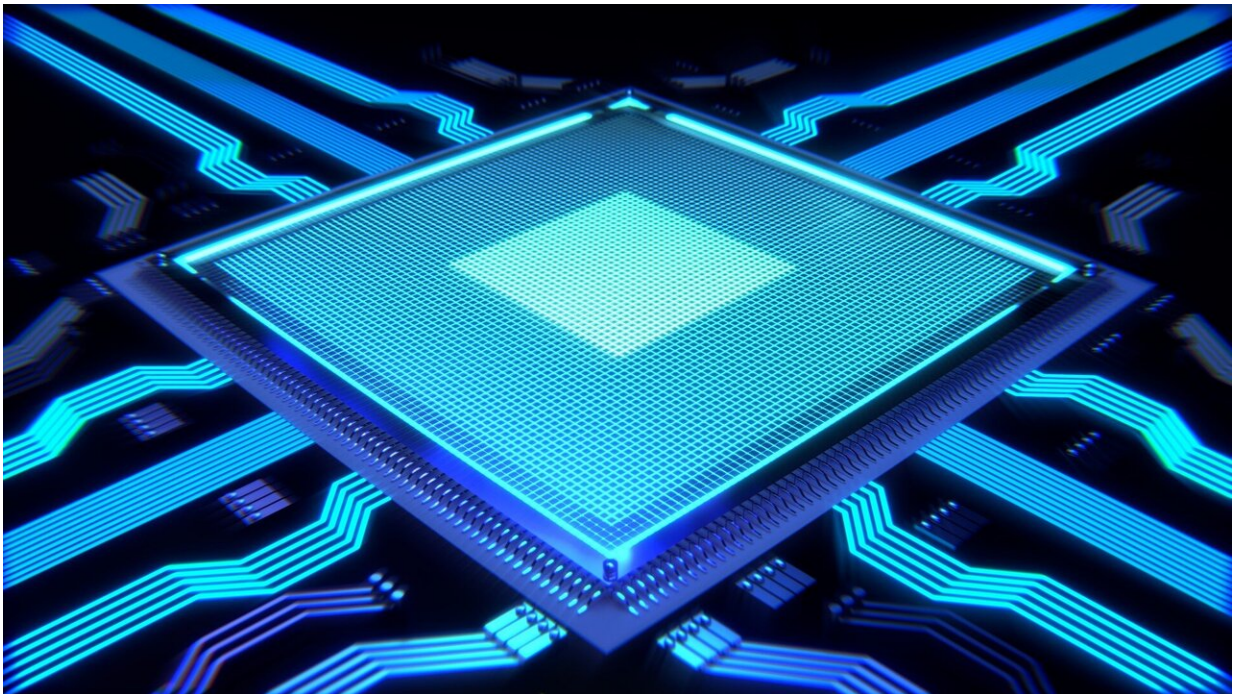


Opinion: Chips Act won't work without every part of the chip

October 31 2022, by Thomas Black



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The U.S. was awakened by the pandemic to the gaping holes in its supply chains for crucial medical supplies and electronics. One of the most significant was semiconductors, the pieces of silicon that hold millions of tiny transistors that are needed in everything from automobiles to toys.

The Chips and Science Act devotes \$52 billion to begin to remedy a decades-long trend of U.S. production drifting away to lower cost regions, mostly to Asia and especially to China. The rebuilding of that supply chain and manufacturing capacity will take years, but it will come to naught unless all the components, even the low-margin ones, have a presence in the Americas, if not the U.S.

The production of semiconductors is arguably the most globalized industry, and the [small size](#) and higher value of chips make them ideal for ferrying around the globe by aircraft. The ability to move materials and components at a negligible cost and time of transport made them an early candidate for moving manufacturing overseas.

The combination of this mobility and the push of U.S. chipmakers to improve [profit margins](#) resulted over the decades in the industry being broken down into several distinct activities, with specialized manufacturers at each stage. U.S. companies have kept the research and design, which is the most lucrative part of the business. Although there are some integrated chipmakers, most of the manufacturing has migrated overseas: the [raw materials](#); silicone substrates on which the chips are built; the wafers on which chips are engraved; and a final production process that encases and tests the chips.

Like any chain, the one that produces semiconductors is only as strong as its weakest link. It doesn't make any sense for the U.S. government to invest billions of dollars to support the manufacturing of chips if they need to be shipped to Asia anyway to be completed. Each stage of production should be readily available to make it much easier to ramp up if supplies were disrupted instead of having to start from scratch.

Farming out the lower-margin businesses made sense at the time. Stand-alone [chip](#) designers have gross margins of 60%, while companies that assemble the chips and test them manage gross margins of only 17%,

according to Bloomberg Intelligence. The U.S. dominates chip design with 68% of the [global market](#) but has only 3% of the outsourced semiconductor assembly and testing. The U.S. market share is even lower for production of the integrated chip substrates.

This strategy, though, left the industry dependent on Asia, which has built up the supply chain to become a one-stop, low-cost area to manufacture computer chips. The products that require the chips, such as laptop computers and television, are also mostly made in Asia because the U.S. ceded manufacturing to others.

The Chips Act has made headlines for enticing new so-called fabs, the factories that jam millions of transistors onto silicon wafers. Companies including Intel Corp., Samsung Electronics Co. and Micron Technology Inc. are among the companies planning large investments. It's unclear how much of the other separate processes of the chipmaking chain will remain abroad. It's even more unclear how the government plans to entice these low-margin activities to locate in the U.S.

Amkor Technology Inc. is an outsourced assembly and test company based in Tempe, Arizona. The company, though, doesn't have any factory operations in the U.S. Its factories are in China, Malaysia, the Philippines, Singapore, South Korea, Taiwan, Japan and Portugal. It's building a plant in Vietnam that will be up and running next year. Amkor, which completes the semiconductor assembly process so the chips can be used by makers of electronics, vehicles and consumer goods, has no manufacturing operations in the Americas. This isn't only about wages—Japan and Portugal aren't low-wage countries. Chip assembly and testing is already highly automated manufacturing.

There is an argument that the U.S. just can't produce these components or perform these processes competitively. Labor costs are just too high, which means production here would only add to inflation or require

perpetual subsidies. If this is the case, what's the purpose of the Chips Act? It's imperative for the U.S. to have redundant sources of supplies on critical products. The pandemic and now China's more aggressive stance on the world stage has made that clear.

The promises of China bending more toward a free-market economy and open society after the world's most populated country was admitted to the World Trade Organization in 2001 are now broken.

"We are deglobalizing. There's no going back on this," Mark Zandi, chief economist of Moody's Analytics Inc., said in an interview with Bloomberg TV. "Xi is moving in a different direction. U.S. is moving in another direction. We are pulling apart."

The U.S. will have to lean on automation to have cost-competitive manufacturing. In those areas where it's more difficult to replace low-cost labor with automation, Mexico, Brazil, Costa Rica and other partners can help fill that gap. The bottom line is that if the Chips Act doesn't bring back the whole chain—even the less lucrative parts—it will fail to achieve its goal.

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