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The CHIPS and Science Act: Here's what's in it

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The act invests $280 billion to bolster US semiconductor capacity, catalyze R&D, and create regional high-tech hubs and a bigger, more inclusive STEM workforce.

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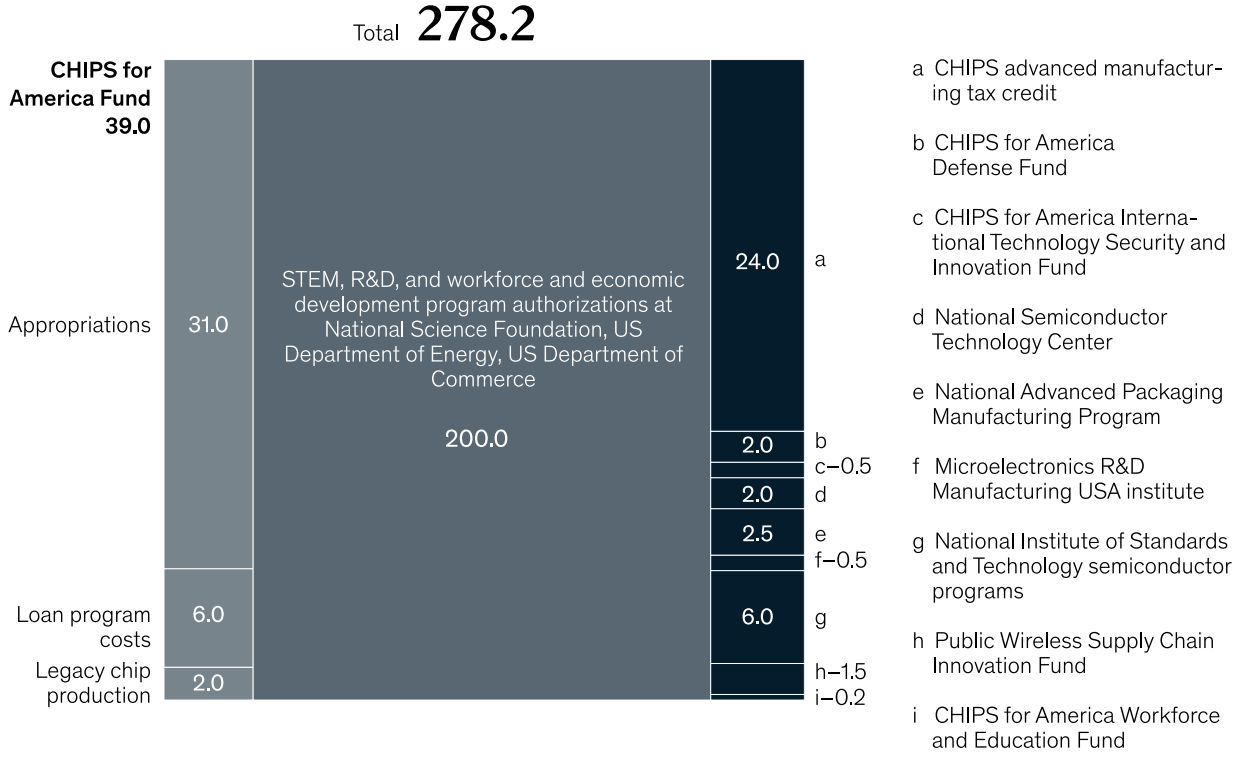
The Creating Helpful Incentives to Produce Semiconductors and Science Act of 2022 (CHIPS Act), signed into law on August 9, 2022, is designed to boost US competitiveness, innovation, and national security. The law aims to catalyze investments in domestic semiconductor manufacturing capacity. It also seeks to jump-start R&D and commercialization of leading-edge technologies, such as quantum computing, AI, clean energy, and nanotechnology, and create new regional high-tech hubs and a bigger, more inclusive science, technology, engineering, and math (STEM) workforce. Here is a breakdown of the law's key provisions.

By the numbers: The CHIPS Act directs $280 billion in spending over the next ten years. The majority—$200 billion—is for scientific R&D and commercialization. Some $52.7

billion is for semiconductor manufacturing, R&D, and workforce development, with another $24 billion worth of tax credits for chip production. There is $3 billion slated for programs aimed at leading-edge technology and wireless supply chains.

The CHIPS and Science Act of 2022 directs $280 billion in spending over the next ten years, with the bulk for scientific R&D.

CHIPS and Science Act funding for 2022–26, $ billion



Source: Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act of 2022, H.R. 4346, 117th Cong. (2022)

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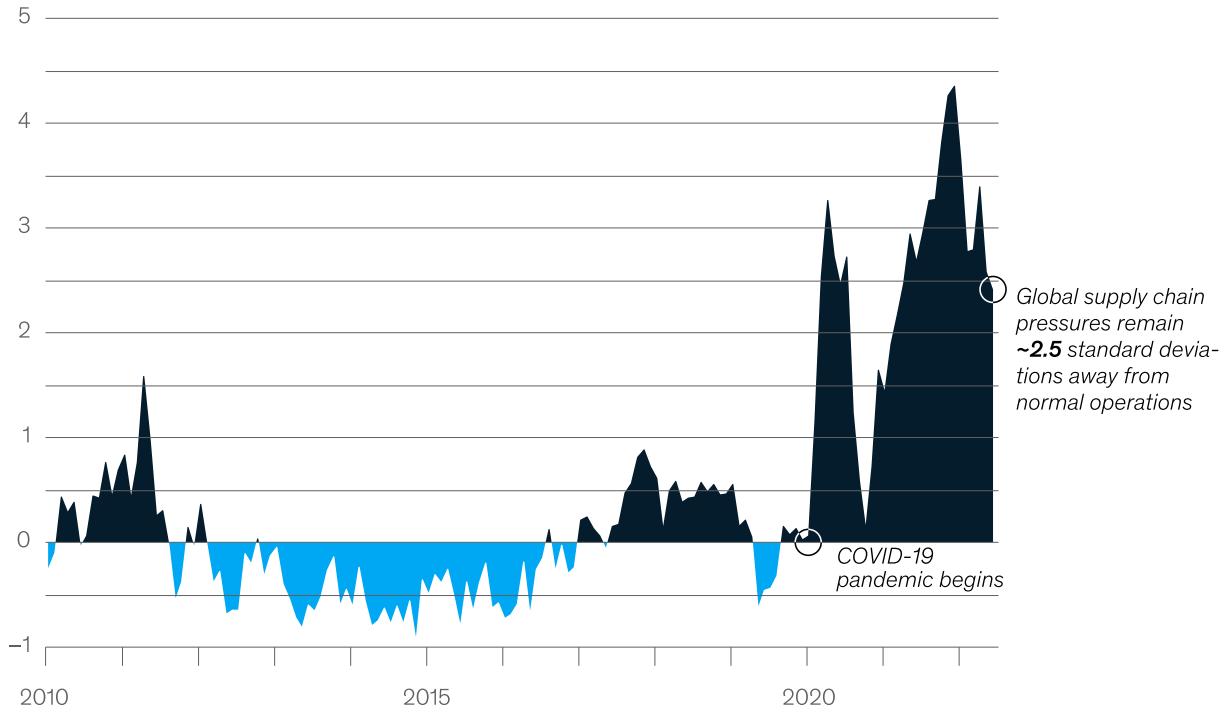
The chips are down: The United States makes 12 percent of the world's semiconductors, compared with 37 percent in the 1990s, according to US government statistics.[1] Many US firms are dependent on chips made abroad, and the fragility of those supply chains has been laid bare over the past 18 months. Moreover, McKinsey research estimates that worldwide demand will keep growing, with semiconductors poised to become a $1 trillion industry by the end of the decade.

Semiconductor shortages have been a key aspect of global supply chain pressures over the past 18 months.

Global Supply Chain Pressure Index, standard deviations from average value



Source: Federal Reserve Bank of New York; S&P Global PMI Commodity Price and Supply Indicators

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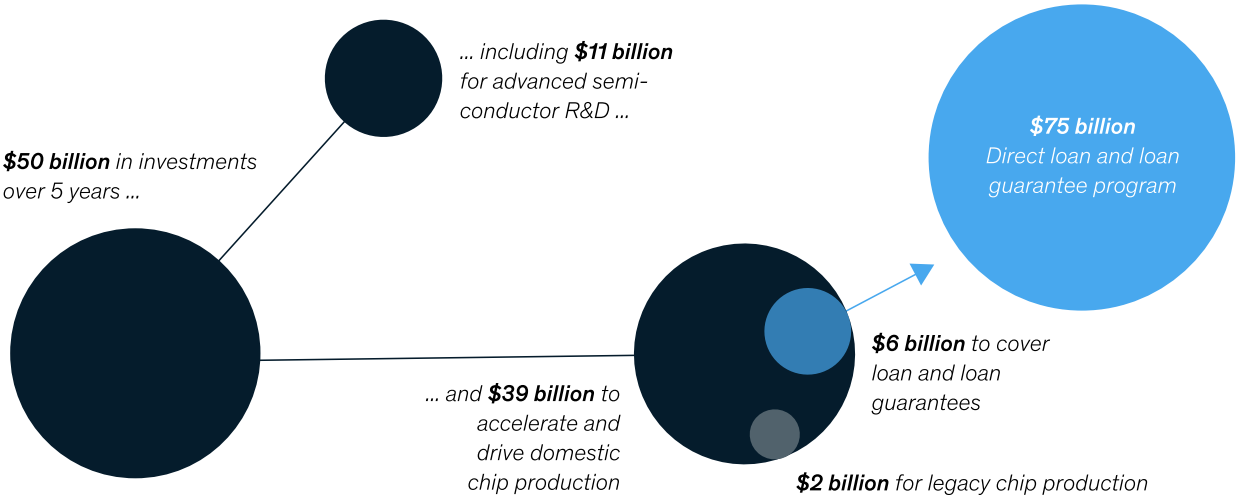
Shoring up semiconductors: Shortages of semiconductors dented US economic growth by nearly a quarter-trillion dollars in 2021, according to the US Department of Commerce.[1] To expand domestic manufacturing of mature and advanced semiconductors, the Department of Commerce will oversee $50 billion in investments over five years, including $11 billion for advanced semiconductor R&D and $39 billion to accelerate and drive domestic chip production ($6 billion of which can cover direct loans and loan guarantees).

The US Department of Commerce will oversee $50 billion in investments to expand domestic manufacturing of mature and advanced semiconductors.

Budget to expand domestic manufacturing of mature and advanced semiconductors



Source: US Department of Commerce

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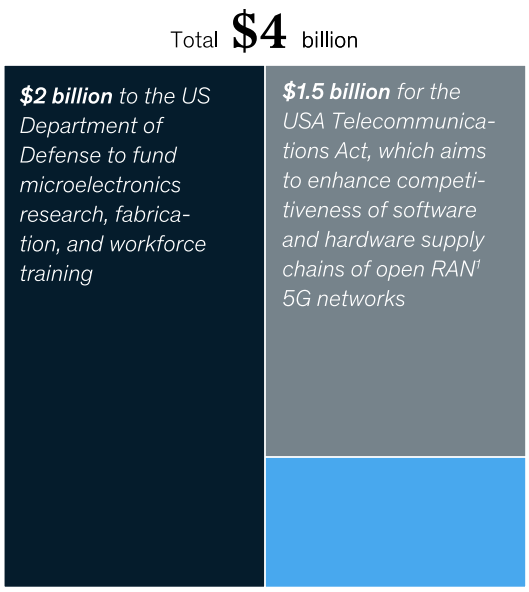
Boosting national security and 5G supply chains: The CHIPS Act allocates $2 billion to the US Department of Defense to fund microelectronics research, fabrication, and workforce training. An additional $500 million goes to the US Department of State [1] to coordinate with foreign-government partners on semiconductor supply chain security. And $1.5 billion funds the USA Telecommunications Act of 2020, which aims to enhance competitiveness of software and hardware supply chains of open RAN (radio access network) 5G networks.

The CHIPS and Science Act will fund a national network of semiconductor technologies for the defense industrial base and investments in supply chain resilience.

Breakdown of national security funding within the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act



[1]Radio access network.
Source: US Department of Commerce

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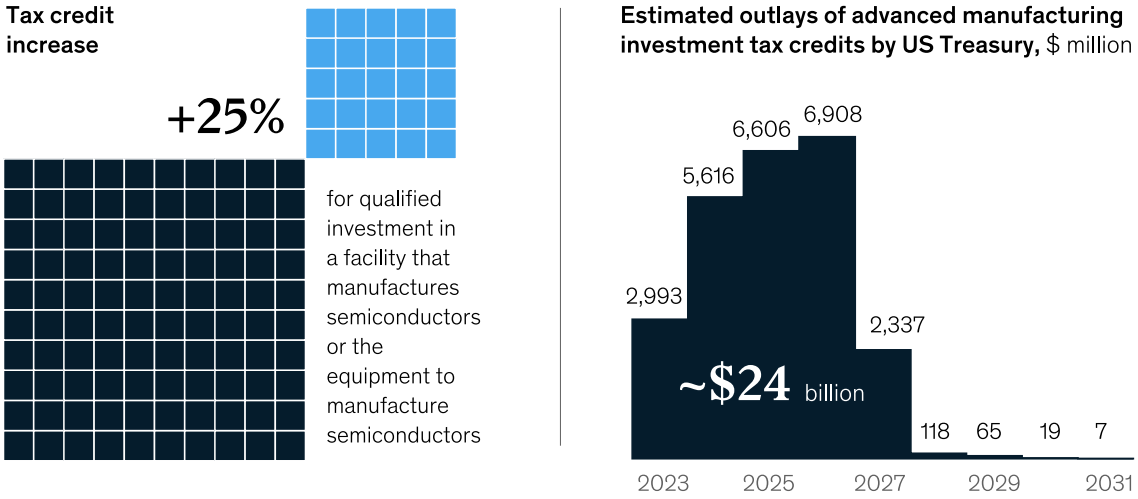
About those tax credits: Given the scale of investment required, building new semiconductor fabrication plants will take more than government funding. Private investment is needed too. Under the CHIPS Act, taxpaying entities receive a 25 percent advanced manufacturing investment tax credit for investments in semiconductor manufacturing and processing equipment—an outlay the Congressional Budget Office estimates will cost $24 billion over five years.

The CHIPS and Science Act establishes a semiconductor investment tax credit of approximately $24 billion to spur private investment until January 1, 2027.

Advanced manufacturing investment tax credit



Source: Congress.gov; Congressional Research Service; Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act of 2022, H.R. 4346, 117th Cong. (2022); "Estimated budgetary effects of H.R. 4346, Divisions A and B," Congressional Budget Office; William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Public Law 116–283

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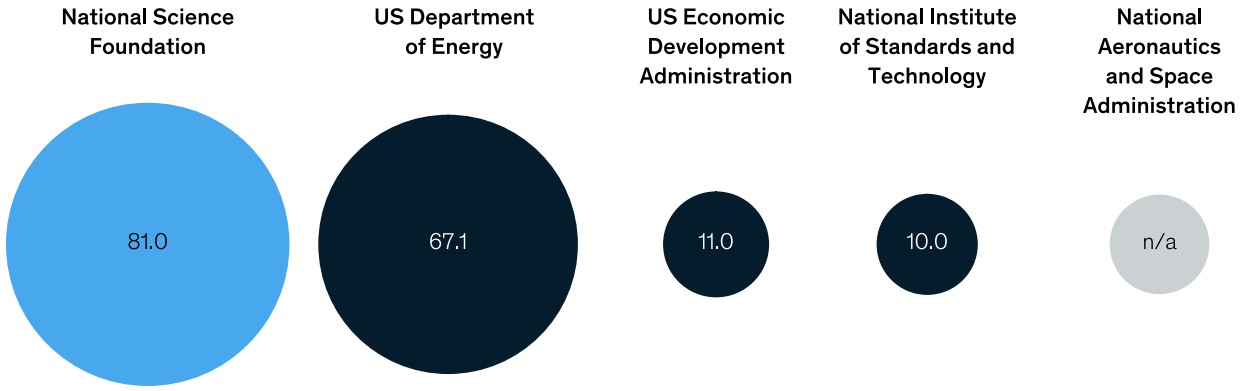
STEM, the moon, and Mars: The law authorizes (but does not yet appropriate) $174 billion over the next five years to various federal science agencies to invest in STEM, workforce development, and R&D, with some $80 billion earmarked for the National Science Foundation. Though specific funding was not allocated to NASA, the law does direct the space agency to establish a "Moon to Mars Program Office."

The CHIPS and Science Act authorizes $174 billion for investment in science, technology, engineering, and math programs, workforce development, and R&D.

CHIPS and Science Act funding 2022–27,[1] $ billion



[1]Final funding levels subject to future budget appropriations by US Congress.
Source: Congress.gov; Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act of 2022, H.R. 4346, 117th Cong. (2022)

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1. Creating Helpful Incentives to Produce Semiconductors and Science Act of 2022, Section-by-section summary, US Department of Commerce.
2. "Analysis for CHIPS Act and BIA briefing," US Department of Commerce press release, April 6, 2022.
3. In coordination with the US Agency for International Development, the US International Development Finance Corporation, and the Export–Import Bank of the United States.

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