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# The year that car production stopped – a lesson in complex risk

The global shortage of silicon chips has demonstrated the need to build ‘slack’ into systems so that businesses can cope when things go wrong. And risk managers should think about how they create solutions to such issues

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## How did we get here?

The global car industry is running short of silicon chips. A shortage that began at the start of 2021 has halted production lines around the world: the chip drought has also slowed production of everything from smart phones and personal gadgets to household ‘white goods’ as well. The shortage is likely to have a greater impact on the car industry than the Covid-19 pandemic itself.

Companies like Ford, Volkswagen and Jaguar Land Rover have shut factories, laid off workers and slashed production. And some car makers are now leaving out advanced features, such as satellite navigation systems, from their vehicles as a result of the shortage.

This challenge began in the early months of the pandemic, when car sales dropped as much as 80% throughout Europe and almost 70% in China. The lack of demand for new cars at that time led to plants being closed, with orders for chips from car makers being cut as a result.

The industry then faced a consequent shortage of chips as demand for new cars began to pick up this year. No single factor caused this shortage. Like many of today’s potentially existential threats to businesses, it was a series of factors that led to the situation that car makers now face. It is a classic example of a complex risk, the sort of risk that in today’s world is increasingly all too common.

## Competition from other sectors

While car makers were cutting production in early 2020, at the same time, driven by a shift to remote working, demand rose significantly for personal computers and communications equipment, all of which also heavily depend on chips. That meant that as car makers cut their chip orders, other sectors increased theirs.

## Chip manufacturing capacity

The semiconductor industry has matured in recent years through consolidation and the achievement of greater scale. Its capacity has expanded steadily by around 4% a year, in line with sales. Demand for production output from the chip fabrication industry over that period has been, more or less, complete, with little slack in the system. On top of this, it takes time for chip fabricators to add additional capacity – they cannot just ‘turn on’ extra capacity over the short term.



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## Global tensions

Because of global tensions, particularly between the USA and China, some car manufacturers have considerably increased their chip inventory levels to protect against potential shortages. Such stockpiling can, and has, impacted the availability of chips for the vehicle market.

## Natural disasters

A fire at a semiconductor plant in Japan and power outages from storms in Texas further exacerbated shortages in production.

## Limited stock

Just-in-time manufacturing practices, which can minimise waste and increase efficiency by keeping inventories low, are widely used by car makers. In normal times, the reduction of inventory is financially helpful; however, in the event of an unexpected shortage, it causes immediate disruption of the entire supply chain. Since most car makers didn’t expect the chip shortage in 2020 and 2021, they had very limited stock available to weather any crisis. These problems were exacerbated by the tendency of the sector to rely on single suppliers for each chip type they use: there is often no ‘plan B’.

### Solving the problem

It is unlikely that this situation will abate over the short-term. Over the longer term, car makers will need to rethink the way they source silicon chips.

Chip shortages are a huge issue for today's car industry as there can be between 50 and 1,000 semiconductors in a vehicle depending on its complexity.

Chips feature in everything from infotainment and navigation systems to parking cameras, engine management systems and power steering.

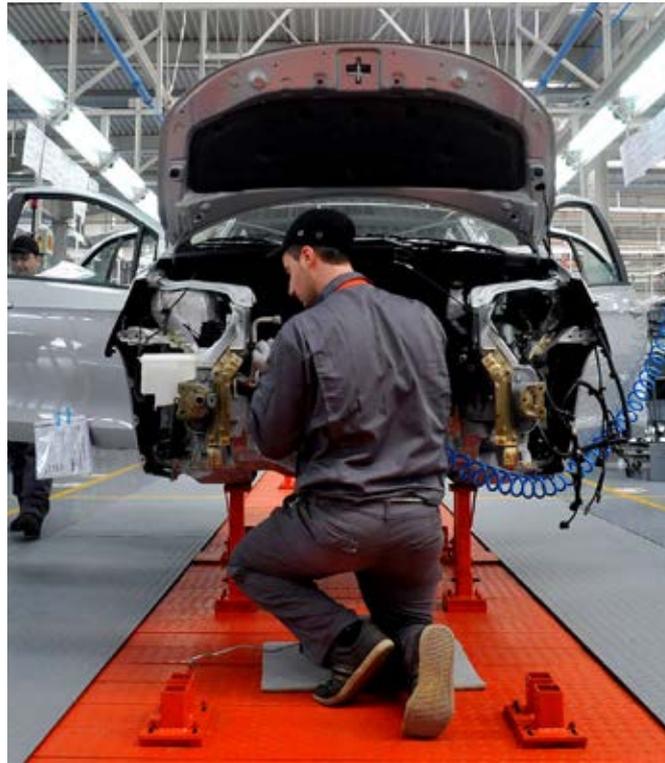
The severity of the global chip shortage has grown in recent months and it's now looking as though millions of people will be impacted, not just consumers, but the car rental industry and, indeed, those dependent on the car makers for their livelihoods. And all this is happening at a time of radical change as the industry transforms itself from internal combustion power to electric vehicles.

On top of this, chips are now found in a huge range of other manufactured goods from computers and smart phones to domestic goods. But demand for chips is continuing to outstrip supply, and car makers are no longer the only companies feeling the pinch.

South Korean tech giant Samsung admitted that the chip shortage is hitting television production, while fellow manufacturer LG admitted the shortage is a risk.

Production of simple processors, such as those used to weigh clothes in a washing machine, has also been impacted. While most retailers are still able to get their hands on the products they need at the moment, they may face issues in the months ahead.

Nations are now being forced to think again about how they can increase the number of chips they require. The vast majority



of the world's chips are made in China, while the U.S. is the second biggest producer. The EU and UK have both said they want to build up their own chip manufacturing capacities as part of an effort to become more self-reliant on what they see as a critical technology.

Car makers rely on bigger, older chips while phone makers are using the latest processors. Smart phones are also sold in far higher volumes than vehicles, making them a preferred customer of suppliers. In addition, smart phone makers didn't reduce their demand for chips as the automotive sector did when they expected a drop in demand for cars at the start of the pandemic.

Indeed, phone makers took up the capacity cancelled by vehicle firms at the start of the pandemic, in turn leading the latter to experience a chip shortage when demand for cars rose faster than they anticipated this year. However, phone manufacturers too are

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now starting to feel the impact of the global chip shortage, as car makers start to reclaim their supply chains.

### Lessons for risk management

As we have seen with the pandemic and indeed what has happened with the global car industry, risk is hardly ever in today's world a 'simple' matter of likelihood and impact. Speed of impact of a risk, or so-called 'risk velocity', often happens much faster than we are accustomed to. Then, as the auto industry has shown us, complexity from overlapping factors can make risk difficult or indeed impossible to detect, measure and effectively mitigate.

So what do we do? Diversity of thinking, not just on a gender, racial, sexual orientation or age basis, but also in terms of background and experience, does help to identify these risks in the first place. It also helps to eliminate 'group think' and improve the organisation's ability to 'think outside the box'.

Building 'slack' into systems, in order to reduce so-called 'close coupling' between risks, so that action can be taken before one risk immediately triggers another, helps too.

As does agility, which can help support an organisation's ability to cope with not just known and knowable risks, but the not knowable too.

And when it comes to supply chains, I guess we've now all learned that single supplier solutions and 'lean production' aren't all they're cracked up to. As the author Nassim Nicholas Taleb said in his book *The Black Swan*, if God believed in just in efficiency rather than resilience, he'd have given us all one kidney rather than two, as it would have produced a lighter, simpler and more efficient design, but not necessarily one that could withstand future shocks. ❤