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Article

Covid-19 calls for more resilient production chains, but that's easier said than done

Covid-19 has shown how vulnerable supply chains are to disruption. Their resilience can be enhanced by diversifying suppliers or holding more inventory, but both options are costly and far from straightforward, as we illustrate in an analysis of the automotive, electronics and textiles industries



Source: Shutterstock

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Overall, we don't expect major changes in the length or location of global value chains in direct response to Covid-19. In the industries we look at, the sheer number of suppliers and their concentration in specific regions present major obstacles to diversifying risks. But reducing the number of suppliers is not necessarily the way to more resilient supply chains. If rising protectionism triggers re-shoring, this could make supply chains more vulnerable to disruption in the future.

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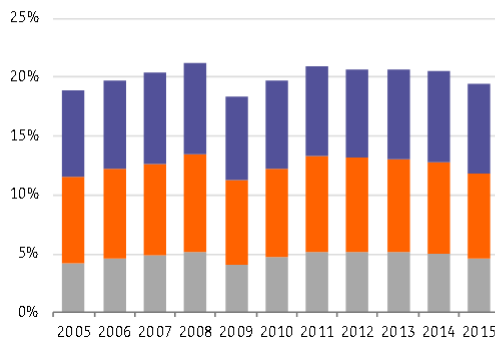
Value chains and vulnerability

Until the start of the global financial crisis, more and more firms set up production chains across borders, mainly to benefit from lower wage costs in Asia and Central and Eastern Europe. Many of the resulting supply chains are complex, meaning that at least three borders are crossed by (parts of) a product before it arrives in the shops.

On average, the share of products made in complex value chains worldwide stopped rising following the global financial crisis. However, in some industries it continued to increase, including electronics which has a relatively large share of production in complex value chains. In the automotive and textiles and apparel industries, the share has been stable (Charts 1-4). meaning that at least three borders are crossed by (parts of) a product before it arrives in the shops.

Value chains have been on the decline, but not in all sectors

Fig 1 Total



Source: OECD ICIOT 2018

Fig 2 Electronics

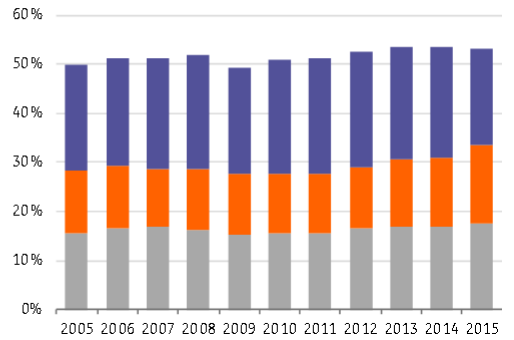
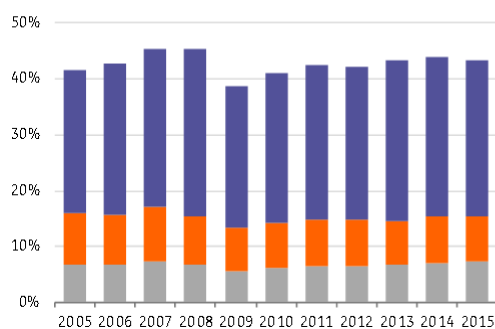
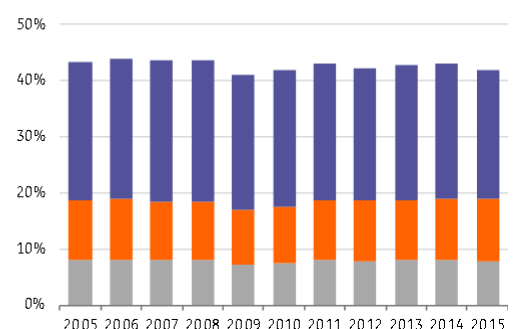


Fig 3 Automotive



Source: OECD ICIOT 2018

Fig 4 Textiles



By transmitting demand and supply shocks back and forth across different countries, value chains appear to be a source of [vulnerability](#) to firms and economies. Diversifying suppliers internationally is one way of protecting against shocks hitting a particular country or region.

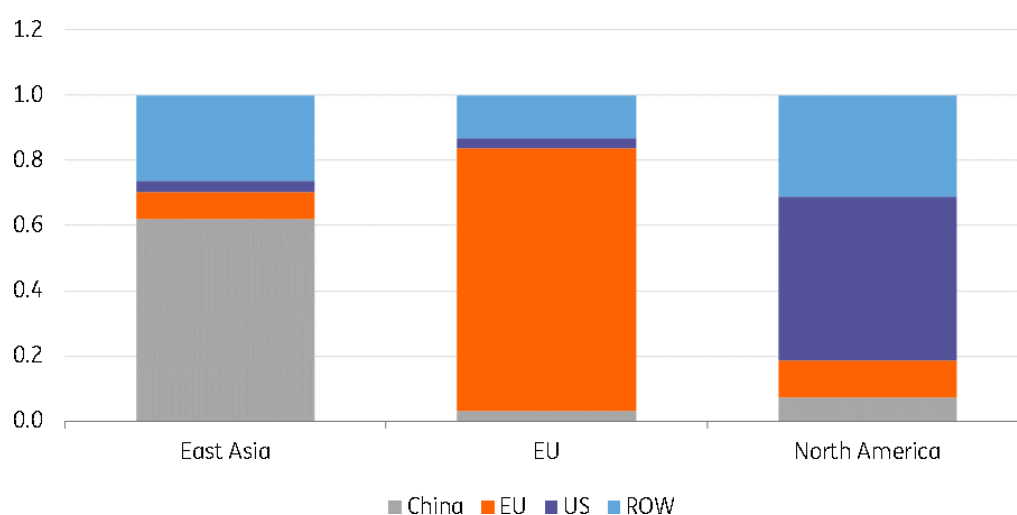
Holding more inventory can also increase supply chain resilience by enabling production to continue when the supply of intermediate inputs is disrupted. Covid-19 has made the costs of supply chain disruption clear. Firms will have to weigh the benefits of avoiding these costs if a similar future shock hit, against the costs of increasing resilience, where each industry faces its own specific challenges.

Automotive: de-risking is costly

Supply chains in the automotive industry consist of a large group of specialised suppliers that are clustered within regions. Most value is added in the region where the cars are sold (**Chart 5**), but the inter-regional links were still able to stop the global automotive industry in its tracks early in the Covid-19 outbreak. The lockdown in Hubei province in China forced factory closures in Europe weeks before European countries went into lockdown.

The costs of supply chain disruption are considerable. In early June, the European Automobile Manufacturers Association (EAMA) [reported](#) that factory shutdowns due to Covid-19 (30 days on average at the time of reporting) had resulted in a production loss of 2.5 million vehicles in Europe, of which around 617,000 were in Germany, the hub for European car manufacturing.

Automotive production is clustered around regional hubs



Source: OECD Trade in Value Added, ING calculations

In spite of the pain caused by production losses, the business case for increasing automotive supply chain resilience is not straightforward. There are two key reasons that automotive production is clustered within regions. First, components are heavy, bulky and easily damaged, so transport costs are high. Second, final markets often have local content requirements to be free of import tariffs, which can only be achieved by locating production nearby.

With thousands of suppliers involved in a vehicle's value chain, diversifying suppliers to increase resilience involves considerable ongoing costs. Even if they are only used as backups, suppliers need to be able to produce to detailed specifications, and meet quality and safety standards at any time. Holding more inventory also involves higher costs for working capital and storage costs, especially considering the bulkiness of many of the parts.

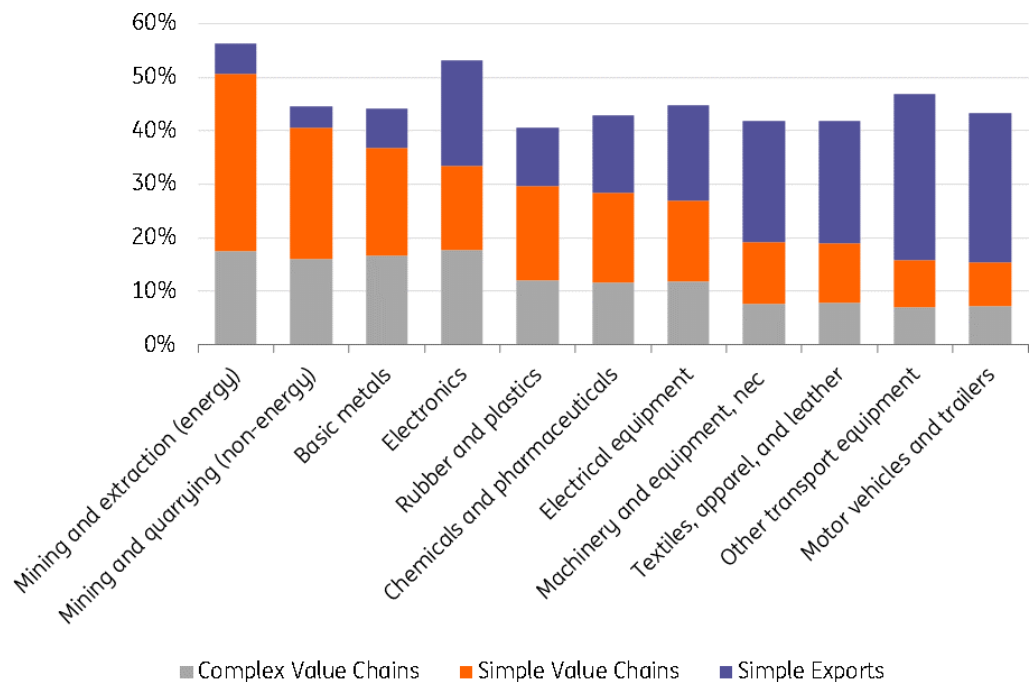
The shift to electric vehicles will deliver a transformation in supply chains in the automotive industry, which offers opportunities for building in resilience. Electric vehicles have [fewer parts](#) than vehicles with traditional engines, so as the share of electric vehicles in total sales increases [during this decade](#), the number of suppliers will go down.

Nevertheless, production in regional hubs is likely to remain the norm, thanks to the pattern of trade tariffs. The European Union also aims to establish production of electric vehicle batteries [within the EU](#). Overall, we don't foresee an industry-wide move to reconfigure existing automotive supply chains. The costs are simply too great, and automotive manufacturers' margins are not in a position to absorb the higher costs of more resilient supply chains.

Electronics: specialisation makes diversifying difficult

The electronics industry boasts one of the most complex supply chains of any industry (**Chart 6**). Components cross borders multiple times before reaching the point of assembly into a final product. Most consumer electronics are produced in Asia, with a high degree of specialisation across different countries. South Korea and Japan lead in the production of complex electronic components such as optical equipment, semi-conductors (memory chips) and LCD displays.

Electronics production is very reliant on cross-border trade



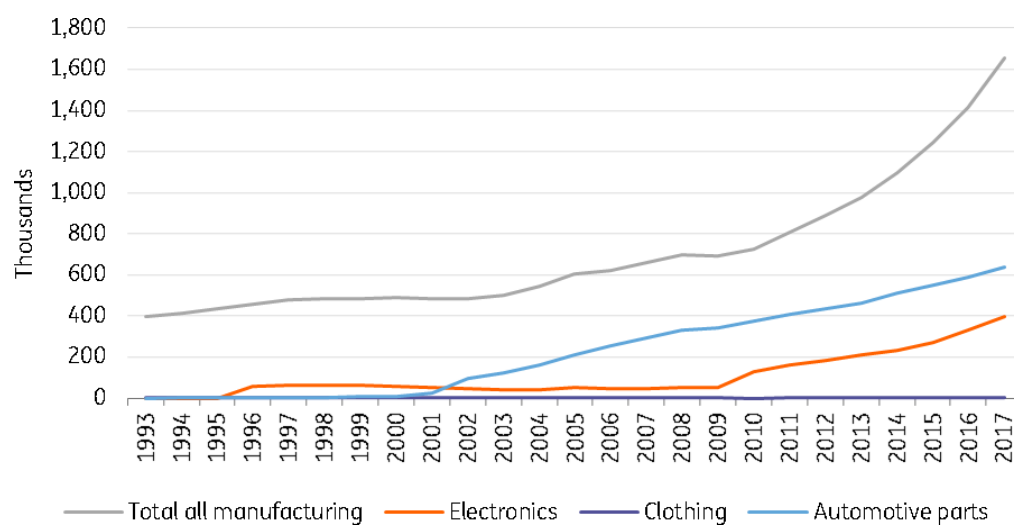
Source: OECD ICIOT 2018

Specialisation in electronics value chains makes it difficult for firms to diversify their suppliers across countries to increase supply chain resilience. For example, South Korea is the major exporter of memory chips. Although some other countries produce these goods as well, quantities are not sufficient to meet global demand in the event of a shock affecting the supply of South Korean producers.

The complexity of electronics supply chains and the limited scope for diversifying suppliers matter because a single input, if unavailable, can disrupt entire supply chains. The same supply chain may have exposure to a given country in multiple stages, or via multiple suppliers, and it is difficult for firms to evaluate these dependencies across different tiers of the supply chain. Even if a firm successfully diversifies the suppliers of 90% of its inputs, a disruption to any of the remaining 10% is still enough to shut down production.

China has been steadily upgrading its position within electronics value chains, helped by investing in robots and automation of lower value-added tasks (**Chart 7**). By becoming more competitive in higher value-added activities within the production of electronics goods and components, China could become a source of alternative suppliers to help firms diversify their supply chain risks.

Robots are increasingly common in electronics production



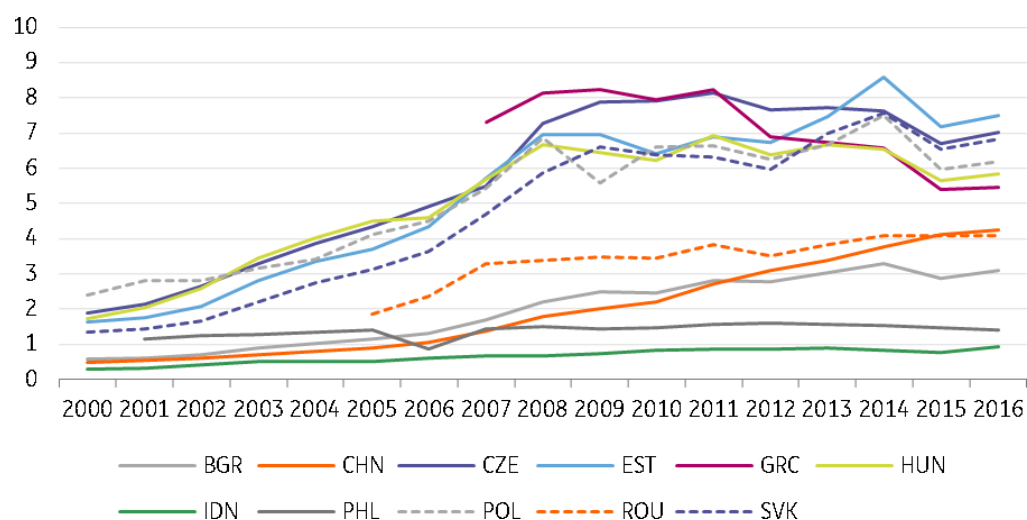
Source: International Federation of Robotics

But at the lower value-added end of electronics production, value chains are increasingly exposed to shocks to China. In recent years, rising Chinese wages and the hiking of US import tariffs on Chinese electronics have led firms to shift lower value-added activities out of China and [into other Asian economies](#). But robotisation and automation in China is enabling it to re-shore some of this activity, partly to serve domestic demand. As a result, options for supplier diversification in electronics value chains are limited, and becoming more so.

Textiles and garments: weak buyer-supplier relationships

Although there are fewer components in a T-shirt than a car or phone, producing textiles and garments also involves complex value chains. Clothing manufacturing is labour-intensive which has led to global production of basic items becoming concentrated in Asia, reflecting relatively low wage costs (**Chart 8**). Supply chains in the industry are relatively changeable, with supplier contracts going season to season. During the Covid-19 outbreak, buyers have simply cancelled their orders.

Wages have risen in China, but labour costs remain relatively low in Asia



Source: ILO, ING Calculations

European buyers of textiles already pursue a strategy of sourcing from geographically diverse suppliers, including from countries [within, or on the edges of, Europe](#). This helps to achieve fast turnaround times between orders being placed and delivery, which is especially important for the 'fast fashion' segment of the market for garments. Although this strategy allows firms a high degree of certainty about being able to get their products into the shops, the low volumes make it very vulnerable to delays in distribution, or in the supply of fabric, which is still mainly imported from Asia.

Even outside the 'fast fashion' segment of the market, clothing has a limited shelf life, meaning that little resilience is gained by holding larger inventories. So the only option for increasing textiles and garments' supply chain resilience is through diversifying suppliers. However, even before Covid-19, pressures within the industry were taking firms in the opposite direction.

Clothing brands have been under sustained pressure to achieve more transparency in their supply chains, following industrial accidents in clothing factories and the poor working conditions of garment factory workers coming to light, as well as demands for the industry to improve its sustainability performance. [Survey evidence from 2019](#) suggested that firms were responding to these pressures by planning to reduce the number of their suppliers. Covid-19 may yet cause firms to re-evaluate the worth of diverse sourcing and maintaining relationships with suppliers.

Protectionism may induce re-shoring, but won't deliver resilience

The current configuration of international supply chains relies on low trade barriers and a degree of certainty that these trade barriers will remain low in the future, or even diminish further. Covid-19 is changing these conditions. It has led to protectionist sentiments and subsequent actions in many countries. At the moment, export restrictions have mainly applied to medical products. However, trade costs are higher for all types of goods due to Covid precautions limiting the processing speeds at ports and at borders.

In contrast to the difficult-to-calculate costs of a future disaster or crisis, higher barriers to trade add to firms' day-to-day running costs, which accumulate along value chains. Firms may decide to re-shore production if value chains start to involve higher costs. But this decision would likely result in a narrowing of their supplier base, and an increased exposure to shocks in the home country. Overall, we don't expect major changes in the length or location of global value chains as a risk-management response to Covid-19. However, if the crisis leads to more protectionism, it could result in some re-shoring of production, and put supply on a riskier footing.

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