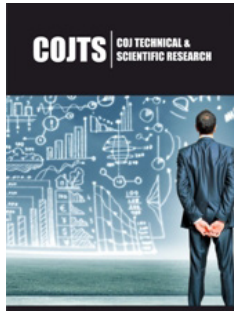


Revitalizing US Semiconductor Manufacturing: A Review of the CHIPS Act and its Implications for National Security and Economic Competitiveness

ISSN: 2643-7066



***Corresponding authors:** Nima Vafai, Assistant Professor of Finance, College of Business, Department of Accounting, Finance, and Energy Business, USA

Submission: 📅 October 26, 2024

Published: 📅 November 19, 2024

Volume 5 - Issue 2

How to cite this article: Nima Vafai*. Revitalizing US Semiconductor Manufacturing: A Review of the CHIPS Act and its Implications for National Security and Economic Competitiveness. COJ Tech Sci Res. 5(2). COJTS. 000608. 2024. DOI: [10.31031/COJTS.2024.05.000608](https://doi.org/10.31031/COJTS.2024.05.000608)

Copyright@ Nima Vafai*, This article is distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use and redistribution provided that the original author and source are credited.

Nima Vafai*

Department of Accounting, Finance, and Energy Business, USA

Mini Review

The semiconductor industry has become indispensable to contemporary technology, powering everything from consumer devices to critical infrastructure and advanced military systems. Despite its early dominance, the United States has seen its global share in semiconductor manufacturing decline drastically from 37% in 1990 to around 12% by 2020. This shift has raised concerns over US economic competitiveness, supply chain resilience, and national security, given the concentration of semiconductor production in East Asia, particularly in Taiwan, South Korea, and China. Recognizing these vulnerabilities, the US Congress passed the CHIPS Act as part of the National Defense Authorization Act in 2021, later expanding and funding it through the CHIPS and Science Act of 2022. This report provides an overview of the CHIPS Act, its key provisions, and its anticipated impact on the US semiconductor industry [1].

Key provisions of the CHIPS act

The CHIPS Act is structured around four primary objectives: incentivizing domestic manufacturing, supporting research and development (R&D), bolstering supply chain security, and fostering international collaboration.

Incentives for domestic manufacturing: The CHIPS Act earmarks \$52.7 billion over five years to support semiconductor manufacturing and R&D, which includes grants, subsidies, and tax credits. This financial support encourages companies to establish or expand semiconductor fabrication plants (fabs) within the United States. A notable provision is a 25% investment tax credit for semiconductor manufacturing equipment and construction projects, making domestic investment significantly more attractive [2].

Support for research and development: The CHIPS Act emphasizes advancing semiconductor technology through the establishment of the National Semiconductor Technology Center (NSTC). This public-private partnership is tasked with fostering innovation by supporting R&D in next-generation semiconductor materials, design, and manufacturing processes. Funding is also allocated to universities and national laboratories to cultivate new technological breakthroughs and promote collaboration across research institutions.

Supply chain security and workforce development: A critical component of the CHIPS Act is strengthening supply chain security for industries reliant on semiconductors, such as defense and healthcare. The Act promotes supply chain diversification, reducing dependency on foreign suppliers while increasing US production capacity. Additionally, the CHIPS Act funds education and training programs aimed at developing a skilled workforce, a necessary

investment given the technical demands of the semiconductor industry [3].

International collaboration: Although centered on US production, the CHIPS Act encourages collaboration with international allies. Such partnerships aim to create a resilient global semiconductor ecosystem, recognizing that semiconductor supply chains are inherently global and collaborative efforts could reinforce security and stability.

Impact and implications

The enactment of the CHIPS Act signifies a pivotal shift in US industrial policy, representing a strong commitment to supporting strategic industries that are essential to national security and economic stability. Since its passage, several major semiconductor companies, including Intel, Taiwan Semiconductor Manufacturing Company (TSMC) and Samsung, have announced plans for substantial investment in U.S.-based fabrication facilities. For example, Intel's \$20 billion investment in new fabs in Ohio and TSMC's \$12 billion plant in Arizona underscore the significant momentum the CHIPS Act has catalyzed in domestic semiconductor manufacturing. Long-term, the CHIPS Act is anticipated to enhance US leadership in semiconductor technology, supporting innovation that will benefit key sectors, from defense and healthcare to artificial intelligence. However, the global semiconductor industry is highly competitive, with countries in East Asia and Europe also pursuing aggressive strategies to boost domestic semiconductor production. The success of the CHIPS Act hinges on the effective and timely implementation of its provisions, as well as on sustaining the funding necessary to maintain competitiveness in this fast-paced industry [4].

Challenges and considerations

Despite the optimism surrounding the CHIPS Act, several challenges may influence its effectiveness [5]. Workforce development remains a primary concern, as the complex technical skills required for semiconductor manufacturing necessitate long-term investment in training and education. Additionally,

efficient disbursement and management of the allocated funds will be crucial to avoid potential inefficiencies. Furthermore, US policymakers must monitor evolving global market conditions, as other nations may intensify their semiconductor production efforts [6], potentially diminishing the relative advantages provided by the CHIPS Act.

Conclusion

The CHIPS Act represents a decisive step in securing the US semiconductor industry against global supply chain disruptions and enhancing its national and economic security. By investing in domestic manufacturing, R&D, and workforce development, the US has taken an important measure to ensure resilience in a sector critical to the functioning of modern technology and defense infrastructure. Although challenges persist, the CHIPS Act's successful implementation has the potential to reinstate US leadership in semiconductor manufacturing, bolstering its global technological standing and promoting sustainable economic growth. This legislation not only positions the US to compete in an increasingly complex global landscape but also reinforces the strategic autonomy of the nation in critical technological domains. The continued commitment to the CHIPS Act will determine the United States' capability to maintain a robust semiconductor industry and uphold its technological and economic leadership in the decades to come.

References

1. Semiconductor Industry Association (2022) The role of the chips act in strengthening US semiconductor supply chains.
2. National Taxpayers Union (2022) Arguments against the chips act: risks of government intervention in the semiconductor industry.
3. US Department of Commerce (2023) CHIPS act implementation and strategic goals for the US semiconductor industry.
4. Reuters (2022) Intel and TSMC respond to CHIPS Act incentives with US manufacturing plans.
5. Americans for Tax Reform (2022) A critical view of the CHIPS act: Corporate welfare concerns and economic implications.
6. Automotive News (2022) Automotive industry and the CHIPS Act: Addressing semiconductor supply shortages.