

FINANCIAL TIMES – 07 OTTOBRE 2024

America's chips effort is at a crossroads

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Looking back over the Biden administration, the passage of the bipartisan Chips and Science Act should fall near the top of any list of its accomplishments. It has been obvious for a long time that not only the US, but also the world, needed a more diverse group of production hubs for semiconductors — the lifeblood of the digital economy. Until quite recently, most chips were made in south-east Asia and nearly all high-end ones were made in Taiwan, arguably the third most geopolitically contentious place in the world after Ukraine and the Middle East.

Now, thanks to the Chips Act, there is new production capacity being built in both America and Europe, with the EU launching its own stimulus to compete with the US.

While some in economics and business circles doubted whether the US would be able to reindustrialise in this way, the economy goes where incentives push it. It is amazing what you can accomplish in two years when you pour \$53bn of public money and nearly \$400bn worth of private investment into incentivising domestic production.

For example, in early September, Taiwan Semiconductor Manufacturing Company, which plans to start mass producing chips in Arizona by 2025, achieved production yields similar to what it can do in established plants back home. That's a big deal. Yield rate is not only a key factor in profitability, it also leads to more productivity.

This is the great lesson from Taiwan's chip success: making things matters. By producing more and more of something in the physical world, you move up the innovation food chain. That is something that has always been obvious to engineers, if not also to economists.

Despite the criticism around delays in semiconductor production (as if it's possible to rebuild a multitrillion industry in a few months), a lot of progress has been made, not just in yields but also in areas like workforce training.

Lack of skilled labour has been a big chokepoint in chips. When industries go away, so do workers, and the educational programmes that support them. A good chunk of the chips money has gone into bolstering schools and vocational programmes in areas like upstate New York, where the US science department signed a memorandum of terms with Micron Technology, which plans to invest around \$100bn in chip production over 20 years.

The commerce department, which runs the chips programme, worked with the American Federation of Teachers and Micron to put together a new technology curriculum which launched in ten state

school districts this fall, and is now spreading to other states. This is the sort of deep engagement between educators and job creators that we need to build a better workforce.

But all this said, I'm worried about where America's chip production efforts go from here. While we've learned that making things matters, we haven't yet learned how to do real industrial policy in a systematic way. Nor have we learned how to promote the greater public good over private interests. Chip production, in particular that of AI-related chips, is where the challenges on these issues are especially acute.

One big challenge is which countries to "friend-shore" with, and how. Consider that in late September, the US and the United Arab Emirates agreed to deepen co-operation in advanced technologies such as semiconductors and clean energy, with the aim of bolstering capacity in artificial intelligence. Microsoft and OpenAI are among the US companies either investing in the region or receiving Gulf funding.

Part of this is about trying to pull more countries into the US tech orbit, but more significant is the lobbying power of tech companies, which are desperate to take advantage of the huge subsidies and cheap energy offered by Gulf countries looking to grow an AI industry.

If we are going to worry about the national security implications of Nippon Steel buying US Steel, I suggest we should also be sceptical of sharing the most cutting edge and strategic technologies with an autocratic country with little respect for human rights or privacy and deep academic and business connections with China.

Many in defence and intelligence circles share this concern. As one person familiar with the matter told me: "Silicon Valley executives love this free money party in the desert, but Gulf nations are connected to China at the hip," and there's almost no way to prevent tech transfer in sensitive areas. It's not only software but hardware that's a concern. TSMC and Samsung are considering building massive high-end chip production facilities in the UAE. That's not a problem in and of itself, though it does amaze me how tax breaks and subsidies will lure an industry hugely dependent on precise temperatures and lots of water into the desert, be it in the Gulf or Arizona.

The problem is what happens if the massive amounts of cheap capital and energy being poured into the industry by the UAE undercuts American production efforts. That, after all, is exactly how the entire chip industry ended up in south-east Asia in the first place.

If America is serious about resilience and security in semiconductors and AI, the next president is going to have to think even harder than Joe Biden did about the risks and rewards of re-industrialisation.