

## **Washington has become a driver of China's chip self-sufficiency**

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Nvidia is facing its first real competitor in China. US export controls, designed to cut off China's access to advanced chips and chipmaking gear, were supposed to ensure that no domestic rival could emerge. But the very sanctions meant to shut down China's chipmaking sector have instead fuelled it, accelerating the rise of an unexpected challenger: Huawei.

The paradox is clear — had the US never imposed chip export bans, the Chinese conglomerate would have continued to rely on Taiwan Semiconductor Manufacturing Company for its chips. Chinese chips would have probably remained second tier, reliant on foreign technology with little urgency to innovate. Instead, by sanctioning Huawei and cutting it off from advanced US chips, Washington has become the greatest driver of the technological self-sufficiency it sought to prevent. Huawei together with Chinese chipmaker SMIC — which is also under US sanctions — has made a key breakthrough in chipmaking, improving the yield of its latest AI chips to about 40 per cent, doubling from 20 per cent a year ago.

Yield, the percentage of functional chips in a batch without defects, is a critical metric in chipmaking. Defects in chips are inevitable, especially in advanced chips. Shrinking transistor sizes and complex chip designs raise failure rates. Even slight variations in production and impurities in materials can cause malfunctions. Advanced chips are built in multiple layers, where misalignments add another layer of risk.

Therefore, yields of between 30 and 40 per cent are common for new chip production lines, improving significantly as manufacturing is refined. Huawei reaching this crucial threshold — despite limited access to advanced fabrication tools — marks a turning point for its AI chip business, with the higher yields making its production line profitable for the first time.

Challenges remain. Nvidia's dominance is reinforced by its deeply entrenched software ecosystem and developer base, making a shift to alternatives difficult.

Meanwhile, local chipmakers' access to advanced manufacturing gear remains limited, meaning less efficient fabrication. Performance is another concern. Critics argue that Huawei's chips lag behind Nvidia's in performance per unit.

However, a fundamental shift in the AI sector could work in Huawei's favour. AI can be categorised into two markets: training — where AI models are created; and inference — where they are deployed to generate real-world responses.

While training happens once, inference happens billions of times in realworld use. This shift towards inference-heavy workloads marks the next stage of competition for chip companies. For example, creating AI models such as OpenAI's GPT-4 uses high-performance training chips. But once trained, deploying it to users requires a far greater number of lower-power inference chips. As AI inference becomes more prevalent, demand for costefficient chips will increase. In China, where AI chips are in short supply, Huawei may have an edge despite trailing Nvidia in performance. Scaling up the number of chips could help bridge this gap. Parallel processing allows multiple chips to work together, distributing the workload and combining results for the final output.

Chinese tech giants such as Baidu and ByteDance are shifting to Huawei's AI chips for deep-learning workloads, potentially setting a precedent for other countries seeking non-Nvidia alternatives. But the broader battle over chips extends far beyond Huawei. China, the largest chip consumer in the world, is a market Nvidia cannot afford to lose. Analysts estimate that last year alone, Nvidia made \$12bn from 1mn H20 AI chips sold to China. That a single product generated revenue equivalent to nearly a tenth of the company's annual total underscores how critical the Chinese market remains to Nvidia.

Yet Washington's greatest miscalculation may not be underestimating China's chipmaking capabilities, but rather overlooking the forces that drive technological progress.

History has shown that every industrial power that has tried to suppress a rival's technological rise has, at best, delayed it — and at worst, accelerated it. Chips are no exception. The chip war is far from over, but in the long run, the US may have ensured that it is a war China cannot lose.