

SEMICONDUCTORS

Fact Sheet¹

COSTS OF DECOUPLING

Economic Impact: U.S.-China decoupling in the semiconductor industry would reduce sales revenues for U.S. semiconductor firms, hitting U.S. output, jobs, and payrolls.

- If U.S. semiconductor sales to China drop to zero, U.S. industry revenue would drop by \$83 billion annually, resulting in 124,000 lost jobs, implicating \$124 billion in related production, and affecting \$46 billion in employee compensation.²
- Given projected growth of the global semiconductor market, a 13% drop in market share for U.S. companies due to decoupling would equate to \$95 billion in forgone revenue in 2027.
- Stricter export regulations would increase the cost of regulatory compliance.

R&D and Competitiveness: Lost China market share would reduce economies of scale for U.S. semiconductor firms, translating into smaller R&D budgets and capital expenditures and eroding the U.S. semiconductor industry's global competitive advantages.

- If U.S. semiconductor sales to China drop to zero, annual U.S. R&D spending would drop by at least \$12 billion and capital spending would drop by \$13 billion.³

- Smaller R&D budgets would diminish the ability of U.S. firms to invest in new designs and advanced chip components, creating a downward spiral of decreasing R&D, sales, and market share and empowering international competitors.
- International competitors will pick up market share ceded by U.S. firms, enabling them to invest more in R&D. As the global industry comes to view U.S. suppliers as unreliable, Chinese and other global customers will source chips and equipment from non-U.S. firms.

Standards and Emerging Technology: The fall of the U.S. semiconductor industry from its global leadership position would reduce the U.S.' ability to influence standards for emerging technologies, with consequences for national security.

- Lost U.S. market share and global technology leadership will result in less U.S. intellectual property at the foundational layers of future technology standards, enabling greater Chinese influence in setting standards for the future of semiconductor technologies and increasing the possibility of bifurcated global chip technology spheres.
- Advanced military systems are dependent on semiconductor innovation. Specifically, the architecture that semiconductors are built on is key to competitiveness in emerging dual-use military technologies, such as supercomputing, artificial intelligence, and quantum computing.

1 For a full explanation of methodology and detailed sourcing, please see the Semiconductors chapter of "Understanding U.S.-China Decoupling: Macro Trends and Industry Impacts," U.S. Chamber of Commerce, 2021.

2 Antonio Varas and Raj Varadarajan, "How Restricting Trade with China Could End U.S. Semiconductor Leadership," Boston Consulting Group, March 9, 2020. <https://www.bcg.com/publications/2020/restricting-trade-with-china-could-end-united-states-semiconductor-leadership.aspx>

3 Ibid.

INDUSTRY SNAPSHOT AND BILATERAL TRENDS

The U.S. semiconductor industry leads global sales and innovation and supports thousands of highly skilled workers, but it is dependent on overseas manufacturing.

- U.S. firms accounted for 55% of the global chip industry's \$418.3 billion revenue in 2019, a far larger market share than any other country.
- The U.S. semiconductor industry spends more on R&D than any other country, with about \$40 billion in R&D spending in 2019. The industry directly employs about 250,000 workers in the U.S. and indirectly supports an additional 1 million jobs.
- U.S. semiconductor firms maintain about 44% of their manufacturing capacity in the U.S. as of 2019, but the U.S.' share of global chip production is only about 12% today, down from 37% in 1990 and projected to decline further.

China is a major sales market for U.S. semiconductors and related technology due in large part to its role as a global hub for the manufacturing and assembly of electronics containing semiconductors.

- China is the world's largest single-country market for semiconductors, accounting for 60% of global demand.
- China-based firms purchased \$70.5 billion worth of U.S. semiconductors in 2019, about 37% of U.S. firms' global sales.
- China is still heavily reliant on imported technology. Chinese semiconductor companies supply only 14% of demand from Chinese equipment manufacturers in value terms.

EVOLUTION OF DECOUPLING POLICIES

Since coming to power in 2012, President Xi Jinping has made global leadership in every stage of the semiconductor manufacturing process a national goal, and Beijing has released a series of measures aimed at achieving self-sufficiency in semiconductors. Select measures include the following:

- **The Guidelines to Promote the National Integrated Circuit Industry (2014)** launched a nationwide effort to develop a completely indigenous end-to-end semiconductor industry and established a National Integrated Circuit Investment Fund with over \$150 billion to fund overseas R&D and help increase China's domestic market share to a minimum of 70% by 2025.
- **The Made in China 2025 Plan (2015, updated in 2017)** prioritized development of the integrated circuit (IC) industry and established updated targets for domestic production to meet 58% of domestic market demand by 2020 and 80% by 2030, and to expand the size of China's IC market share to reach 60% of global market share by 2020 and 70% by 2030.
- **Local government support** for domestic IC development includes local funds (such as the Shanghai IC Fund and Beijing IC Development Fund), preferential loans and income tax rates, direct grants, and other policies to encourage domestic companies to attain technology through mergers and acquisitions (M&A).
- **Unofficial measures** to support domestic semiconductor companies and put foreign firms at a competitive disadvantage include conditioning market access on joint ventures and technology transfer, domestic procurement rules, and state-sponsored cyber-espionage.

Beijing's use of nonmarket measures and its explicit aim to occupy the global leadership position in semiconductors, coupled with U.S. national security concerns about China's advancement in semiconductor technology, have led the U.S. to respond with decoupling policies.

- **Reforms to the Committee on Foreign Investment in the United States** make it harder for Chinese companies to acquire U.S. semiconductor and other technologies through M&A.
- **The Export Control Reform Act** requires the Department of Commerce to identify and control *emerging* and *foundational* technologies for national security, including semiconductors.
- **The addition of Chinese firms to the Department of Commerce's Entity List** requires U.S. exporters to obtain licenses for the export, reexport, and retransfer of U.S.-origin products and technology to listed entities, which include major Chinese chip purchasers.
- **Revisions to the Export Administration Regulation** require an export license for semiconductors that are produced or developed by Huawei using U.S.-origin technology. The revisions also require a license to export to *military end users*, defined as entities that support or contribute to military items.