Chiu, "The impact of 3D Printing Technology on the supply chain: Manufacturing and legal perspectives", *International Journal of Production Economics*, vol 205, November 2018; H. Rogers, N. Baricz, K.S. Pawar, "3D printing services: classification, supply chain implications and research agenda", *International Journal of Physical Distribution & Logistics Management*, vol 46, 13 October 2016.

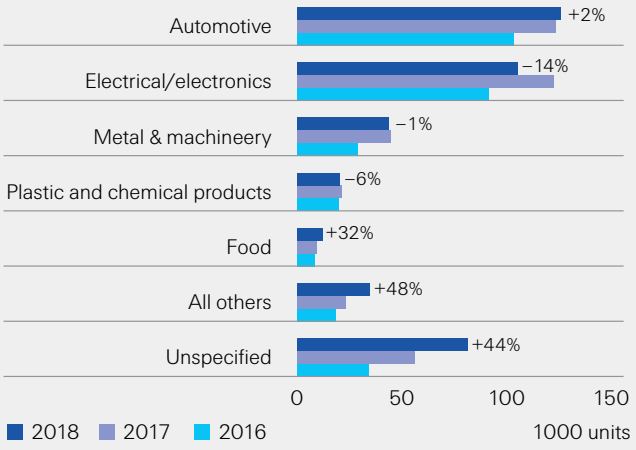
[17] "Denmark Shipping Company, Maersk, Using 3D Printing to Fabricate Spare Parts on Ships", *3Dprint.com*, 12 July 2014.

[18] *5 Ways GE Is Changing The World With 3D Printing*, GE, 26 August 2017.

mid-1990s. In 2018, global robot installations increased by 6% to 422 271 units, worth USD 16.5 billion (without software). Installations have been highest in the automotive industry, which accounts for almost 30% of all industrial robots globally, followed by electrical/electronics (25%), metal and machinery (see Figure 7, LHS).[19] In 2018, the average robot density in the manufacturing industry was 99 robots per 10 000 employees globally. Singapore, South Korea, Germany and Japan lead in robot adoption in manufacturing (see Figure 7, RHS). The sharp decline in interest rates relative to wages after the GFC has encouraged greater investment in robots.

Figure 7

Number of installed industrial robots in global by sector (change shows 2018 vs 2017)



The 10 countries with highest robot density in manufacturing (number of installed robots per 10 000 workers), 2018

Source: *World Robotics 2019 edition*, International Federation of Robotics, Swiss Re Institute

Politics has become more populist after the GFC.

Political risk: Rising protectionism and the US-China trade war

A dramatic increase in political risks over the last three years has been a major source of instability for global trade and supply chains. Globalisation has fuelled economic inequality in many countries, which in turn has contributed to populist shifts in the political landscape, including in European countries. Many governments have implemented protectionist measures in the form of non-tariff barriers since the GFC. Large free-trade agreements such as the TPP and TTIP have not closed or been ratified due to protectionist shifts in politics. Starting in January 2018, the Trump administration in the US has gradually turned a sectoral trade dispute into a fully-fledged trade war against many economies and China in particular.

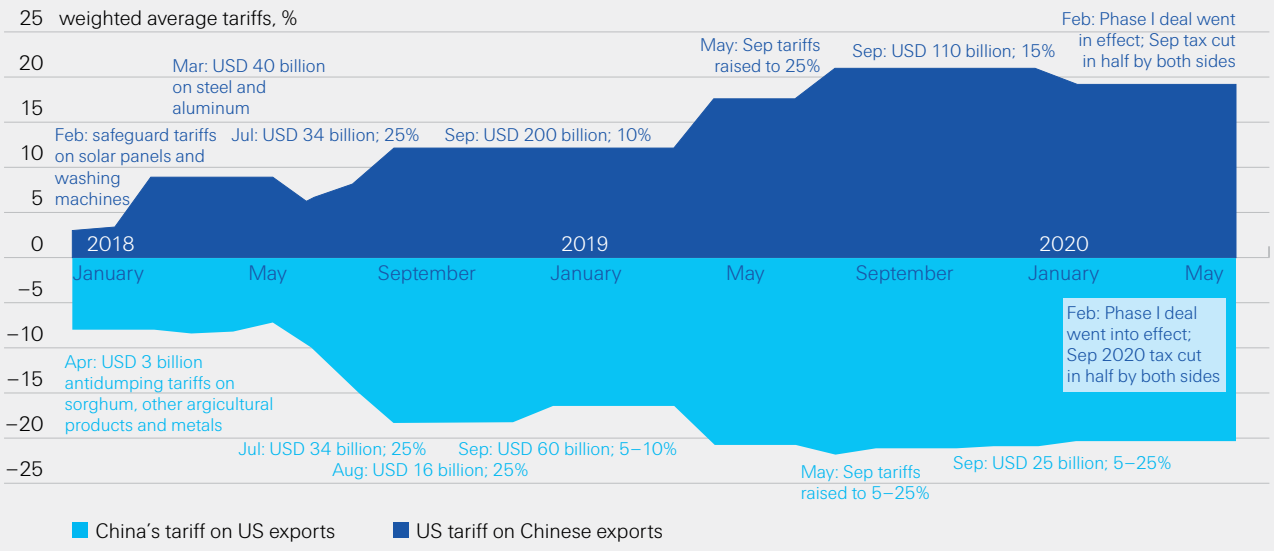
Long-lasting fractures in US-Chinese relations could have long-lasting impact on the GSC.

Over the course of 2018–2020, tariffs levied by the US specifically targeting Chinese goods have amounted to roughly USD 375 billion (see Figure 8). According to the IMF, trade disputes had already cost the global economy USD 700 billion by 2020.[20] The US-China trade war does not stop at tariffs. Concerns about IP theft and economic espionage have been raised by the US in several rounds of trade talks. According to a 2017 report from the US, IP theft by China costs the US up to USD 600 billion per year.[21] The US says Chinese state-owned enterprises enjoy unfair advantages gained from forced technology transfer and preferential national

[19] See "Executive Summary World Robotics 2019 Industrial Robots", *International Federation of Robotics*.
[20] "Trump's Trade War Could Put Swiss-Size Dent in Global Economy, IMF Warns", *The New York Times*, 8 October 2019.
[21] "Trump administration considers blacklisting Chinese companies that repeatedly steal US intellectual property", *The Washington Post*, 26 October 2019.

industrial policies. These are long-lasting fractures in US-Chinese relations and could have equally long-lasting effects on GSCs.

Figure 8
Timeline of US-China trade war



Source: Peterson Institute for International Economics, Swiss Re Institute

Tariffs have resulted in China losing market share in the US...

The trade war has resulted in shifting trade patterns and a re-jigging of supply chains. China's import tariffs are concentrated more on commodities priced globally, while import tariffs by the US have fallen mostly on intermediate goods such as machine and equipment. These lie deeper at the core of GSCs.[22] While trade diversion of commodity products (eg, soybean or crude oil) will not notably affect supply chains, the shift in suppliers of manufactured products could have a profound impact. Expectedly, China has lost market share in the US over the past two years, and Mexico, Vietnam and Thailand have gained. This represents both the switch in sourcing from China to these markets, and relocation of physical production facilities.

...but it has increased export share elsewhere.

Nonetheless, the ramifications go beyond bilateral trade. While Chinese exports to the US shrank, exports to other countries have expanded robustly, such that China's share of global exports actually increased by 0.8 percentage points (ppt) between 2017 and 2019.[23] Its exports are increasingly competing with products from more advanced markets like South Korea, Germany, Japan, Singapore and Taiwan. The main "losers" are the advanced markets, whose exports are being displaced by competitive products from China. An example is semiconductors, where China has lost market share in the US due to tariffs, but has gained global market presence at the expense of traditional suppliers like South Korea, Singapore and Taiwan.

[22] Ibid.
[23] *Two years of US-China tariff tussles*, HSBC Global Research, 19 June 2020.

Change accelerator: COVID-19

COVID-19 is adding momentum to restructuring of GSCs.

Disruption stemming from natural disasters or pandemics is typically huge and sudden, leaving firms very little time to react and/or no alternatives. In the case of COVID-19, supply shortages of auto parts from China led to the unplanned shutdown of factories across Europe,[24] which was exacerbated by disruption to deliveries and logistics. News reports told of containers leaving China with only 10% of capacity used, while cargo traffic at the largest US container port was down 25% year-on-year in February 2020.[25] This demonstrates the large impact of a production shutdown in China when alternative supplies are not immediately available.

China is a global production base for cars and automotive parts.

Case study: automotive industry

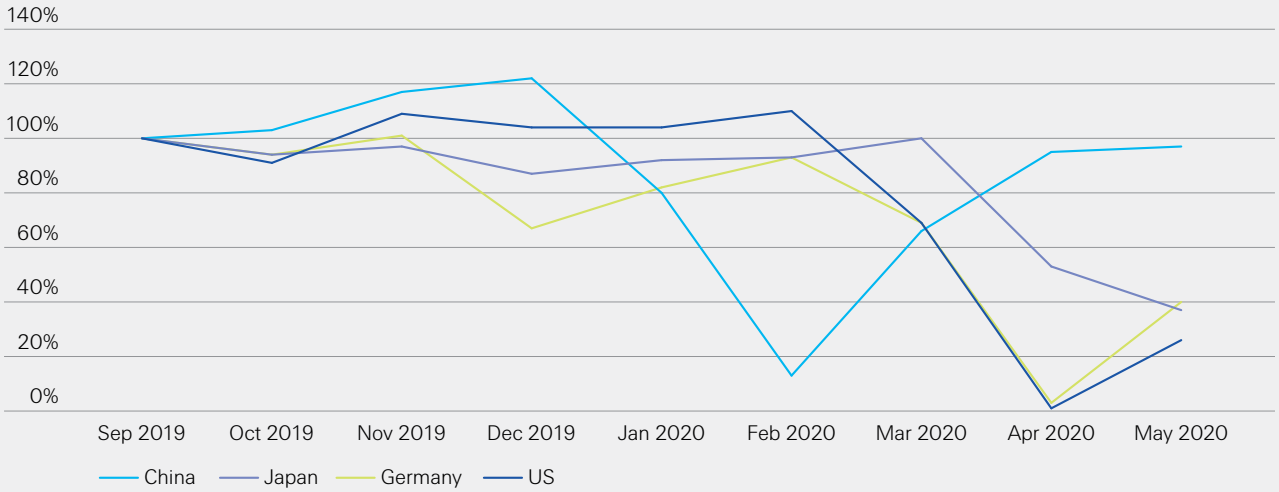
In recent decades, China has become a main player in the automotive industry. In 2019, it produced over 25 million vehicles, the US ranking second with less than 11 million. China has also gained significant ground in the auto supply chain. Data for 2018 shows that China is the fourth largest source of automotive parts imports worldwide (ninth in 2007), and the second largest provider for the US, having doubled its share in a little more than a decade.[26] Hubei province, with its capital Wuhan at the centre of the COVID-19 outbreak, is home to manufacturing plants for companies including General Motors, Honda, Nissan, Peugeot Group and Renault. Hubei accounted for about 50% of all Honda's production in China pre-crisis.[27]

COVID-19 led to major production slowdowns globally.

With lockdowns in Hubei lifted earlier than elsewhere, Chinese suppliers had returned to 95% capacity utilisation by the end of March when the rest of the world was under full lockdown. The later easing of restrictions in other countries further held back global production. Original equipment manufacturers (OEMs) could only resume production in late April or May. By then, the interruption had moved from a supply to a logistics issue, with less available air freight and temporary layoffs in cargo-related industries. In the process, the air freight price out of China to southeast Asia increased by 200%. To Europe and the US it was up 100%.[28]

[24] "Coronavirus Creates Domino Effect in Global Automotive Supply Chain", *The Wall Street Journal*, 14 February 2020.
[25] "China's Shipping Nears a Standstill Amid Coronavirus Disruption", *The Wall Street Journal*, 14 February 2020.
[26] *China's growing role in US automotive supply chains*. Office of Industries of the US International Trade Commission, August 2019.
[27] *This industry was crippled by the coronavirus - here's how it's fighting back*, World Economic Forum, 25 February 2020.
[28] *Webinar - Impact of COVID-19 on China's automotive industry and global supply chain*, AutoCare Digital Hub, April 2020.

Figure 9
Monthly car production (indexed to 100 at September 2019)



Source: US Bureau of Economic Analysis, Japan Automobile Manufacturing Association, China Association of Automobile Manufacturers

The global supply of drug ingredients and personal protection equipment is highly concentrated.

Case study: medical supplies and the pharmaceutical industry

COVID-19 has highlighted vulnerabilities in the medical manufacturing supply chain, most notably in the US.[29] In the healthcare sector, third-party foreign manufacturing is prevalent for the raw materials necessary for medical equipment and the active pharmaceutical ingredients of drugs. It is estimated that 80% of the ingredients in US-branded pharmaceuticals and over-the-counter drugs start out in either China or India.[30] China is also the main supplier of personal protective equipment to the US.

After COVID-19 hit, governments took action to safeguard domestic pharmaceutical supplies.

Governments' responses to COVID-19 have shown that in times of crisis, international cooperation can be interrupted, as countries prioritise domestic needs. India is the world's leading supplier of generic drugs and also a major manufacturer of pharmaceutical active ingredients. When the pandemic broke, the Indian government imposed restrictions on pharmaceutical exports to counteract interruptions in supply from China, and as a pre-emptive effort to guarantee that the country could handle its own virus outbreak first. As of 21 March, 54 countries had taken similar measures restricting trade in medical supplies.[31]

Validating new suppliers when alternatives are not immediately available takes a long time.

As in the supply chain of several other industries, medical supply manufacturers struggled to obtain the raw materials for their products when Chinese factories closed for weeks in the early stages of the pandemic. In February, Indian drugmakers had to resort to European as well as domestic sourcing of key ingredients to keep production going. Such quick adjustment to make ends meet is not a long-term solution, and creates a more expensive final product. Validating a new permanent supplier, even when successful, can take around 18 months.[32] The source of final medical products is also highly concentrated. Out of the 25 nations that export significant volumes of ventilators, only one is in Latin America. There are none in Africa, the Commonwealth of Independent States, the Middle East, and south Asia.[33]

[29] *Emerging Market Healthcare Systems Poorly Positioned To Tackle Covid-19 Pandemic*, Fitch Solutions, 22 April 2020.
[30] R. Gibson, J. P. Singh, *China Rx: Exposing the Risks of America's Dependence on China for Medicine*, 2018.
[31] *Tackling COVID-19 together: The trade policy dimension*. Global Trade Alert, 23 March 2020.
[32] *Impact of the Global Medical Supply Chain on SNS Operations and Communications – Proceedings of a Workshop*. The National Academies of Sciences, Engineering, and Medicine, 2018.
[33] Global Trade Alert, op. cit.

Accelerator factors: survey evidence

Manufacturers tend to focus on alternative sourcing in times of crisis.

Various surveys show that COVID-19 and, to a lesser extent, the fear of US-China trade war, have accelerated changes in GSCs. In a survey of 600 multinationals across Asia early last year, 82% of global and 93% of Chinese respondents said they were changing their supply chains because of the trade war.[34] In a different survey by the European Chamber of Commerce China in 2019, 56% of the European company respondents said their supply chains were affected by the trade war, but 64% said they would not change strategy. Only 8% of businesses had moved or said they planned to move production out of China.[35]

Multinationals have shown increased intention to relocate operations out of China post-COVID-19.

That was before COVID-19. Intention to relocate has increased tangibly since the virus outbreak. While some manufacturers moved or planned to move in response to higher tariffs, the pandemic and associated lockdowns are more problematic for global sourcing and procurement. For example, in a UBS survey of manufacturers in North Asia in early 2020, 44% of respondents said they had increased intention to relocate due to the pandemic.[36] The different surveys do not reveal much about the extent of capacity to be relocated, although the UBS study suggests 20–30%. We believe those thinking about relocation will likely downsize their China presence rather than move out completely.

Southeast Asia is the hot spot for the shift in production.

In terms of where production will go, markets in southeast Asia stand out as the preferred destinations. According to a survey by the American Chamber of Commerce of China in 2019, 24.7% of China-based US manufacturers said they were considering relocating to southeast Asia, followed by 10.5% to Mexico and 8.4% to south Asia. Less than 6% said they would move back to the US.[37] In another survey by QIMA in 2019, about three quarters of the companies surveyed started sourcing in new countries due to the trade war. Vietnam was the most popular alternative, with two thirds of US and one third of European companies planning to increase sourcing from there.[38] A survey conducted by resilience360.com in 2019 similarly showed southeast Asia as the preferred location, followed by the EU, Mexico and the US.[39]

There is also rising interest in near- and reshoring

The QIMA survey findings also highlighted a growing trend of near-, but not fully-fledged reshoring. Respondents to last year's resilience360.com survey also indicated their intention to shift production back to advanced markets (the EU, the US, Canada, Japan, South Korea and Singapore).[40] This trend was more apparent in the findings of the 2020 UBS survey, with most US companies (82%) looking to move some production capacity back home. In north Asia, 52% of Korean, 55% of Taiwanese and 63% of Japanese indicated intention to do likewise.[41]

Sectors most likely to restructure their supply chains

Relocation is most likely in the pharmaceutical, apparel, communications, medical supplies, transport equipment and semiconductor sectors.

Industrial sectors face different constraints when it comes to relocation or reshoring. For instance, it is costly for highly capital-intensive industries to move production, given the large fixed investment requirements. However, COVID-19 and rising political risks have made non-economic factors increasingly relevant in decision making. For example, there is political pressure for more reshoring of essentials such as medical supplies, and to safeguard strategic technology sectors (eg, 5G).

[34] *The Age of Hypercomplexity*, Baker McKenzie, April 2019.
[35] *European Chamber survey on the US-China trade war finds more companies making difficult strategic changes to adapt to the indefinite nature of the tensions*, European Chamber, 10 October 2019.
[36] The CFO surveys from US, North Asia and China show firms plan to move c. 20–30% of their production capacity out of China. See *Supply chains are shifting: how much and where?* UBS, 15 June 2020.
[37] Data from America Chamber of Commerce China and America Chamber of Commerce Shanghai.
[38] *Global Supply Chains Amid the Trade War of 2019*, QIMA, July 2019.
[39] "Impact of the US-China Trade War on Global Supply Chains", *resilience360.com*, November 2019.
[40] Ibid.
[41] UBS, op. cit.

According to a report by McKinsey, relocation on account of non-economic factors is most likely in the pharmaceuticals, medical supplies and semiconductor sectors.[42]

Table 1
Sectors mostly likely to go for GSC restructuring, globally

	Economic factors	Non-economic factors	Share of export (%) with shift potential		Market capitalisation USD bn
			Low	High	
Pharmaceuticals	◔	●	38	60	6 044
Apparel	●	◔	36	57	868
Communications equipment	◔	●	34	54	2 720
Medical devices	◑	◕	37	45	2 760
Transportation equipment	◕	◔	29	43	564
Textiles	●	○	23	45	113
Furniture	●	○	22	45	90
Aerospace	◔	◑	25	33	1 137
Computers & electronics	◕	◔	23	35	111
Electrical equipment	◕	◔	23	34	1 519
Machinery & equipment	◑	◔	19	25	1 332
Automotive	◔	◑	15	20	1 611
Semiconductors & components	○	●	9	19	2 570
Chemicals	○	◔	5	11	2 477

○ Low ● High

Note: Non-economic factors include policy-driven shifts (eg, essential goods for national security and industries of national strategic priorities). Market capitalisation as of 13 August 2020
Source: McKinsey,[43] Thomson Reuters, Swiss Re Institute

In China, surveys show major moves are likely in the healthcare, technology, consumer staples, textile and electrical sectors.

For China specifically, different surveys reveal similar results. The QIMA 2019 survey showed that the most price-sensitive sectors move fastest when restructuring GSCs. These were promotional products (eg, gifts for marketing purposes, which 93% of respondents had already started sourcing or planned to start sourcing from outside China), textiles (86%) and the electrical and electronic sector (73%), largely in line with the higher US tariff implementation.[44] According to a survey by UBS in 2020, for US firms with operations in China, healthcare (92% of the respondents had moved/planned to move capacity out from China), consumer staples (89%) and tech firms (80%) will likely see capacity relocation.[45] For Chinese firms, technology was the top candidate. And as indicated by government responses in different nations to supply chain disruptions arising from the COVID-19 outbreak, medical manufacturing is likely to be one of the sectors more noticeably impacted over the long term.

[42] *Risk, resilience and rebalancing in global value chain*, McKinsey, 6 August 2020.
[43] Ibid
[44] QIMA, op. cit.
[45] *Supply chains are shifting: how much and where?* UBS, 15 June 2020.

New and parallel supply chains

We expect more built-in redundancy, duplication and shortening of supply chains as manufacturers seek to reduce their GSC exposures. Countries in southeast Asia stand out as preferred alternatives hosts for production activities alongside existing operations in China and elsewhere. We also anticipate more reshoring of essential goods of national strategic importance. In China itself, the government will likely reallocate lost productive capacity to further its transition to a domestic consumption-led economic growth strategy. The additional investment that comes with the formation of parallel supply chains will boost growth in the alternative host nations, but at the cost of some global efficiency loss.

Geographic diversification and parallel supply chains

Both the US and China want to reduce reliance on each other.

We believe the peak of globalisation has long passed and expect to see more redundancy in supply chains and duplication of some. Many US and manufacturers in some other advanced markets are reshoring operations. The US and China specifically, the world's two largest economies and consumer markets, both want to reduce reliance on each other. If current trends persist, the result could be two GSCs: one for China (and some of its allies), and another for the rest of the world.

China has de-Americanised its sourcing and accelerated import substitution.

Amid already long-running tensions with the US, we believe China will continue efforts to de-Americanise its supply chain by sourcing more from non-US vendors. For example, China's telecoms giant Huawei has begun to source from non-US suppliers for its estimated USD 11 billion worth of technology needs.[46] We also expect to see China accelerate import substitution, especially in the high-tech sector. Chinese firms are still highly dependent on US technologies, including those embedded in products from third-country providers (inputs of US origin content). After the US put Huawei on the "Restricted Entities list" in May 2019, concerns about the availability of critical US-made components such as semiconductors for Chinese companies have risen, leading to greater effort to reduce US-origin content in third-country inputs.[47]

China is also keen to build parallel supply chains.

China is eager to build parallel and independent supply chains insulated from US influence for its high-tech sector. This could result in multiple global technology standards, one for China (and allies) and another for the rest of the world. For example, it could be that China and the west pursue different standards for 5G networks, resulting in two GSCs. China will look to onshore more of these high-tech supply chains in future, in line with increasing China-centricity in production.

Relocation out of China: which countries will benefit most?

Countries with export composition similar to China will benefit most.

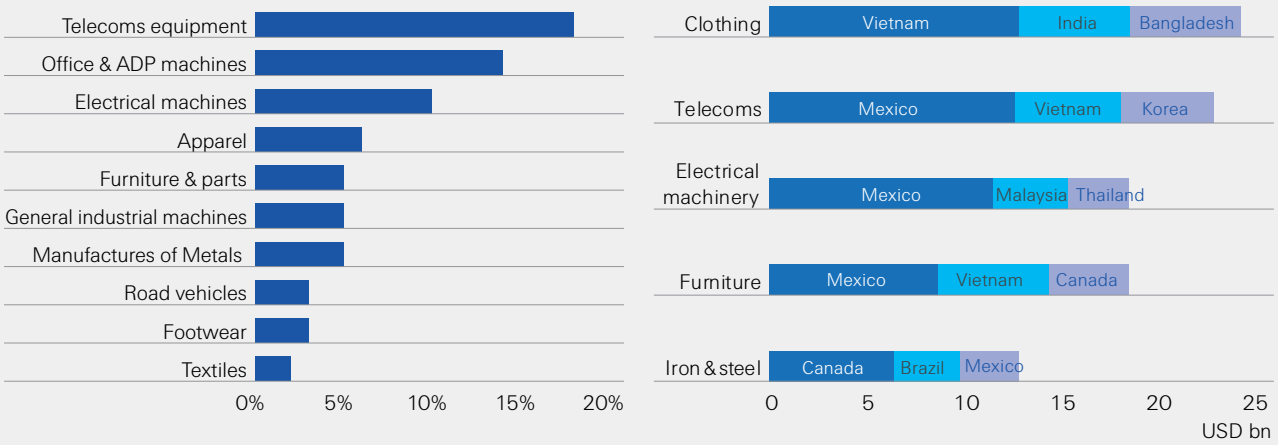
So far, the formation of fledging parallel supply chains has only led to limited transfer of production from China. The main reasons are concerns about a lack of supplier clusters and skilled workforce in alternative markets, and the prospect that leavers may not be able to return to China at a later date. The COVID-19 crisis has intensified interest in relocation and, according to survey findings, markets in southeast Asia are the preferred alternatives. Segments of heavy US dependence on China include notebooks, PCs, tablets, smartphones and parts, toy drones, apparel, video games, furniture and bedding. Countries with the same industries as those that support China's exports to the US will likely benefit most. Vietnam and Mexico are prominent among these (see Figure 10).

[46] "US chipmakers quietly lobby to ease Huawei ban", *Reuters*, 17 June 2019.

[47] The Entity List identifies entities reasonably believed to be involved, or to pose a significant risk of being or becoming involved, in activities contrary to the national security or foreign policy interests of the US. See *Bureau of Industry and Security,* US Department of Commerce.

Figure 10

China's top 10 exports to the US, % of total exports (LHS), and US imports from top alternatives to China, USD billion (RHS), 2018



Source: UN Comtrade, Swiss Re Institute

We created a relocation scorecard to assess the potential beneficiaries from GSC restructuring.

To assess the attractiveness of potential relocation countries, we built a scorecard based on a mix of comparative advantages (see Table 2). We consider five categories of input factors: economic growth potential, trade openness and structure, manufacturing labour costs, infrastructure set-up, and scale of recent foreign direct investment (FDI) inflows. Each country's input factors are normalised to an index score within each category, and then aggregated using equal weights.[48]

[48] Normalised z-score: if a value is exactly equal to the mean of all the values of the feature, it will be normalized to 0. If it is below the mean, it will be a negative number. Above the mean it will be a positive.

Table 2
Production relocation scorecard (normalised z-score)

		External trade			Infrastructure			Aggregate ranking
	Growth potential (2020–2023E)	Trade dependency	Export similarity with China	Labour costs	Logistics	Ease of doing business	FDI, % of GDP (2016–2018)	Normalised z-score
Vietnam	1.5	2.2	0.7	0.9	0.2	−0.4	1.2	0.99
Cambodia	2.3	0.9	−1.9	0.9	−2.5	−2.3	3.4	0.73
Malaysia	0.3	0.7	0.4	0.6	0.1	1.0	0.0	0.40
Thailand	−0.2	0.0	0.4	0.5	0.5	0.8	−0.6	0.13
Philippines	1.0	−0.6	0.4	0.9	−0.8	−1.1	−0.2	0.13
Taiwan	−0.2	0.4	0.9	−0.3	0.7	1.1	−0.6	0.07
India	0.8	−1.0	−0.4	0.9	−0.1	−0.3	−0.4	0.07
Czech Republic	−0.5	1.3	0.9	−1.4	1.0	0.3	0.4	0.06
Indonesia	1.0	−1.0	−0.9	0.8	−0.1	−0.5	−0.5	0.01
Hungary	−0.6	1.3	0.9	−0.8	0.5	0.0	−0.2	−0.06
Turkey	0.0	−0.6	0.0	0.2	−0.2	0.5	−0.4	−0.07
Poland	−0.6	0.0	0.6	−0.7	0.7	0.3	−0.2	−0.14
Mexico	−1.2	−0.1	0.4	0.6	−0.4	−0.2	0.0	−0.16
South Korea	−0.6	−0.4	0.8	−1.7	0.8	1.2	−0.7	−0.36
Brazil	−0.9	−1.2	−1.5	0.7	−0.6	−1.8	0.2	−0.50
Russia	−0.8	−0.8	−2.1	0.1	−1.5	0.6	−0.4	−0.60
Japan	−1.3	−1.0	0.4	−2.2	1.7	0.6	−0.9	−0.71

Notes: **Growth potential:** average expected real GDP growth, 2020–2023E; **Trade dependency:** (Exports + imports)/GDP; **Exports similarity with China**: similarity of exports product composition over the 99 product categories as defined in the ITC Trade Map. **Labour cost:** average annual labour cost in manufacturing; **Logistics and ease of doing business:** ranking index as defined by World Bank; FDI: average **FDI** inflow between 2016–2018 as % of GDP. Green cells indicate numbers larger than one standard deviation from sample mean (z-score>1), and red cells denote z-score less than −1.
Source: CEIC, ITC Trade Map, JETRO, World Bank, UNCTAD, Swiss Re Institute

Southeast Asia, in particular Vietnam, looks set to benefit most.

Results show that other markets in Asia are top of the attractiveness league table due to their growth potential, export-oriented model and competitive labour costs. Vietnam scores highest, followed by Cambodia, Malaysia, Thailand and the Philippines. Anecdotal evidence already points to Vietnam as a key beneficiary of relocation. In 2019, there was significant export growth across all sectors in the country, and FDI grew by 7%, with manufacturing FDI up 11%.[49] In industries with higher value-added content like mobile phones and parts, computers, and electrical equipment and parts, Vietnam has started to substitute for some US demand from China since the start of the trade war. Non-Asian economies are less attractive due to higher labour costs and less competitive infrastructure. Nonetheless, the choice also hinges on other factors, including the domicile of the parent company. For example, surveys found that US companies are more inclined to relocate to the Americas, given proximity and regional trade agreements.[50]

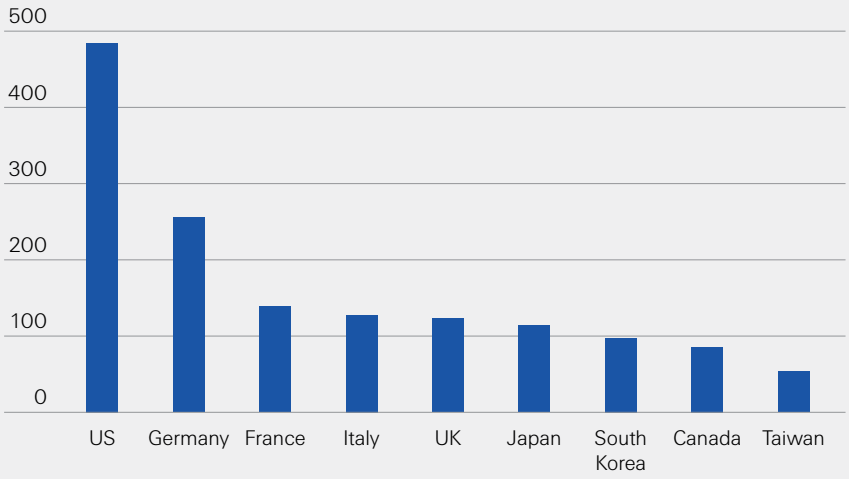
[49] See *Ministry of Planning and Investment*, Socialist Republic of Vietnam.
[50] UBS, op. cit.

Technology, rising labour costs in offshore locations and shortening of supply chains are key drivers of reshoring.

Reshoring and shortening supply chains

As technology boosts productivity and manufacturing becomes more capital-intensive, there is less need for labour. Emerging countries' comparative advantage in low-skill, low-labour-cost production is eroding as routine low-skill tasks are increasingly automated. In the future, a larger part of total production costs will derive from advanced machinery, and a smaller part from human capital. As such, the savings to be had from lower-wage labour are reduced, rendering manpower cost-arbitrage benefits negligible. This is fuelling an emerging trend of reshoring of manufacturing production back to home markets. Beyond the changing labour and capital cost dynamics, factors such as reducing risk by shortening supply chains, proximity to consumers and avoiding trade war are other drivers of reshoring. Figure 11 shows the main mature economies involved in GSCs via importing intermediate manufacturing goods. These trade volumes indicate the pool of offshored GVC production that could potentially be considered for reshoring.

Figure 11
Imports of intermediate manufacturing goods in USD billions, 2018



Source: OECD TiVA, Swiss Re Institute

The US has the largest import volume to potentially substitute, and this is a central rationale for an "America First" import substitution policy shift. At the same time, many advanced markets in Asia are proactively promoting reshoring. For example, in January 2019, Taiwan announced the "Action Plan for Welcoming Overseas Taiwanese Businesses to Return to Invest in Taiwan", encouraging companies to repatriate operations.[51] By the end of last year, 156 Taiwanese companies operating in mainland China pledged to invest TWD 703 billion (USD 23 billion) back home.[52] This year Japan's Ministry of Economy, Trade and Industry announced that 87 Japanese companies are eligible for government subsidies to relocate their operations from China back to Japan or to elsewhere in southeast Asia.[53] In Europe, the European Commission wants to reverse the declining share of manufacturing in GDP, having targeted an increase to 20% after 2020 from about 16% in 2011.[54] The European Parliament has adopted a report by the Industry Committee on re-industrialising Europe and has supported reshoring initiatives seeking the re-entry of

[51] See *Action Plan for Welcoming Overseas Taiwanese Businesses to Return to Invest in Taiwan*, National Development Council.
[52] "Taiwan homebound investment tops US$23 billion year to date", *Taiwan Today*, 29 November 2019.
[53] "Japan reveals 87 projects eligible for 'China exit' subsidies", *Nikkei Asian Review*, 17 July 2020.
[54] *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A Stronger European Industry for Growth and Economic Recovery*, European Commission, 10 October 2012; *Commission call for a European industrial renaissance*, European Commission, 22 January 2014,

production and services from third countries.[55] According to a study by Eurofound, the number of manufacturers in Europe reshoring production activities is on the rise, with most of the reshoring returning from China.[56]

Reshoring requires investment in equipment and labour.

All told, the global extent of reshoring implemented to date is still limited. The companies that have reshored to the US are typically smaller operations that make specialised products for niche markets, for which they can demand premium prices. There is still a shortage of skilled manufacturing labour at home, and the long-promised productivity boom via automation has yet to be realised. To this end, the two key components to make US domestic manufacturing more competitive are: (1) upgrading and modernising manufacturing equipment; and (2) re-skilling the labour force to work in new arenas of manufacturing.[57]

Technological advances will benefit reshoring business models.

Technological advances, in particular 3D printing and robotics, paired with low interest rates and rising geopolitical uncertainty, could encourage more reshoring. Advances in industrial 3D printers, for example, enable rapid prototyping and small-scale orders without sacrificing quality. This allows for just-in-time manufacturing, meaning firms do not have to place bulk orders and tie up capital in inventories. Less mass production reduces the benefits of offshoring, allowing manufacturing to stay closer to the customer. For example, Germany's "Industries 4.0 " initiative driving digital manufacturing, which was initially established as a national strategy, is now also active in many other European countries.[58] In March 2020, the European Commission's communication on the proposed new industrial strategy was explicitly linked to digitalisation and decarbonisation.[59]

The trade-off is that consumers may end up paying higher prices.

We incorporate a continuation of these trends into our scenario calculations (see chapter *Supply chain shifts: quantifying the impacts*). Escalating geopolitical conflicts, protectionist policies or breakthrough technologies could accelerate the trends. However, for all the rationale supporting restructuring of GSCs, relocation and/or reshoring on the grounds of strengthening supply chain resilience and sustainability could entail moving from most to less cost-efficient options. The trade-off can be higher production costs and, ultimately, higher prices for final products and lower corporate profits. Just as globalisation has been a major driver of today's low price and wage inflation in mature economies, rolling back the process could eventually push prices and wages in the other direction.

China: building the domestic demand-led economy

China will likely reallocate production capacity to its domestic market.

With transfer of production out of China, we believe the government will action additional fiscal stimulus to boost demand at home to compensate for the loss of some production activities to alternative markets, and to further the desired transition from an export-oriented to a domestic demand-led growth strategy. We expect effective policy support to achieve the shifts and meet growth targets, which in turn could attract foreign investment for different purposes.

[55] *Report on re-industrialising Europe to promote competitiveness and sustainability*, European Parliament, 18 December 2013.
[56] *Reshoring in Europe: overview 2015–2018*, Eurofound, April 2019.
[57] *Trade war spurs sharp reversal in 2019 Reshoring Index, foreshadowing COVID-19 test of supply chain resilience*, Kearney, 7 April 2020¨.
[58] The initiative was launched in 2011 and adopted through the High-Tech Strategy 2020 action plan. *Implementation of an Industry 4.0 Strategy - The German Platform Industrie 4.0*, European Commission, 8 March 2020; *Germany Industrie 4.0 - Digital Transformation Monitor*, European Commission, January 2017.
[59] *Communication from the Commission to the European parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the regions European Commission, A new strategy for Europe*, European Commission, 8 March 2020.

Supply chains and insurance

This year's COVID-19 outbreak has more than ever reaffirmed the need for protection against supply chain disruptions. Available solutions include contingent business interruption, supply chain and non-damage business interruption insurance to compensate for losses arising from pandemic, regulatory and political risk events. Beyond these lines of business, relocation and reshoring of production activities as manufacturers seek to reduce their GSC exposures will generate new demand for traditional insurance like property and engineering covers in alternative host locations.

Risk management

Finding the balance between efficiency and resilience.

GSCs have been honed over decades to focus on efficiency and cost-effectiveness. Of late, with rising trade tensions and the COVID-19 crisis, considerations of resilience and risk management have become more prevalent. These developments have thrown the spotlight on the inherent vulnerabilities in GSCs, including unpredictability of supply, failure of transport and communication networks, interruptions in financing, and regulatory and political risks. To improve GSC resilience, transparency and diversification are key. Table 3 presents what can be done to improve resilience from the perspective of different stakeholder groups.

Table 3
Different perspectives of how various stakeholders improve supply chain resilience

	Transparency	Diversification	Resilience
Consumers	■ Visibility of how and where products are produced ■ Conformity to national standards and societal norms ■ ESG compliance	■ A selection of products from different sources to choose from	■ Minimisation of disruptions
Manufacturers	■ Visibility of different layers and silos of production chain, in terms of cost, productivity, inter-connectivity and vulnerability ■ Transparency over operational, financial, geo-political and other emerging risks ■ Adherence to producers' "Code of conduct"	■ Diversification in terms of sourcing and production ■ Minimise critical supply chain bottlenecks ■ Increase global competitiveness	■ Availability of alternative sources of inputs, production facilities, transportation and distribution networks
Governments	■ Visibility in terms of overseas dependence on sensitive and critical supply (eg, defence; medical supplies)	■ Availability of reliable suppliers at different layers ■ Localisation of production in lieu of global diversification ■ Development of domestic supply chain clusters	■ Reduce overseas reliance on strategic products through specific government policies

Source: Swiss Re Institute

De-risking the supply chain

Recent events, particularly COVID-19, have heightened awareness of supply chain risks.

In a survey of supply chain executives conducted in May 2020, 93% reported plans to make their supply chains more resilient, including adding redundancy across suppliers, reducing the number of unique parts, and shortening and regionalising the chains.[60] Through geographic diversification, most manufacturers source inputs from multiple back-ups and avoid over-reliance on single-source suppliers. Many global manufacturers with high concentration of production in China have adopted a "China+1" strategy, which is adding a second, supplementary overseas facility to the dominant China production base.[61] This usually involves producing in China for the Chinese and non-US markets, and operating overseas to supply the US. This is not wholesale relocation, but geographical diversification to reduce reliance on China

[60] McKinsey, 6 August 2020, op. cit.
[61] See *Understanding the "China, Plus One" Strategy*, Procurement Bulletin.

and take advantage of lower wages elsewhere.[62] Even some of China's manufacturers are diversifying away from their home location, forming parallel supply chains in other Asian countries.[63]

Different depth of integration with China could dictate diversification strategy.

Manufacturers in advanced Asian markets have adopted a different diversification strategy. Japanese manufacturers, for example, are presently under less pressure to restructure their GSCs as they had previously built a more balanced production portfolio across Asia. Korean manufacturers have become more wary of over-reliance on China due to geopolitical frictions and economic headwinds, with major manufacturers relocating part of their production to Vietnam and other markets in southeast Asia.[64] In comparison, Taiwan is deeply integrated into the China supply chain. It is only recently, alongside heightened tensions surrounding the US-China trade, that large Taiwanese manufacturers like Hon Hai and Pegatron[65] are building new production bases in Vietnam, India and Indonesia.[66]

Insurance and supply chain risks

A high proportion of supply chain losses are uninsured.

Insurance is an integral part of managing supply chain risks in the global economy. A number of insurance solutions can and do facilitate the smooth functioning of business and commercial transactions, both nationally and internationally, including covers for supply-chain disruptions:

Contingent business interruption can cover property risks at supplier's or client's premises.

Business interruption (BI) insurance provides cover for risk of disruptions to production processes resulting from physical damage at a manufacturer. Currently, BI losses typically comprise 50–70% of the total financial losses inflicted by catastrophe events on physical property, a high proportion of which are uninsured. While standard BI insurance is triggered in the event of an insured's own-property loss, **contingent business interruption** (CBI) risk is linked to the property risks of an external party, such as a supplier or client. In particular, CBI insurance reimburses a company for the extra expenses incurred and profits lost due to interruption of business operations at a third party's premises. Hence, certain supply chain risks can be covered by CBI covers. Examples of high-visibility supply chain events with potential for CBI coverage were the Tohoku earthquake and tsunami (2011), the Thailand floods (2011) and the Tianjin harbour explosions (2015).

Supply chain insurance covers losses due to disruption/delay in receipt of products or services...

Supply chain insurance: There is also coverage for BI as a result of disruption or delay in the receipt of products, components or services from a named supplier or supply, but where no physical damage to property is involved.

...even in the absence of physical damage.

Non-damage business interruption (NDBI) insurance[67] covers events such as pandemics, strike, civil unrest, or military action, and/or where regulatory actions, political risk or disaster events (earthquake, flood or volcanic eruption etc) lead to significant delay or disruption in receipt of products or services from a supplier.

62 P. Enderwick, "A 'China-Plus-One' Strategy: The Best of Both Worlds?", *Human Systems Management*, January 2011.
63 P. Goldberg, *Global Value Chains, COVID-19, and the Future of Trade*, Webinar - Princeton University, 17 April 2020.
64 "South Korean companies shift production out of China", *Nikkei Asian Review*, 22 June, 2019.
65 Hon Hai (also known as Foxconn) and Pegatron are the largest two contract electronics manufacturers in Taiwan, with both serving as major assemblers for Apple's final products.
66 "Apple's partners hasten move from China", *The Strait Times*, 29 January 2020.
67 NDBI is in some cases also referred to as "named-peril earnings insurance". With NDBI, the insured risk is completely detached from traditional asset-related property risk, as the cover protects earnings even when there is no physical damage at an insured's own or a third-party's property.

Table 4
Insurance solutions for supply chain risk

	Incidents at policyholder	Incidents at suppliers
Physical damage	Business interruption (BI)	Contingency business interruption (CBI)
Non-physical damage	Cyber Non-damage business interruption (NDBI)	Supply chain insurance NDBI Political risk

Source: Swiss Re Institute

NDBI solutions may have different approaches to indemnity, including:

- indemnification based on actual losses, similar to established BI practices;
- parametric (index-based) solutions based on an objective measure and a formulaic pay-out, structured as insurance or a derivative, where the trigger is customised in such a way to minimise basis risk; and/or
- hybrid solutions: double-triggers where indemnity is based on a sequence of two or more objective events, or possibly staggered pre-defined payouts.

There have been many disaster events where NDBI covers could have mitigated associated losses.

Examples of major supply chain events where NDBI insurance could have potentially offered some protection are the Eyjafjallajökull volcanic eruption and ash cloud that disrupted North Atlantic air travel in 2010, the European droughts and disruption to of river cargo in summer 2018, and the biggest event in recent history: COVID-19. The following are two examples of recent NDBI covers in action.

Solutions example: parametric cover for supply disruptions from water

- **Background:** A global food processing and commodities trading and logistics corporation uses major rivers in central US as the main transport route for inputs and outputs. Heavy snowfall followed by near-record rainfalls in the spring of 2018 left water levels very high, triggering river closures and reduced tow size. This resulted in loss of income and extra expenses for alternative transport means.
- **NBDI insurance objectives:** To protect the client from the financial impact of business interruption resulting from extreme highs or lows in river water levels, including revenue loss and increased costs.
- **Risk-transfer solution:** A parametric solution on river levels with pre-defined pay-outs if water level heights exceed an agreed and pre-defined number of days at each river gauge that triggers tow and fleet restrictions.
- **Benefits:** Tailored risk exposure, with high structuring flexibility (single or multi-trigger). Each contract is custom-made for individual exposure. There are also efficient payouts. Unlike traditional covers, which often require loss investigations and adjudication, parametric insurance provides fixed payouts based on pre-defined terms. Transparent, with settlement of in-scope losses within 30 days.

Solutions example: regulatory impairment insurance

- **Background:** A pharmaceutical company is 100% dependent on external contract manufacturing from overseas suppliers. The manufacture of drugs requires approval and certification of ingredients from suppliers. In recent years, a number of plant closures and import bans have been administered by the designated regulatory authority (DRA) of the countries where the firm's products are sold due to supplier failure to adhere to good practices, leading to huge losses.

- **NDBI insurance objective:** The pharmaceuticals firm wanted cover against the business interruption risk of regulatory actions impairing or halting manufacturing operations from 10 different international outsource supplier locations.
- **Risk-transfer solution:** The insurer offered a 3-year non-cancellable cover protecting the manufacturer's earnings from regulatory shutdowns, pre-emptive suspension, and import bans. Payment are triggered for a Regulator's Order, a Pre-Emptive Suspension, or an Import Ban from a defined Regulatory Agency. This structure provides stability of earnings from low frequency/high severity events, and also the benefit of guaranteed capacity at a fixed rate over the term.
- **Benefits:** Regulatory impairment insurance for pharmaceutical manufacturers is a specific NDBI cover for the highly-regulated pharmaceuticals industry, protecting earnings losses from the negative consequences of a DRA order to shut down manufacturing or their pre-emption. There was previously no cover available for this risk. The insurance protects revenues and cash flows for patent-protected drugs, which are necessary to recoup R&D investments and fund investments in new drugs.

Political risk insurance protects against losses caused by foreign government actions.

Political risk covers

Political risk insurance comes in two forms: equity protection or investment insurance, and solutions for sovereign non-payment. The first covers FDI against political interference and other risks such as expropriation and confiscation of assets, import/export embargos, selective discrimination and forced divestitures. Political risk insurance can also protect against inconvertibility of local into hard currency, and the inability to transfer hard currency out of a country. The contracts are peril-based and generally safeguard foreign investor assets. The covers help to mitigate the strategic risks that come with offshoring. Covers in the sovereign non-payment area (contract frustration by government institutions), meanwhile, protect firms that sell products or services to government. Despite the availability of these covers, a number of political risks still lie beyond the current boundaries of insurability.

Solutions example: political risk cover for currency inconvertibility

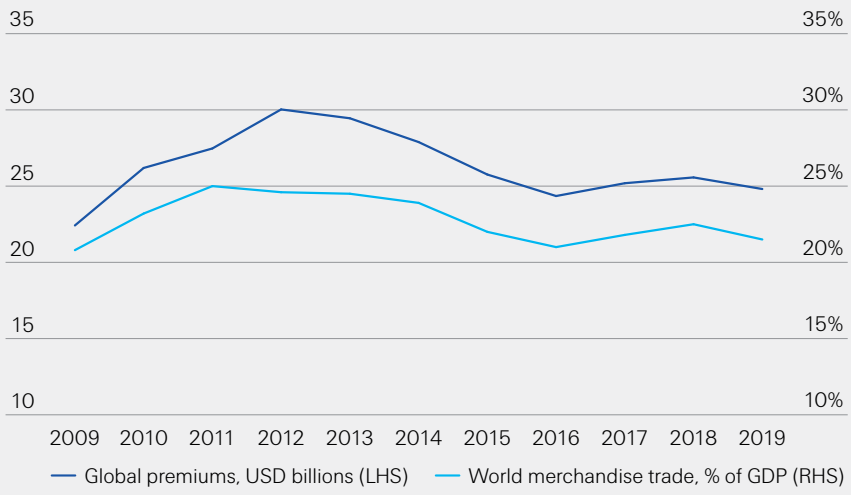
- **Background:** A global manufacturer was facing significant currency inconvertibility and non-transfer risks (CI-NT) in three economies in Africa, Asia and Latin America. The company was experiencing delays in its exports to those emerging markets due to the respective central banks' procedures to approve the transfers. The central banks are not the obligors but the entities that approve and execute foreign exchange transfers. Due to internal risk guidelines, further deliveries to subsidiaries in those countries were constrained without risk transfer.
- **Protection buyer objectives:** The manufacturer wanted cover for the CI-NT risk, in particular protection for the net position of receivables from select high-risk countries. It was looking for an efficient solution which differentiated the risk of transfer delays from commercial risks and credit risks.
- **Risk-transfer solution:** The insurer offered standalone cover for CI-NT risks with sub-limits for each country. The solution was structured as a ground-up quota share with the manufacturer's captive, 90% indemnity; 10% co-insurance. The deductible was set at the level of current existing overdue payments, to effectively remove these from any claim payment.
- **Benefits:** With an insurance solution covering CI-NT risks, the manufacturer was able to unlock further business growth through continued exports.

Ocean marine and trade credit insurance

International trade and ocean marine insurance premium growth have been trending down.

Ever-further-reaching GSCs have been instrumental in driving growth in international trade and investment, and in turn insurance demand. However from 2011, merchandise trade intensity – the percentage of output that is traded – has fallen (see Figure 12), due to slowing global economic growth and weaker commodity prices, and also rising protectionism and maturation of global manufacturing value chains.[68] The backward and forward participation of Asian markets in GSCs has also declined, but their overall trade dependency and supply chain participation is still higher than the global average. With the strong correlation between trade and marine insurance business, the latter has also been impacted.

Figure 12
Global merchandise trade vs ocean marine premium volumes



Sources: IUMI, WTO, Swiss Re Institute

A parallel supply chain scenario will marginally reduce trade volumes.

A future détente in US-China relations could help to rekindle trade volumes, shore up confidence and support investment decisions. At the moment, tensions have increased and halted any progress on the more challenging negotiations for Phase II of the agreement. Our scenario of parallel and/or multiple supply chains would further reduce trade intensity through regionalisation and reshoring, which in our assessment will marginally slow growth in marine trade volumes. The relocation of manufacturing will not necessarily impact trade intensity but rather see a shift in trade routes.

Trade credit insurance should benefit from higher awareness.

The disruption to GSCs over the past couple of years, both from the US-China trade dispute and, more recently, COVID-19, has also raised awareness of the need for trade credit insurance. That's because receivables are threatened by trade barriers, tariffs and changing regulations (eg, a supplier being put on the US Entity List). In a report released in January 2020, Euler Hermes said that in 2020, "business failures will rise again for the fourth consecutive year" and, "Asia will be the key contributor to the rise in insolvencies".[69] We expect that demand for trade credit insurance could increase, though anecdotal evidence has yet to show such a trend.

[68] "Global trade: what's behind the slowdown?" in *World Economic Outlook*, IMF, October 2016.
[69] *Euler Hermes Global Insolvency Index: Insolvencies to rise in 4 out of 5 countries in 2020*, Euler Hermes, 9 January 2020.

GSC changes will generate additional insurance opportunities.

Commercial insurance to gain from relocation and reshoring

Relocation and reshoring will lead to construction of new factories and related facilities. In addition, some regional governments are gearing up investment in infrastructure to encourage and host more relocations from China. Local parts-suppliers and other logistics and supporting sectors could increase their fixed asset investment to take advantage of the changes. All this will boost demand for property and engineering coverage in the alternative locations. Ongoing manufacturing operations will generate new demand for liability and other commercial insurance too. In China itself, demand could reduce as production moves out. However, we expect the government will offer fiscal and policy stimulus to support the economy as it seeks to promote domestic demand and move from the export-growth model. Strong domestic consumption will also feed into demand for insurance.

Data: the key for supply chain risk assessment

Standard supply chain data is crucial for robust business continuity plans.

Corporations need data about their process counterparties. Mapping different tiers of suppliers to model and monitor production flow is critical to identifying the risks inherent in a supply chain. For insurers seeking to cover disruption exposures, understanding of transport vulnerabilities in a supply chain is key. For example, in 2017 the closure of a small stretch of track near Rastatt in Germany on Europe's busiest rail corridor interrupted cargo shipments between Karlsruhe and Basel for seven weeks. Natural and man-made catastrophes also pose (accumulation) risk for insurers. The more transparency an insurer receives regarding supply chain exposures, the more insurable the risk becomes. However, data submitted by insureds to insurers often lacks detail to enable identification of bottlenecks at locations or second-tier suppliers. There is often no standardised format to exchange data, as for life or property insurance. External data are often unstructured and detailed company information on suppliers and products is required.

Technology offers a way to better understand the supply chain risks.

The role of technology in supply chain risk management

Digital technologies offer a way to better understand the supply chain in terms of risk identification, assessment and monitoring. For example, an end-to-end data platform can go a long way to reducing operational risk by ensuring data security and the sharing of critical information with all stakeholders along a supply chain. This can help manage accumulation risk and counter fraudulent claims.[70] Some examples of potential use of technologies to de-risk the supply chain include:

- **Low-cost sensor solutions:** Sensors are widely used in wearables, smart phones and gaming consoles. Making use of low-cost sensors can help quality control and visualisation of supply chains. Tracking apps are used to optimise rotation between different sites and factories, and track assets in transit.
- **Big data analytics:** With digitalisation, large amounts of data are now captured from various sources. Big data analytics can capitalise on these to optimise capacity utilisation, improve customer experience and reduce risk.
- **Blockchain** can facilitate greater trust and transparency between supply chain stakeholders, creating an unalterable record of movement of goods, and a single and secure source of supply chain data across different stages of transit. Combined with process automation, this can help reduce insurance transaction costs and lower fraud risk.

Insurance can leverage the trend to seek tech-enabled risk solutions.

At the same time, the development of digital supply-chain ecosystems is driving new insurance opportunities. They enable the collation of structured and unstructured

[70] Please see www.tradelens.com and https://insurwave.com for more details. Interested readers can also refer to the *Logistics Trend Radar* published by DHL for more examples of imminent as well as long-term trends that could impact the global supply chain and logistics sector.

data, allow on-demand marketplace matchmaking for buyers and sellers, and the establishment of an infrastructure for the delivery of digital products. These will enable insurers to offer risk management as a service in supply-chain risk reduction.

- **Digital marketplace:** Digital, broker-free distribution of existing insurance products for marine, product liability, credit risk, property, BI etc. This can include embedded insurance as a digital service in ecosystems.
- **Digital risk as a service:** Servicing risks with event-triggered, data-driven digital services. Examples of such services include early-warning, autonomous claims processing delivered directly to the insured via a digital ecosystem.
- **Resilience as a service:** Delivering data-driven 360° risk intelligence for loss prevention and mitigation. For instance, port operators will be able to access information about risk accumulation in real time.

Data can facilitate the development of tools to better manage risks.

Swiss Re-Microsoft partnership on a Digital Market Center[71]

Swiss Re is partnering with Microsoft to launch a Digital Market Center to help the insurance industry develop large-scale tools to predict and manage risks, and offer new products. The initial focus will be on connected vehicles and mobility, industrial manufacturing (Industry 4.0) and natural catastrophe resilience. The new platforms will also enable the measuring of business risks in a digital environment with a focus on understanding more complex, interconnected systems and their ripple effects on society, governments and economies. For example, an ambition is to help risk managers better see how of loss of a ship's cargo may impact GSCs, or how natural catastrophes could impact a government's infrastructure projects. With these insights, insurers can develop solutions to proactively mitigate losses.

Solutions example: analytics for risk insights on auto OEM suppliers

- **Background:** An insurer faced challenges covering its clients in the automotive OEM sector due to their complex GSCs, given lack of visibility into suppliers and associated risks beyond the first tier. Losses related to manufacturing bottlenecks and supply chain disruptions can significantly impact financial results.
- **Objective:** To increase transparency and improve the insurability of the supply chain risks, so as to better protect insureds from large accumulated CBI losses.
- **Solution**: Additional data insights, to enable assessment of 52 000 suppliers by combining a number of external data sets to build an outside-in view of supply chains, including the shipping data of 10 countries. An online tool allows for risk assessment and identification of bottlenecks at suppliers, and the development of a new risk scoring framework.
- **Benefits:** More visibility of underlying risks in the automotive OEM supply chain and identification of the key risks. Accumulation potential can be spotted by identifying key shared suppliers, critical ports of import/export and geographic areas of high risk.

[71] *Swiss Re announces a strategic alliance with Microsoft*, Swiss Re, 12 March 2020.

Supply chain shifts: quantifying the impacts

We ran a quantitative scenario to assess the impacts of GSC changes over a 5-year transition period, assuming the transfer of 20% of value-added exports from China to lower-wage manufacturing economies, and 10% reshoring to advanced markets. The close-to USD 1 trillion of additional exports and new investment generated by the changes would boost annual GDP growth in the export substitution economies by an estimated 0.7%, and by 0.2% in the import substitution countries. The overall income effects would boost insurance demand in the alternate locations by an estimated USD 63 billion in premium equivalent terms over the five years.

Quantifying the growth impacts during the transition

We modelled a 5-year transition scenario.

We ran a quantitative scenario to assess the short-term impacts during the transition period. Key assumptions include:

1. **Transition period:** We assume a 5-year transition period, to allow for the time needed for the building of new production capacity in alternative locations.

2. **Capacity shift:** We assume 30% of value-added of China's exports, about USD 300 billion, will move out of the country.[72] This is in line with recent survey findings suggesting that manufacturers will either reshore or relocate around 20–30% of production capacity out of China.

3. **Relocation:** Of that USD 300 billion, USD 200 billion is assumed to be redirected to a group of 20 lower-wage offshoring manufacturing (export substitution) economies in emerging Asia, Eastern Europe and Latin America.

4. **Reshoring:** The remaining USD 100 billion is assumed to reshore to the G7 plus South Korea and Taiwan (import substitution) countries. The country selection is based on current trade statistics.

5. **Impacts on China's and the global economy:** Depends on China's policy responses, and whether the government offsets the negative growth impact at home with additional policy measures.

Impacts on exports and investment during the transition period

Relocation and reshore economies will benefit from close to USD 1 trillion in additional exports and investment…

Additional investment: there is need for additional investment in plants and equipment to expand production in the new locations. We assume a capital-to-output ratio of around 1.4 for the emerging economies and around 4.1 for the advanced.[73] The export substitution countries will benefit from higher exports of USD 200 billion after manufacturing moves in to serve overseas markets. The import substitution countries will benefit from lower imports after manufacturers move capacity of USD 100 billion back home. In addition to the positive trade effects on GDP in both country groups, this translates into additional investments of USD 288 billion in export substitution countries[74] and USD 406 billion in reshoring (import substitution) countries[75] over an assumed transition period of five years (see Table 5). We expect a large share of the investment in emerging markets to be via FDI, which plays a significant role in the development of international trade and helps establish direct, stable and long-lasting links between economies.

[72] This amounts to 12% of China's total gross exports in 2019. Value-added exports measure the value-added contribution to total gross exports. GSC allow countries to specialise activities. Inputs and components can pass through the chain and cross borders many times. Traditional trade data (gross exports) tend to include double-counting. Value-added exports are usually a fraction of the value of total gross exports.

[73] A. Marquetti, "A cross-country non parametric estimation of the returns to factors of production and the elasticity of scale", *Nova Economia*, vol 17 (1), 2007; R. Feenstra et al. "The Next Generation of the Penn World Table" *American Economic Review*, vol 105 (10), 2015: C. Holz, "China's Investment Rate: Implications and Prospects", *CESifo Working Paper*, No. 6496, 2017.

[74] Argentina, Brazil, Chile, Colombia, Czech Republic, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Saudi Arabia, Slovak Republic, South Africa, Thailand, Turkey, UAE, Vietnam

[75] Canada, France, Germany, Italy, Japan, South Korea, Taiwan, the UK and the US.

…boosting GDP growth by 0.7% in relocation countries, and by 0.2% in reshoring countries.

Impacts on growth during the transition period

In the export substitution countries, GDP growth will be boosted by 0.7% annually; the import substitution countries will see a 0.2% annual boost to GDP over the same transition period. These calculations do not include an estimation of lower overall productivity growth, which is expected as a consequence of the shift away from the most efficient way of production to a more resilient one. We expect the growth effect of additional investments to dominate during the transition period. At macro level, in the long run there will also be a small negative effect on global growth, but this is too difficult to estimate given the wide range of uncertainty around the driving factors. All things equal, losses in productivity (growth) will be smaller if parallel supply chains are built up slowly and are complemented by technological advances.

Table 5
Scenario analyses: impacts on investment and growth during the 5-year transition period, USD billion

	Trade effect	Investment effect	Baseline GDP effect (2019)	GDP effects per annum
Relocation/export substitution countries	200	287	13 147	+0.7%
Reshoring/import substitution countries	100	406	41 937	+0.2%
World excluding China	300	694	72 634	+0.25%
*China***	*–300*	*–501*	*14 340*	*–0.9%*
*World***	*0*	*192*	*86 974*	*0.04%*
China with policy stimulus*	0	0	14 340	0.0%
World*	**300**	**694**	**86 974**	**+0.21%**

*Assumes China fully offsets the negative impacts of the trade diversion and shift in production capacity with fiscal stimulus to boost domestic consumption and/or new export markets.
**Assumes no policy reaction from China to offset the negative impact of the trade diversion. Idle manufacturing capacity is reallocated and reduces the need for fixed capital investment.
Source: Swiss Re Institute

We assume China will offset any negative effects on GDP growth with more policy stimulus.

China's policy response matters for global growth

Relocation would have the opposite negative effect on production in China, making USD 300 billion of manufacturing capacity potentially obsolete. Without any policy reaction, this would reduce growth by about 0.9% annually during the transition period. Global growth would still receive a marginal lift from the higher capital intensity in the reshoring countries (0.04% per annum). This would be most likely more than offset by lower productivity growth (in part because of the higher capital intensity). We assume though that given the successful policy adherence to quantitative growth targets in the past, the Chinese government will offset the negative growth impact from loss of production value to alternative markets with additional fiscal measures to boost domestic demand. We also expect a doubling-down on its Belt and Road Initiative in order to develop alternative supply chains and new export markets.

Global growth could gain around 0.2% per year during the transition period.

With the impact in China fully offset, there would be a positive contribution to global GDP growth around 0.2% per year during the transition period. However, this is only a benefit to headline GDP due to the additional investment needed in capital-intensive reshoring countries. The new steady state of the parallel supply chain scenario is based on more capital-intensive production in advanced economies and less labour-intensive manufacturing production in China. This new normal is less efficient and needs additional resources for the transition. The benefit is more resilience, but global growth potential will eventually be lower in the long run due to efficiency loss.

Quantifying the effects on insurance risk pools

The impact on insurance demand will likely be net positive.

Table 6 summarises the expected impacts of the parallel supply chain scenario on different lines of business in insurance, based on the relocation and reshoring scenario as above. All estimates are tentative given the extreme uncertainties related to US-China trade relations and the disruption to supply chains from COVID-19.

Trade diversion and investments will boost GDP and insurance demand via income effects.

There are general income effects from higher GDP in the benefiting countries. First, trade increases GDP in the export substitution countries, with more manufacturing producing additional exports. In the import substitution countries, GDP is boosted by the reshoring of manufacturing. In addition, the fixed capital investment needed to step up of manufacturing capacity further boosts the income effect. We use average insurance penetration rates to calculate additional insurance demand from the additional production and income. We estimate the overall income effect would generate additional premium volume of around USD 63 billion over the five years, assuming China's government actions fiscal stimulus to boost domestic demand to fully offset the impact the transfer of production value to alternative host markets.

New factories will generate demand for commercial covers during construction and operations.

The additional manufacturing capacity in the alternative hosts increases engineering insurance demand during the construction, and additional commercial insurance demand in the ensuing operational phase of the new infrastructure and production facilities. We estimate an additional one-time insurance demand effect of USD 1.2 billion for engineering covers during the construction of new manufacturing capacity, and USD 9 billion for commercial insurance for operations over five years using standardised premium rates. The impact on ocean marine business in our scenario is negligible. Trade diversion to other countries and import substitution is estimated to only affect 0.5% of global merchandise trade.

We assume China will offset negative GDP effects with more fiscal stimulus.

As above, we assume the Chinese government will offset the negative growth impact at home with additional fiscal measures to neutralise most of the production shortfall. Without policy stimulus, there would be a loss of around USD 34 billion in premiums in China specifically, offsetting about 55% of the benefits in the receiving countries. The remaining difference is a result of the higher capital investments and higher insurance penetration in the import substitution countries.

Table 6
Impact on insurance premiums from the parallel GSC scenario during a 5-year transition period

	Insurance premiums from			
USD billions	**Change to trade**	**Additional investments**	**Income effect**	**Total**
Export substitution countries				
Income effect			22	
Commercial insurance (operations phase)		3.1		
Engineering (construction phase)		0.6		
Subtotal				**25.7**
Import substitution countries				
Income effect			30.8	
Commercial insurance (operations phase)		5.9		
Engineering (construction phase)		0.6		
Ocean marine	−0.5			
Subtotal				**36.9**
World*				
Income effect			52.8	
Commercial insurance (operations phase)		9		
Engineering (construction phase)		1.2		
Ocean marine	−0.5			
Total				**62.6**
China **				
Income effect			*-29.7*	
Commercial insurance (operations phase)		*−3.6*		
Engineering (construction phase)		*−0.9*		
Subtotal				*−34.2*
World **				
Income effect			*23.2*	
Commercial insurance (operations phase)		*5.4*		
Engineering (construction phase)		*0.3*		
Ocean marine	*−0.5*			
Total				*28.4*

Note: * China with policy responses, **China without policy responses.
Source: Swiss Re Institute

Conclusions

GSCs have become more vulnerable to disruption.

The US-China trade war and COVID-19 have highlighted the vulnerability of the global economy to supply chain disruption. Cost arbitrage has been the most important driver shaping GSCs for decades. The increased offshoring of operations, characterised by cross-border supply of materials, fragmented production and increased product specialisation, has resulted in complex interdependencies and exposures. Today, in the world's largest 20 economies, 40–80% of exports are integrated into GSCs.

COVID-19 has put the spotlight on the non-economic considerations of supply chain resilience.

COVID-19 has given new urgency to the discussion of resilience versus operational efficiency, with the spotlight on non-economic factors such as national strategic priorities. Many global manufacturers are considering restructuring their production and sourcing processes, a main upshot being transfer of production activities to alternative and duplicate locations under the guise of boosting supply chain resilience. That said, many of the drivers of change have been in force for a while, including a peaking of globalisation fervour. New technologies such as 3D printing facilitate a shortening and simplification of supply chains, which provides rationale for near- and re-shoring of production workflows.

The likely outcomes will be parallel and or multi-polar value chains.

The likely outcomes will include parallel and/or multi-polar value chains, with formation of production operations alongside existing manufacturing operations in China and elsewhere. We estimate that the changes will generate close to USD 1 trillion additional export and investment value over a five-year period across the new production host markets combined. Markets in southeast Asia look set to benefit most as new hosts, with Vietnam top of the list. We estimate that export substitution countries will benefit from a 0.7% annual GDP boost, and that GDP in import substitution countries will gain by 0.2% annually over the five years.

Resilience gains may well come at the expense of lower long-term global growth....

There are trade-offs to higher GSC resilience. Our scenario calculations do not include estimates of lower overall productivity growth that will likely come with the shift away from most cost-efficient means of production in low wage countries, to more resilient and sustainable ones. The increased costs of production will be reflected in higher prices for final products and lower corporate profits for shareholders. At macro level, in the long run there will also be a negative effect on global growth, but this is too difficult to estimate given the wide range of uncertainty around the driving factors. All things remaining equal, losses in productivity (growth) will be lower if parallel supply chains are built up slowly and are complemented by technological advances.

...but will generate demand for insurance, to the tune of an estimated USD 63 billion in new premiums over a five-year period.

The additional growth and income in benefiting countries will boost insurance demand as GSC changes take effect. The construction and operation of the new manufacturing capacity in alternative markets will fuel demand for commercial covers in particular. We estimate that the new dynamics will generate total additional insurance demand of USD 63 billion over five years. The estimate does not include business opportunities from some specialty lines. In the longer term, risk awareness of the need to insure against supply chain disruptions can become a strong source of industry growth through the provision of CBI, supply chain and NDBI covers, as well as cyber insurance.

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Published by
Swiss Re Management Ltd
Swiss Re Institute
Mythenquai 50/60
P.O. Box
8022 Zurich
Switzerland

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Explore and visualize *sigma* data on natural catastrophes and the world insurance markets at *www.sigma-explorer.com*

The editorial deadline for this study was 14 August 2020.

sigma is available in English, Spanish and Chinese.

sigma is available on Swiss Re's website: www.swissre.com/sigma

The internet version may contain slightly updated information.

Translations:
Spanish: Traductores Asociados Valencia S.L.

Graphic design and production:
Corporate Real Estate & Logistics / Media Production, Zurich

Printing: Multicolor Print AG, Baar

Order no: 270_0620_EN

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swissre.com/institute