

How the world ran out of semiconductors

March 5 2021, by Hamza Mudassir



Prices are going up. [Panther Media GmbH/Alamy](#)

There's a global shortage in semiconductors, and it's becoming increasingly serious. The US is currently reviewing of its supply of the technology, following a [landmark executive order](#) from President Joe Biden.

The president also pledged US\$37 billion (£26 billion) to cover the short-term costs of rebuilding and securing America's supply of [semiconductors](#), which are a fundamental part of microchips and thus integral to everything from computers to smartphones to renewable energy and military hardware.

The [automotive sector](#) has been worst affected by the drought, in an era where microchips now form the backbone of most cars. Ford is predicting a [20% slump](#) in production and Tesla [shut down](#) its model 3 assembly line for two weeks. In the UK, Honda was forced to [temporarily shut](#) its plant as well.

Even highly experienced tech companies such as Nvidia and Microsoft are struggling to provide a steady stock of [graphics cards](#) and [Xboxes](#) respectively. It appears that no company, big or small, tech or non-tech, is safe from the wide-ranging impact of the great semiconductor famine of 2021.

The concentration problem

While it is easy to blame the COVID-19 pandemic for this situation, the truth is that the global semiconductor supply chain had this coming for some time. As much as [70% of](#) the world's semiconductors are manufactured by just two companies, Taiwan Semiconductor (TSMC) and Samsung.

The entry barriers into semiconductor manufacturing are astronomically high. There's a steep learning curve required to set up a semiconductor foundry, entailing an [upfront investment of](#) US\$10-\$12 billion and then [at least three years](#) to become production-ready.

Even then, there are no guarantees that a new foundry's chip yields will match those of the incumbents. Chips rapidly become obsolete and price pressures are a major problem in the tech sector, so there are lots of risks to profitability.

Due to such harsh economics, it has only made sense for a handful of large players to invest in manufacturing capabilities and then spread those costs and risks across hundreds of thousands of customers. Global tech has historically been very happy to hand the manufacturing reins to TSMC and Samsung. And in turn, this has created the supply-chain equivalent of a house of cards.

High demand

The pandemic has driven unexpectedly high demand for [home electronics](#) such as [laptops](#) and gaming consoles, as many people started working from home and seeking [more sources](#) of indoor entertainment.

Automotive companies had been expecting lower demand, given that car sales tend to move lower in an economic downturn. This, however, proved to be an erroneous assumption, as new car sales started [bouncing back](#) quickly by the tail end of 2020. Automotive companies tried to re-book previously canceled semiconductor orders only to discover that home electronics manufacturers had taken their place.

At the same time, President Trump's trade war with China led to new rules that made it harder for Chinese companies to source semiconductors from TSMC and Samsung. With China's own

semiconductor technology inferior to the industry leaders, Chinese tech behemoths like Huawei [stockpiled semiconductor chips](#) in advance of the new restrictions in 2020, soaking up any spare capacity with large orders.

But the straw that finally broke the proverbial camel's back was the [sharp rise](#) in bitcoin prices in early 2021. This increased [the demand](#) for the graphics processing units that are traditionally used in mining the digital currency, exacerbating the [semiconductor](#) supply issues further.

All of this has been enough to cause TSMC and Samsung to run out of capacity and significantly increase lead times to fulfill orders, leading to the drought we see today.

Who loses

The share prices of TSMC and Samsung have risen by [190%](#) and [61%](#) respectively in the past 12 months thanks to the supply shortfall. Despite President Biden's best efforts, the situation is unlikely to improve in the next three years because of all the barriers to entry in this sector.

Prices of consumer electronics have shot up, thanks to scalpers who routinely buy graphics cards and consoles at recommended retail prices and sell them for [higher prices](#) on sites like eBay.

It is only a matter of time before tech manufacturers and retailers decide to increase prices to match the high demand and low supply of the components. Expect to see releases of more expensive variants of existing electronic products hitting the market soon.

Just like in an actual famine, the end consumers of these goods are going to be significantly worse off, with little or no respite coming their way.

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