ITIF | INFORMATION TECHNOLOGY & INNOVATION FOUNDATION

Decoupling Risks: How Semiconductor Export Controls Could Harm US Chipmakers and Innovation

TRELYSA LONG | NOVEMBER 2025

U.S. export controls on semiconductor sales to China reduce U.S. chipmakers' revenues, lower their R&D investment capabilities, and reduce industry employment. As such, U.S. policymakers should keep semiconductor export controls to a minimum.

KEY TAKEAWAYS

- ITIF's economic model estimates that U.S. firms could lose about $77 billion in semiconductor industry sales in the initial year after a hypothetical, one-time full decoupling with China.
- South Korean firms could gain about $21 billion in sales, European Union firms $15 billion, Taiwanese firms $14 billion, Japanese firms $12 billion, mainland Chinese firms $9 billion, and other nations' firms $5 billion of U.S. firms' losses.
- U.S. industry R&D investments in semiconductors could decrease by about 24 percent, or $14 billion, compared with the status quo after a one-time full decoupling with China.
- The U.S. semiconductor industry could support over 80,000 fewer U.S. industry jobs and almost 500,000 fewer downstream jobs in the face of a full decoupling between the United States and China.

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INTRODUCTION

Semiconductors constitute the foundation of the global digital economy, generating $631 billion in global sales in 2024, and is projected to exceed $1 trillion by 2030, while enabling more than $7 trillion in annual downstream economic activity in fields such as artificial intelligence (AI), cloud computing, and advanced manufacturing.[1] This represents roughly 7 percent of the world's economic activity.[2]

This report examines a **hypothetical scenario** in which the United States implements broader export controls and policies that effectively decouple U.S. semiconductor firms from the Chinese market. In reality, the United States has only implemented a limited set of export controls aimed at slowing China's access to advanced semiconductors and related technologies for military and high-performance computing applications. For example, in October 2022, the Biden administration issued export controls restricting the sale of AI chips to China, along with technology to manufacture those chips.[3] Following that, in January 2025, the Department of Commerce announced a proposed AI diffusion rule that implemented a three-tiered system for access to advanced AI hardware, capping the number of advanced chips that foreign nations could receive.[4] However, those proposed rules were rescinded by the Trump administration.[5] On the other hand, the Chinese government could also impose similar restrictions on U.S. firms, resulting in a lost of access to the Chinese market. Indeed, because the Chinese government banned Micron products in critical infrastructure in 2023, the U.S. chip company intends to stop supplying server chips to China altogether.[6]

Even within this limited framework, restrictions carry potential risks. The Information Technology and Innovation Foundation's (ITIF's) economic model shows that reducing access to Chinese commercial markets in a decoupling scenario would reduce revenue for U.S. chipmakers, which in turn could lower investment in research and development (R&D), the primary driver of next-generation chips and long-term competitiveness in the industry. Slower revenue growth and innovation would not only weaken the global position of U.S. firms, but could also ripple across the broader economy by affecting high-skill jobs in semiconductor design and manufacturing and downstream employment in industries reliant on chips. In short, reduced revenues and fewer jobs would only end up harming American chip firms and American workers.

This report develops an economic model to estimate the impact of U.S. semiconductor export controls if they were to lead to a full decoupling from the Chinese market. It provides the logic of the economic model followed by a summary of the semiconductor industry in 2024, which serve as the baseline for the model. Subsequently, the report estimates the initial impact of full decoupling on U.S. semiconductor firms' revenues and R&D investments, before examining the impact on industry jobs and downstream jobs in the U.S. economy. In addition, the report estimates the market share and foregone revenue, as well as R&D investments and job losses, in both the short term and long term, assuming a full decoupling scenario. It then provides summaries of the impact from other scenarios of decoupling, such as 25 percent decoupling. The report concludes by exploring the impact of decoupling on specific information and communications technology (ICT) industry sectors.

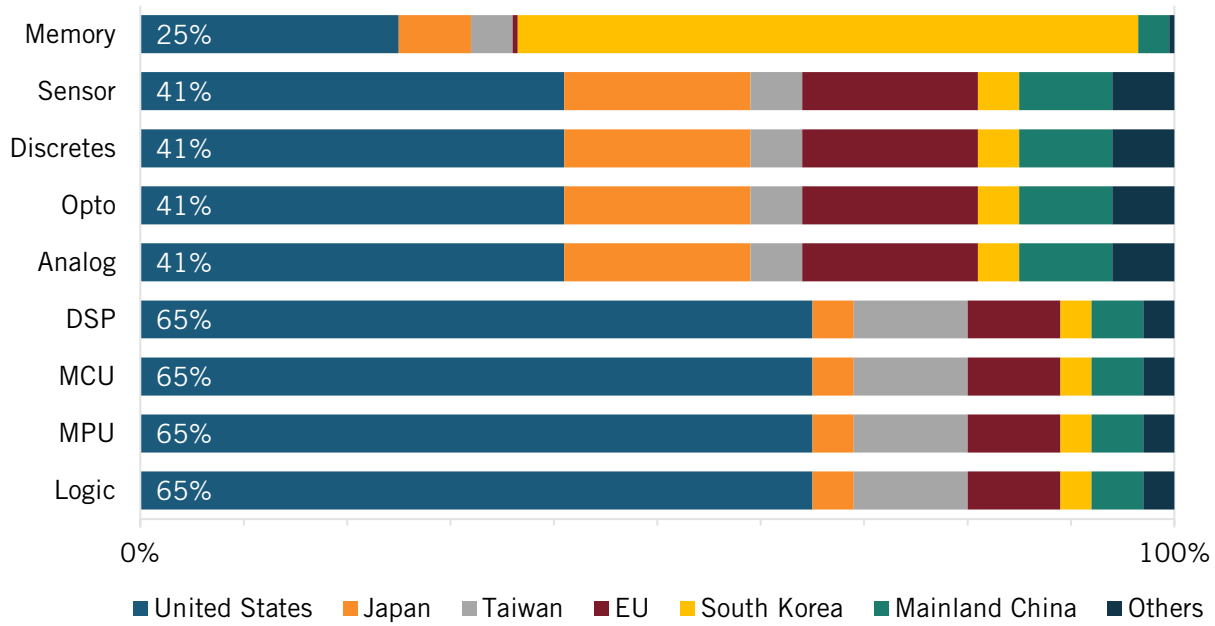
MODELING THE ECONOMIC IMPACT OF SEMICONDUCTOR EXPORT CONTROLS

ITIF developed an economic model to estimate the impact of U.S. semiconductor export controls on China. This model estimates U.S. semiconductor firms' revenue, R&D investments, and jobs impact from four export control/decoupling scenarios: 1) full decoupling or export ban (U.S. companies are completely prohibited from selling to China); 2) 50 percent decoupling (U.S. semiconductors restricted selling to China, leading to a 50 percent revenue loss from the Chinese market); 3) 25 percent decoupling (some U.S. semiconductors cannot be sold to China, leading to a 25 percent revenue loss from the Chinese market); and 4) Entity List-based decoupling (U.S. companies cannot sell to a list of specific Chinese companies, leading to a 10 percent revenue loss from the Chinese market). (See the appendix for the full methodology.)

The rationale behind the four decoupling scenarios is as follows. The United States will try to place export controls on the most important semiconductor products first before expanding the list. As such, the Entity List will first cut off some Chinese companies from a few key semiconductor products, leading U.S. firms to lose 10 percent of revenue from the Chinese market. However, gradually, the United States will expand export controls to encompass all semiconductor products, leading to a full decoupling between the two nations. This would mean that U.S. semiconductor firms would lose all their revenue from the Chinese market.

The economic model measures the extent of negative impact U.S. export controls could have on U.S. semiconductor firms' revenue and share of the global industry. Assuming that the United States does not utilize the Foreign Direct Product Rule, U.S. firms' losses could be gained by other nations, including China, the EU, Japan, Taiwan, South Korea, and others. Using the Boston Consulting Group (BCG) and the Semiconductor Industry Association's (SIA's) "Emerging Resilience in the Semiconductor Supply Chain" report, ITIF estimated the global market shares of each nation for each semiconductor product in 2022.[7] (See figure 1.)

Figure 1: Global market share of each semiconductor product type[8]



Using this as a proxy for future global shares by nation, ITIF estimated the extent to which other nations could benefit from the lost U.S. revenue by removing the United States and scaling the remaining nations' shares.

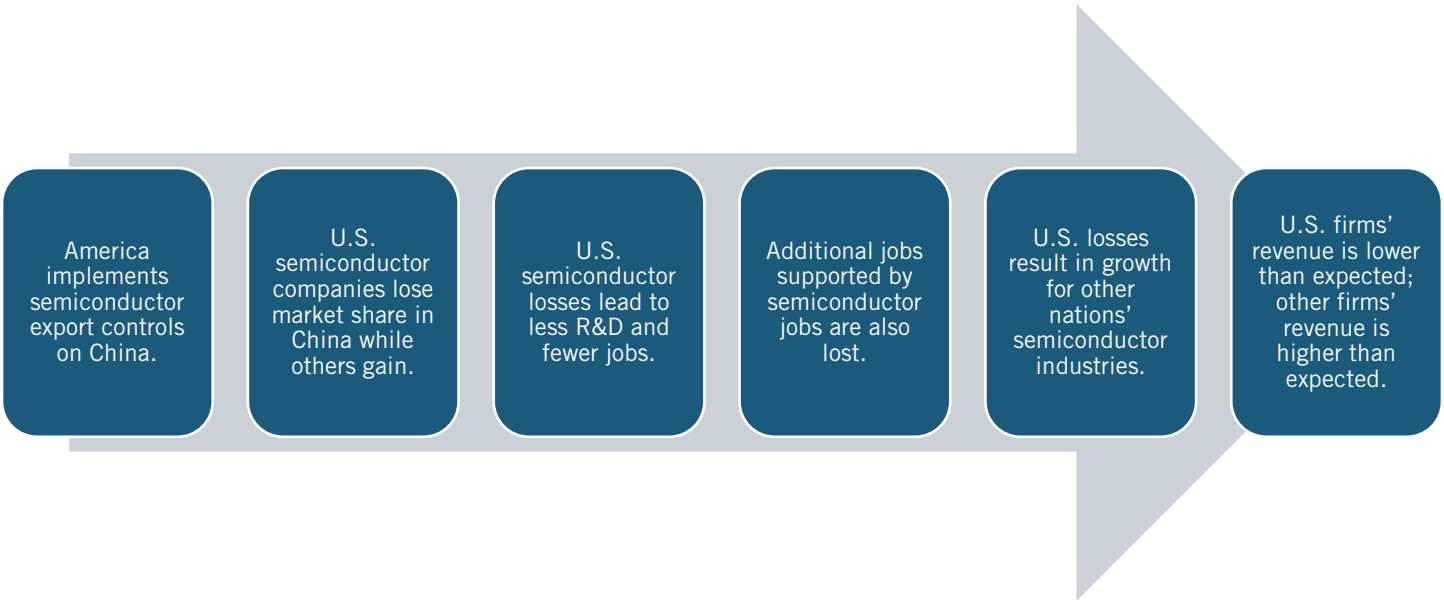
As a result of U.S. firms' revenue losses, their investment in R&D would also be reduced. As SIA found, U.S. semiconductor companies invested 17.7 percent of their revenue into R&D in 2024.[9]

Every job in the semiconductor industry supports an additional 5.7 downstream jobs in the U.S. economy.

Furthermore, the revenue losses would also mean that U.S. semiconductor companies may be unable to offer as many jobs, leading to a decline in the industry's employment numbers. This decline would subsequently result in fewer downstream jobs being created in the U.S. economy. Indeed, as SIA found, every job in the semiconductor industry supports an additional 5.7 downstream jobs in the U.S. economy.[10]

In sum, revenue losses would result in fewer jobs, reduced R&D investment, and a lower global market share for U.S. chipmakers. Figure 2 illustrates the analytical framework ITIF's model uses to estimate the economic impact of U.S. semiconductor export controls on U.S. semiconductor firms and the U.S. economy.

Figure 2: ITIF's analytical framework for modeling the effects of U.S. semiconductor export controls on China



IMPACT OF EXPORT CONTROLS ON U.S. SEMICONDUCTOR FIRMS

The following sections provide background information on the global semiconductor market, the U.S. semiconductor market, China's semiconductor market, and U.S. semiconductor firms' share of the Chinese market in 2024. Afterward, they examine the initial impact of a full decoupling with China on U.S. firms' revenue and other nations' firms' revenue. In addition, the section provides a summary of the impact of the three other decoupling scenarios: 50 percent decoupling, 25 percent decoupling, and Entity List-based export controls. The report later examines the extent to which each decoupling scenario would impact U.S. semiconductor firms' R&D investment levels, before turning to the impact on jobs.

Semiconductor Market in 2024

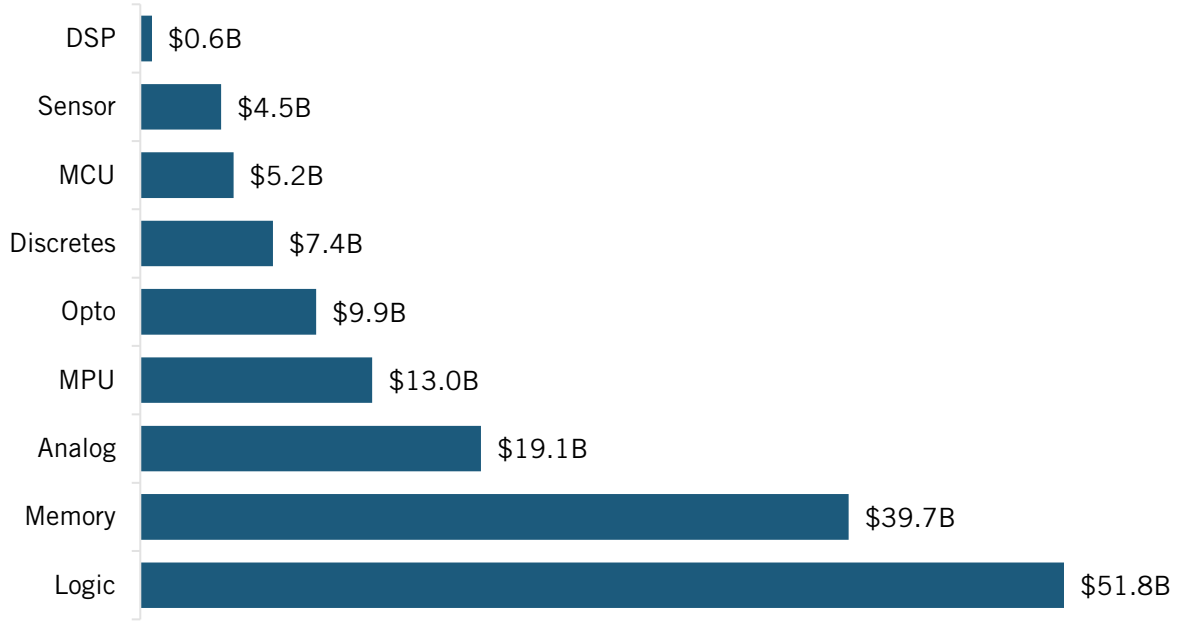
In 2024, the global semiconductor industry generated $630.5 billion in revenue, of which U.S. semiconductor firms accounted for 50.4 percent.[11] Meanwhile, Chinese semiconductor firms accounted for 4.5 percent, or $28.4 billion.[12] China demands more chips than it produces. In 2024, China demanded 24 percent, or $151.3 billion, of the global semiconductor market.[13] Given U.S. semiconductor firms' large market share, they supplied 50.7 percent of China's demand in 2024.[14] (See table 1.)

Table 1: Semiconductor market measures, 2024[15]

Measure	Value (Billions)	Share
Global semiconductor market	$631	100.0%
Chinese firms' global market share	$28	4.5%
China's demand of global market	$151	24.0%
U.S. firms' global market share	$318	50.4%
U.S. firms' share of China market	$77	50.7%

China's demand for semiconductors varies by type. For example, China's computing and information technology (IT) industries may require logic chips such as central processing units, while a phone maker would need more memory chips and an electric vehicle (EV) manufacturer more sensors and microcontrollers. As such, using the SIA 2025 Factbook's share of global demand for each semiconductor product type as a proxy, ITIF estimated China's demand for each product type in 2024.[16] The top three semiconductor product types most demanded include logic chips (34 percent), memory chips (26 percent), and analog chips (13 percent). (See figure 3.)

Figure 3: China's chip demand by semiconductor product types[17]



Impact on U.S. Semiconductor Firms' Revenue

Since U.S. firms fulfill a significant share of China's demand, export controls or full decoupling could have a severe impact on U.S. semiconductor firms' revenues. They would eliminate, or at least partially reduce, U.S. firms' ability to sell to China, thereby reducing U.S. firms' overall revenue. In this section, ITIF uses 2024 as a baseline to estimate the revenue U.S. firms could lose and other nations' firms could gain in the initial year after decoupling with China.

Table 3 shows the potential revenue losses of U.S. firms by semiconductor product type after a full decoupling from China and the nations that could gain from U.S. firms' losses. In the event of a complete decoupling, U.S. firms would no longer sell to China, meaning they would lose 100 percent of their revenue from China. In this scenario, U.S. firms could lose about $77 billion from complete decoupling with China. Meanwhile, mainland Chinese firms could gain about $9 billion, EU firms $15 billion, Japanese firms $12 billion, Taiwanese firms $14 billion, South Korean firms $21 billion, and other nations' firms $5 billion of those losses.

Table 2: Foreign firms' potential gains from U.S. semiconductor firms' losses after full decoupling (billions)[18]

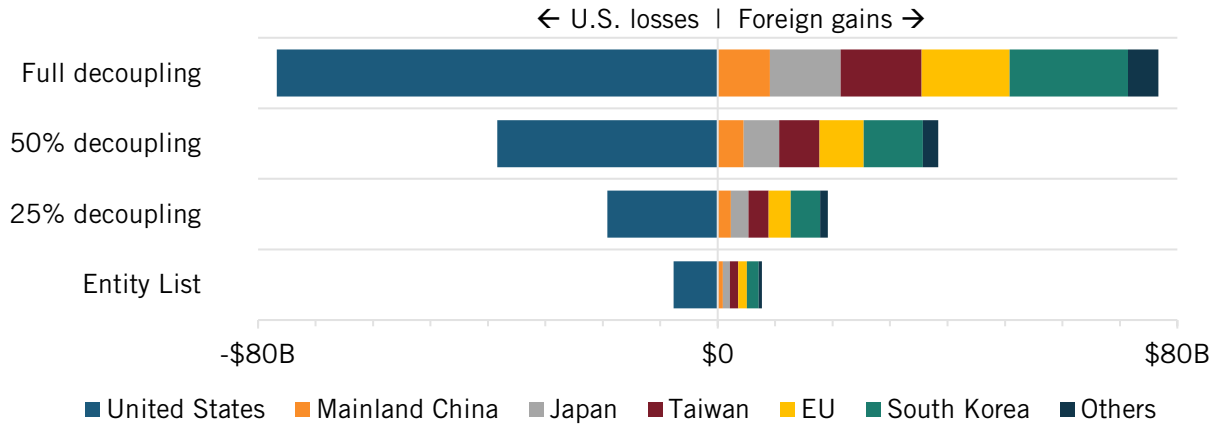
Product Type	United States	Mainland China	Japan	Taiwan	EU	South Korea	Others
Logic	**-$26.3**	$3.8	$3.0	$8.3	$6.8	$2.3	$2.3
Memory	**-$20.1**	$0.8	$1.9	$1.1	$0.1	$16.1	$0.1
Analog	**-$9.7**	$1.5	$3.0	$0.8	$2.8	$0.7	$1.0
MPU	**-$6.6**	$0.9	$0.8	$2.1	$1.7	$0.6	$0.6
Opto	**-$5.0**	$0.8	$1.5	$0.4	$1.4	$0.3	$0.5

Product Type	United States	Mainland China	Japan	Taiwan	EU	South Korea	Others
Discretes	**-$3.8**	$0.6	$1.2	$0.3	$1.1	$0.3	$0.4
MCU	**-$2.7**	$0.4	$0.3	$0.8	$0.7	$0.2	$0.2
Sensor	**-$2.3**	$0.4	$0.7	$0.2	$0.7	$0.2	$0.2
DSP	**-$0.3**	$0.0	$0.0	$0.1	$0.1	$0.0	$0.0
Total	**-$76.7**	**$9.1**	**$12.3**	**$14.1**	**$15.3**	**$20.6**	**$5.3**

Any form of decoupling could exert negative impacts on U.S. firms' revenues while benefitting other nations. U.S. firms could lose as much as $38.4 billion in revenue in the face of 50 percent decoupling with China. Of this, mainland Chinese firms could gain about $5 billion, South Korean firms $10 billion, and Taiwanese firms $7 billion. Under 25 percent decoupling, U.S. firms could lose about $19 billion while mainland Chinese firms could gain about $2 billion, Japanese ones $3 billion, and Taiwanese firms $4 billion. Lastly, under an Entity Listing against Chinese companies, U.S. firms could lose about $8 billion while mainland Chinese firms gain $1 billion, the EU's firms $2 billion, and South Korea's firms $2 billion. (See table 3.)

Table 3: Foreign semiconductor firms' potential gains from U.S. firms' losses (billions)[19]

Decoupling Scenarios	United States	Mainland China	Japan	Taiwan	EU	South Korea	Others
Full decoupling	**-$76.7**	$9.1	$12.3	$14.1	$15.3	$20.6	$5.3
50% decoupling	**-$38.4**	$4.5	$6.2	$7.0	$7.7	$10.3	$2.7
25% decoupling	**-$19.2**	$2.3	$3.1	$3.5	$3.8	$5.1	$1.3
Entity List	**-$7.7**	$0.9	$1.2	$1.4	$1.5	$2.1	$0.5



Impact on U.S. Semiconductor Firms' R&D Spending

The U.S. semiconductor industry invests a significant share of its revenue in R&D to develop the next generation of globally competitive chips. In 2024 alone, the industry invested 17.7 percent of its revenue in R&D, and, on average, invested 18.3 percent from 2015 to 2024. As such, given that U.S. semiconductor firms' revenues would decline from decoupling with China, R&D investments would also decline. Generally, the share of revenue invested in R&D would also decline when revenue declines, but ITIF kept the share constant for a more conservative estimate.

The U.S. semiconductor industry invested $56.2 billion in R&D in 2024. However, if the United States fully decouples from China, U.S. firms' R&D investments could decrease to about $43 billion, roughly $14 billion lower than the status quo. This is calculated by multiplying the industry's R&D intensity by the lost revenues from precluded sales to China. Meanwhile, U.S. firms would likely reduce R&D investments to about $49 billion, or about $7 billion lower than the status quo, under 50 percent decoupling. Further, U.S. firms could reduce R&D investments to about $53 billion (about $3 billion lower than status quo) and $55 billion (about $1 billion lower) from 25 percent decoupling or export control entity listing, respectively. (See figure 4.)

Figure 4: U.S. semiconductor firms' future investments in R&D, by decoupling scenario[20]



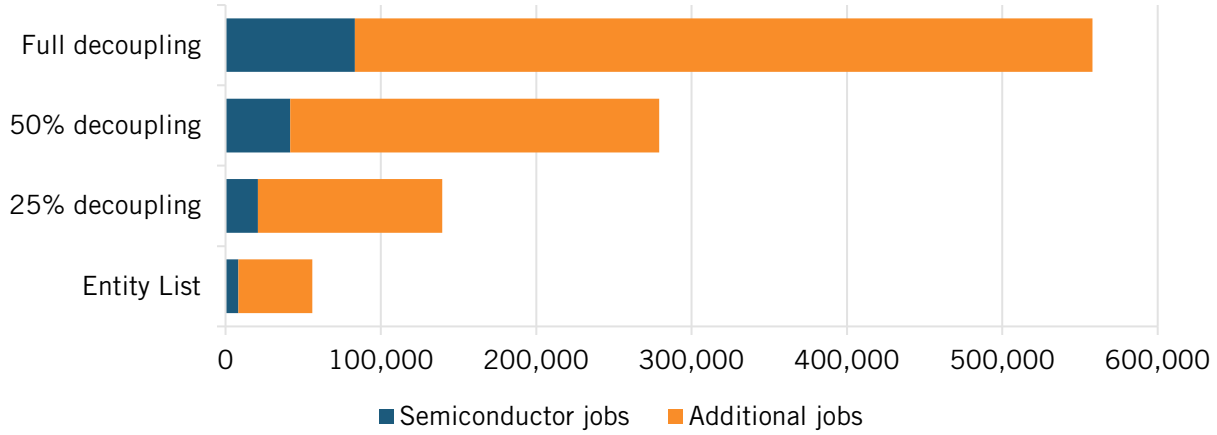
Impact on U.S. Jobs

The robust U.S. semiconductor industry provides hundreds of thousands of jobs to the U.S. economy while simultaneously supporting downstream job creation in other sectors. For instance, a semiconductor process engineer position is one job in the economy, but it also indirectly supports logistics providers who ship the chips the engineer helps produce. Moreover, when the engineer spends their money in the economy, this further supports other jobs. For example, engineers support restaurant employees when they spend money at a restaurant. Indeed, as SIA's 2025 Factbook highlights, a semiconductor industry job supports 5.7 additional downstream jobs in the U.S. economy. In 2024, the U.S. semiconductor industry supported approximately 345,000 direct jobs and indirectly supported nearly 2 million additional ones.

However, when U.S. semiconductor firms' revenues decline, they can no longer support as many industry jobs, leading to both direct and indirect job losses. Indeed, the U.S. semiconductor industry could support over 80,000 fewer industry jobs and almost 500,000 fewer downstream

jobs if the United States fully decoupled from China. Meanwhile, the U.S. industry could support over 40,000 fewer industry jobs and more than 200,000 fewer downstream jobs in a scenario of 50 percent decoupling. A 25 percent decoupling could lead to about 20,000 fewer industry jobs and over 100,000 fewer downstream jobs. Finally, an export control entity listing could lead to over 8,000 fewer industry jobs and almost 50,000 fewer downstream jobs. (See figure 5.) In sum, significant export controls or decoupling with China could negatively impact U.S. households from decreased employment opportunities in well-paying high-tech jobs.

Figure 5: U.S. semiconductor and additional job losses by decoupling scenario[21]



MEDIUM-TERM FOREGONE GROWTH AND RESULTING MARKET

The following section first examines the U.S. and Chinese global semiconductor market shares and revenues five years after a one-time full decoupling scenario. Afterward, it quantifies how a one-time full decoupling would negatively impact R&D investments in subsequent years, before examining the foregone jobs.

If normal growth trajectories had prevailed (e.g., expected growth of China's semiconductor market and stable U.S. market share) then after five years under a normal scenario, U.S. semiconductor companies could have been expected to earn about $84 billion from China's market. With those revenues now lost in this full decoupling scenario, the sales would likely be accrued by other nations' semiconductor firms. Chinese firms could gain about $10 billion, EU firms $17 billion, South Korean firms $22 billion, Japanese firms $13 billion, Taiwanese firms $15 billion, and other nations' firms $6 billion. (See table 4.)

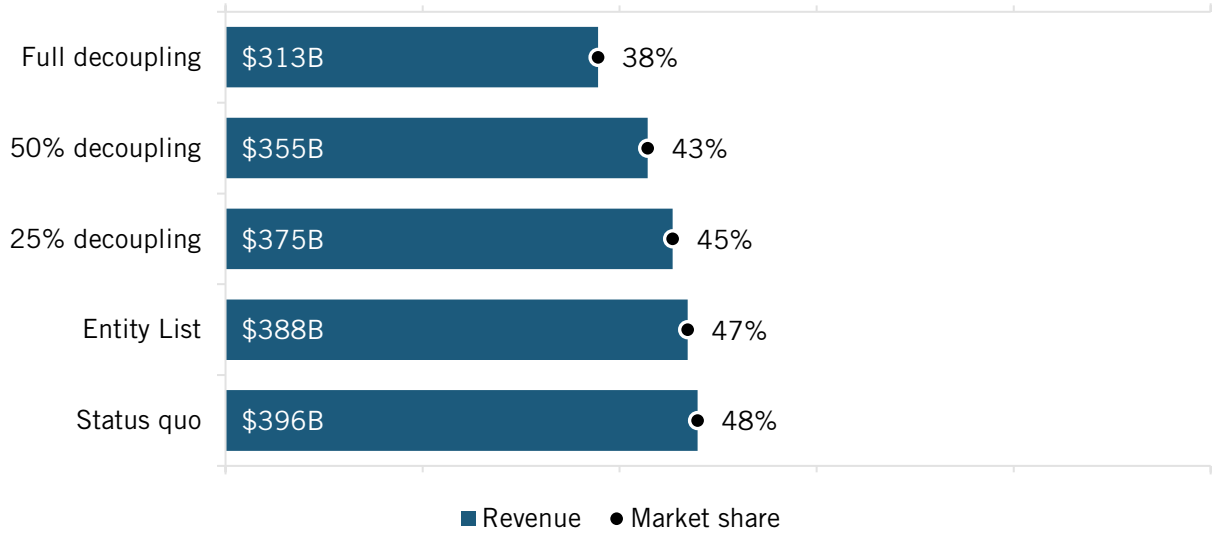
Table 4: Foreign firms' potential gains from U.S. firms' losses five years after full decoupling (billions)[22]

Product Type	United States	Mainland China	Japan	Taiwan	EU	South Korea	Others
Logic	**-$28.6**	$4.1	$3.3	$9.0	$7.4	$2.5	$2.5
Memory	**-$21.9**	$0.9	$2.0	$1.2	$0.1	$17.5	$0.1
Analog	**-$10.6**	$1.6	$3.2	$0.9	$3.0	$0.7	$1.1
MPU	**-$7.2**	$1.0	$0.8	$2.3	$1.8	$0.6	$0.6

Product Type	United States	Mainland China	Japan	Taiwan	EU	South Korea	Others
Opto	**-$5.4**	$0.8	$1.7	$0.5	$1.6	$0.4	$0.6
Discretes	**-$4.1**	$0.6	$1.3	$0.3	$1.2	$0.3	$0.4
MCU	**-$2.9**	$0.4	$0.3	$0.9	$0.7	$0.2	$0.2
Sensor	**-$2.5**	$0.4	$0.8	$0.2	$0.7	$0.2	$0.3
DSP	**-$0.4**	$0.1	$0.0	$0.1	$0.1	$0.0	$0.0
Total	**-$83.6**	**$9.9**	**$13.4**	**$15.4**	**$16.7**	**$22.4**	**$5.8**

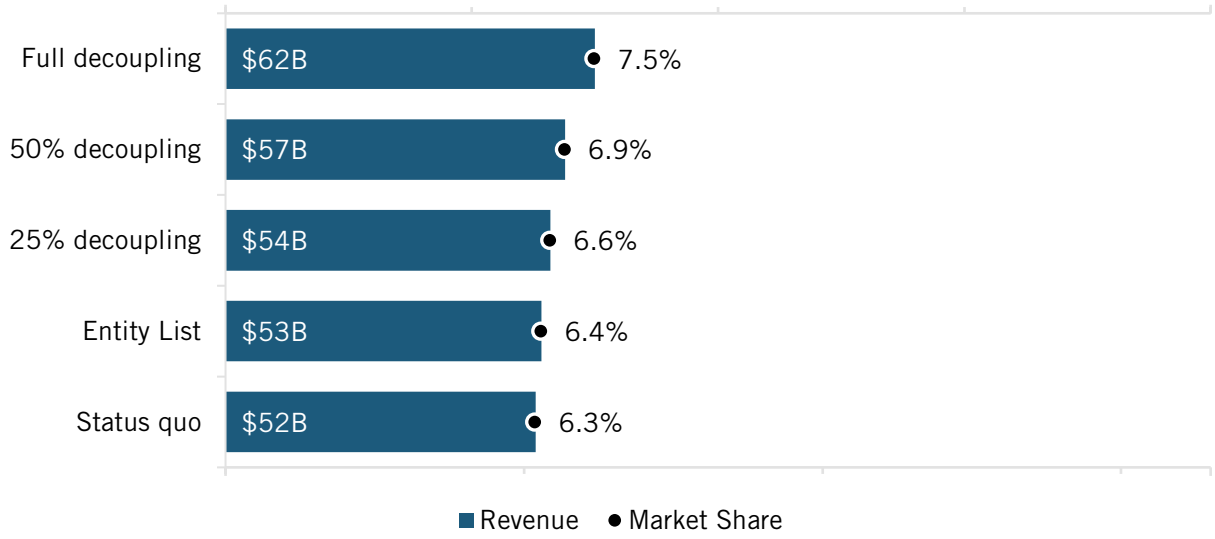
As a result of the revenue reduction, U.S. firms' global market share would be lower than without decoupling after five years. Without decoupling, the U.S. semiconductor industry's global revenue could be about $396 billion, or a market share of 48 percent. In comparison, with full decoupling, the U.S. industry's market share would likely fall to about 38 percent, equating to about $313 billion in revenue. (See figure 6.)

Figure 6: U.S. semiconductor firms' global market share five years after full decoupling versus the status quo[23]



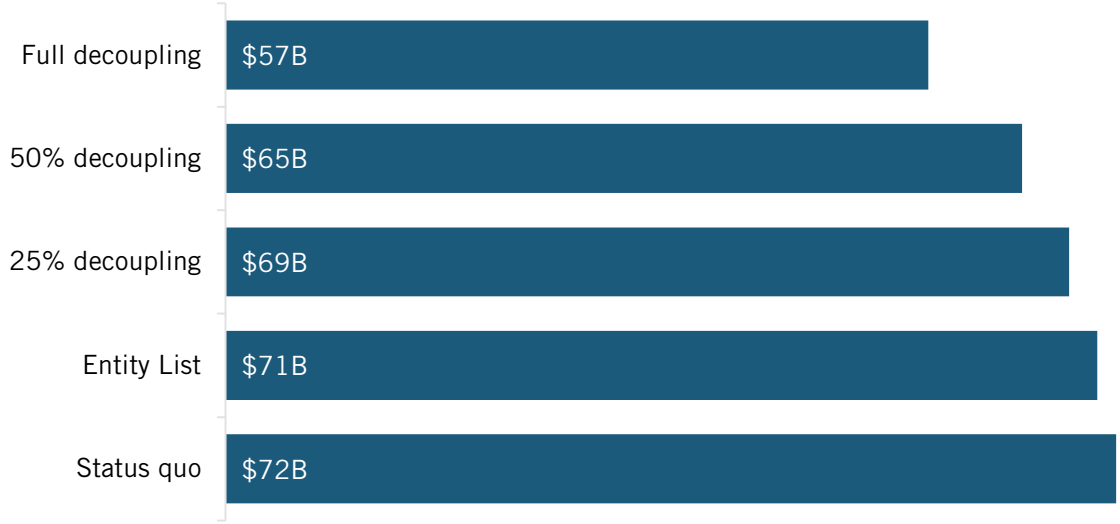
In contrast, Chinese semiconductor firms could gain some of U.S. firms' lost revenue and grow their overall global revenue and market share. Without decoupling, Chinese firms' global revenue could be about $52 billion, or about 6.3 percent. However, with full decoupling, Chinese firms' global revenue could grow to about $62 billion (about 7 percent) after five years, approximately $10 billion higher than without decoupling. (See figure 7.)

Figure 7: Chinese semiconductor firms' global market share five years after full decoupling[24]



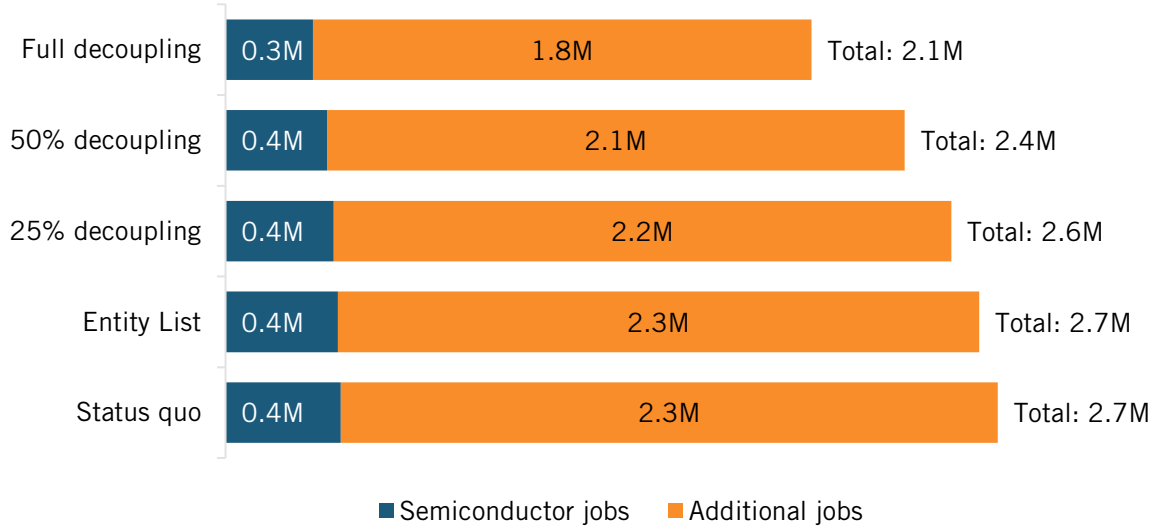
Due to the lower-than-expected revenue, U.S. firms' R&D investments after five years would be smaller than with no decoupling. Without decoupling, U.S. firms would likely invest about $72 billion in R&D investments. Yet, U.S. firms could reduce their investments to about $57 billion under full decoupling, leading to $15 billion in foregone R&D investments. (See figure 8.)

Figure 8: U.S. semiconductor firms' investment in R&D five years after full decoupling versus the status quo[25]



U.S. semiconductor firms' lower-than-expected revenue also means that they would be able to support fewer industry and downstream jobs in the economy. Under the status quo scenario, the U.S. semiconductor industry could support about 400,000 industry jobs and 2.3 million downstream jobs. However, under full decoupling, U.S. firms could only support about 300,000 industry jobs and 1.8 million downstream jobs, leading to almost 100,000 foregone industry jobs and over 550,000 foregone downstream jobs. (See figure 9.)

Figure 9: U.S. semiconductor and related jobs five years after full decoupling versus the status quo[26]



In the medium term, U.S. firms would continue to forego revenue, R&D investments, and jobs in the event of any of the contemplated decoupling scenarios. Under 50 percent decoupling, U.S. firms could forego about $42 billion in revenue—resulting in a global market share of about 43 percent compared with 48 percent under the status quo—about $8 billion in R&D investments, about 50,000 industry jobs, and almost 300,000 downstream jobs after five years. Chinese firms could gain some of the U.S. firms' losses, resulting in about a 7 percent global market share rather than 6 percent under the status quo. Under a 25 percent decoupling, U.S. firms would forego about $21 billion in revenue, $4 billion in R&D investments, almost 25,000 industry jobs and about 140,000 downstream jobs. U.S. firms' global market share could fall to about 45 percent, while Chinese firms' share could rise to about 7 percent. Under an Entity List scenario, U.S. firms could still forego about $8 billion in revenue, $2 billion in R&D, almost 10,000 industry jobs, and over 56,000 downstream jobs—U.S. firms' global market share could fall to 47 percent while Chinese firms' share could rise to 6 percent. (See table 5.)

Table 5: Summary of decoupling impact after five years[27]

Impact	Entity List	25% Decoupling	50% Decoupling	Full Decoupling
U.S. firms' share of the Chinese market	28.3%	23.6%	15.7%	0.0%
U.S. firms' global market share	46.9%	45.4%	42.9%	37.8%
Chinese firms' global market share	6.4%	6.6%	6.9%	7.5%
U.S. firms' revenue foregone	$8.4B	$20.9B	$41.8B	$83.6B
U.S. firms' R&D spending foregone	$1.5B	$3.8B	$7.6B	$15.3B
U.S. industry jobs foregone	9,888	24,720	49,440	98,881
U.S. downstream jobs foregone	56,362	140,905	281,810	563,620

LONG-TERM FOREGONE GROWTH AND RESULTING MARKET

Similar to the previous section, this one examines the U.S. and Chinese global semiconductor market shares and revenue 10 years after a one-time full decoupling with China. Then, it examines the impact on U.S. semiconductor firms' share of and revenue from the Chinese market, U.S. firms' R&D investments, and U.S. industry and downstream jobs.

Over the long run, the missing supply of semiconductors otherwise provided by U.S. firms to the Chinese market would be gained by foreign competitors, especially by China's domestic semiconductor industry. As a result, these countries' firms would have larger revenues to reinvest in R&D, accelerating their innovation capacity. Moreover, Chinese and other nations' firms could steadily close the technological gap with the United States. In contrast, U.S. firms, constrained by smaller markets and diminished R&D capacity, could risk falling behind. This erosion of leadership could undermine the U.S. semiconductor industry's central role in sustaining national competitiveness and technological primacy.

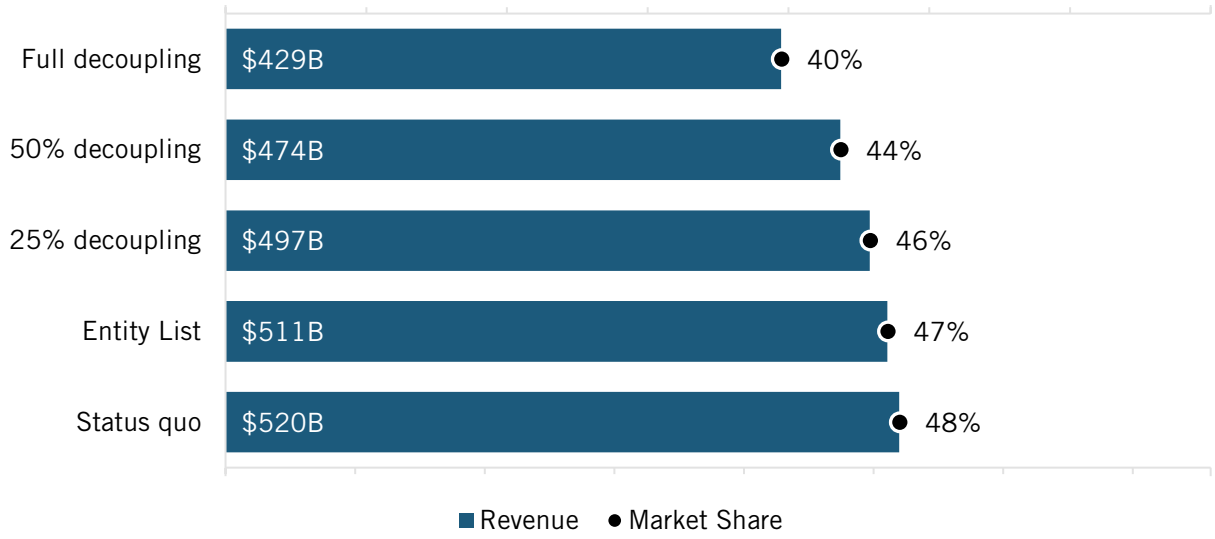
ITIF estimates that, if current growth trends had prevailed and there had been no decoupling, U.S. semiconductor companies could have likely earned about $91 billion in revenues from the Chinese market 10 years from now. Again, those revenues are lost in this full decoupling scenario and instead would be accrued by firms from other nations. Here, ITIF estimates that South Korean firms could gain about $24 billion, EU firms $18 billion, and mainland Chinese firms $11 billion. Japan, Taiwan, and other nations could gain the remainder of the foregone revenue. (See table 6.)

Table 6: Other nations' gains and U.S. semiconductor firms' foregone revenue by semiconductor product type 10 years after full decoupling (billions)[28]

Product Type	United States	Japan	Taiwan	EU	South Korea	Mainland China	Others
Logic	**-$31.2**	$3.6	$9.8	$8.0	$2.7	$4.5	$2.7
Memory	**-$23.9**	$2.2	$1.3	$0.2	$19.1	$1.0	$0.2
Analog	**-$11.5**	$3.5	$1.0	$3.3	$0.8	$1.8	$1.2
MPU	**-$7.8**	$0.9	$2.5	$2.0	$0.7	$1.1	$0.7
Opto	**-$5.9**	$1.8	$0.5	$1.7	$0.4	$0.9	$0.6
Discretes	**-$4.5**	$1.4	$0.4	$1.3	$0.3	$0.7	$0.5
MCU	**-$3.1**	$0.4	$1.0	$0.8	$0.3	$0.4	$0.3
Sensor	**-$2.7**	$0.8	$0.2	$0.8	$0.2	$0.4	$0.3
DSP	**-$0.4**	$0.0	$0.1	$0.1	$0.0	$0.1	$0.0
Total	-$91.1	**$14.6**	**$16.7**	**$18.2**	**$24.4**	**$10.8**	**$6.3**

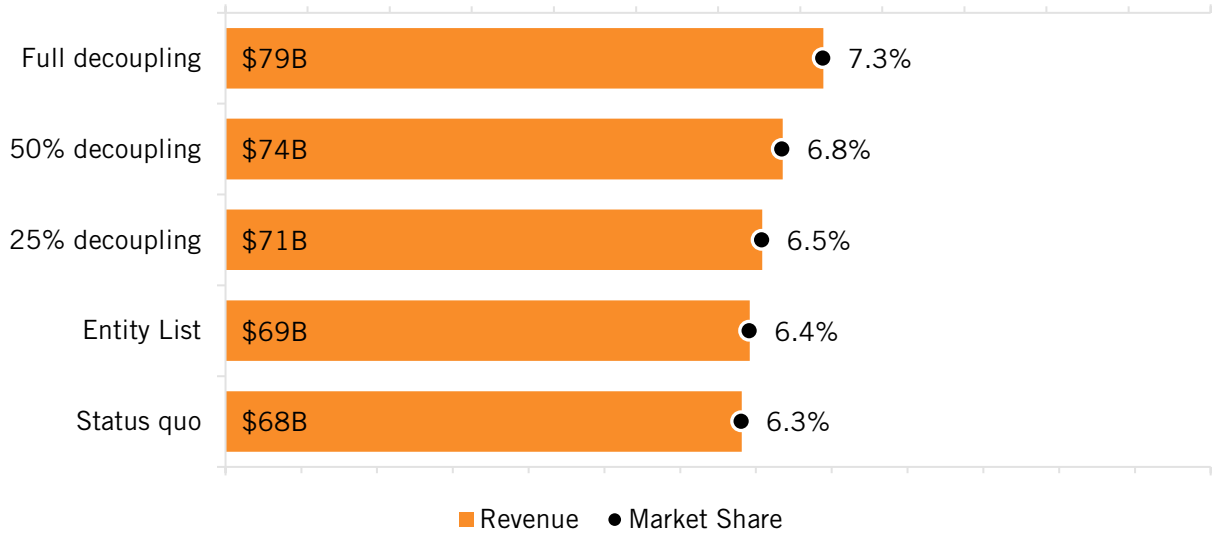
Under the status quo, U.S. firms could maintain their global market share of 48 percent, which would result in about $520 billion in global revenues 10 years on. In contrast, under full decoupling, U.S. firms' market share would likely drop to about 40 percent, resulting in about $429 billion of global revenue. (See figure 10.)

Figure 10: U.S. semiconductor firms' global market share 10 years after full decoupling versus the status quo[29]



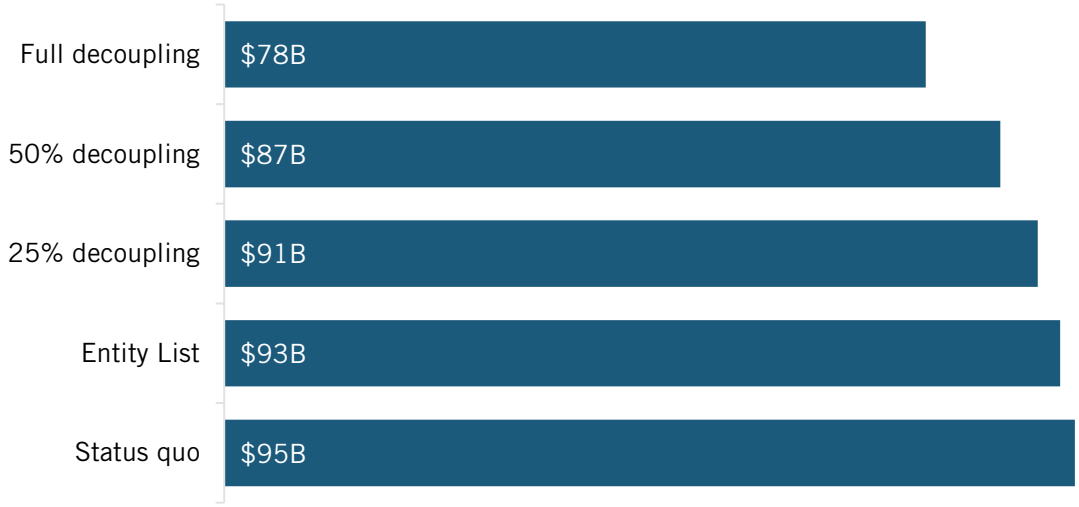
In comparison, Chinese semiconductor firms' global market share and revenue would be higher than no decoupling, as they would gain some of the U.S. firms' lost revenue. Without decoupling, Chinese firms' share could be about 6 percent, equating to a revenue of about $68 billion. Yet, with full decoupling, Chinese firms' revenue could rise to $79 billion, leading to about a 7 percent global market share and about $11 billion more than if the United States does not fully decouple from China. (See figure 11.)

Figure 11: Chinese semiconductor firms' global market share after full decoupling versus the status quo[30]



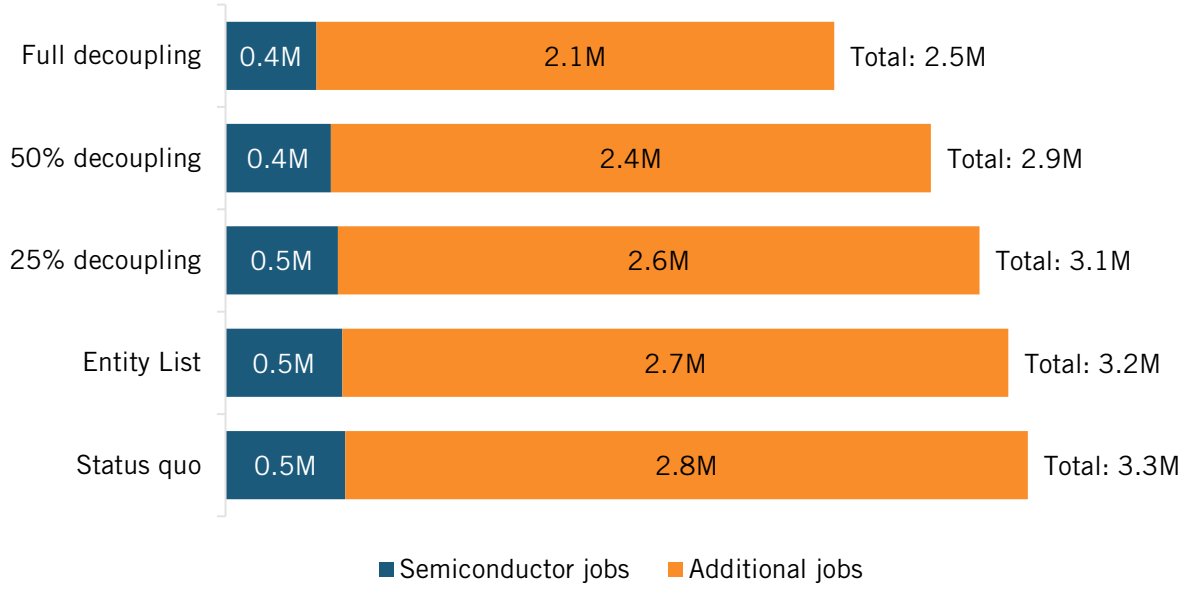
As a result of the foregone revenue, U.S. firms would invest less in R&D compared with no decoupling. Under the status quo scenario, U.S. firms could invest about $95 billion in R&D in the 10th year. In comparison, under full decoupling, U.S. firms could invest only about $78 billion, resulting in about $17 billion of foregone R&D investments. (See figure 12.)

Figure 12: U.S. semiconductor firms' investment in R&D 10 years after full decoupling versus the status quo[31]



Moreover, U.S. semiconductor firms would support fewer jobs. Under a status quo growth scenario, the U.S. semiconductor industry could likely support about 500,000 industry jobs and 2.8 million downstream jobs in the U.S. economy in 10 years' time. But in a full decoupling scenario, after 10 years, U.S. firms would only be able to support about 370,000 industry jobs and 2.1 million downstream jobs, foregoing almost 120,000 industry jobs and over 650,000 downstream jobs. (See figure 13.)

Figure 13: U.S. semiconductor jobs and additional jobs 10 years after full decoupling versus the status quo[32]



In the long term, regardless of the extent of decoupling, U.S. firms could lose more than they gain. Accordingly, under 50 percent decoupling, U.S. firms could forego about $46 billion in revenue, $8 billion in R&D investments, almost 60,000 industry jobs, and over 300,000 downstream jobs 10 years after the initial decoupling. As a result, U.S. firms' market share could be about 44 percent compared to about 48 percent without decoupling, while Chinese firms' share could be about 7 percent compared with 6 percent without decoupling. Under 25 percent decoupling, U.S. firms could forego about $23 billion in revenue, $4 billion in R&D investments, almost 30,000 industry jobs, and almost 170,000 downstream jobs. Under an Entity List scenario, U.S. firms could still forego about $9 billion in revenue, $2 billion in R&D investments, over 10,000 industry jobs, and almost 70,000 downstream jobs. (See table 7.)

Table 7: Summary of decoupling impact after 10 years[33]

Decoupling Scenarios	Entity List	25% Decoupling	50% Decoupling	Full Decoupling
U.S. firms' share of the Chinese market	23.5%	19.6%	13.1%	0.0%
U.S. firms' global market share	47.1%	45.8%	43.7%	39.5%
Chinese firms' global market share	6.4%	6.5%	6.8%	7.3%
U.S. firms' revenue foregone	$9.1B	$22.8B	$45.5B	$91.1B
U.S. firms' R&D spending foregone	$1.7B	$4.2B	$8.3B	$16.6B
U.S. industry jobs foregone	11,739	29,346	58,693	117,386
U.S. downstream jobs foregone	66,910	167,275	334,549	669,099

IMPACT ON ICT INDUSTRIES

The U.S. ICT sector is deeply reliant on the continuous advancement of semiconductor technology. Advanced chips represent the backbone of modern ICT infrastructure, powering everything from data centers and cloud computing platforms to AI systems and high-performance computing applications. Indeed, as an ITIF report estimates, an average data center relies on approximately 340,000 semiconductors to function.[34] These chips enable efficiency in processing speed, energy efficiency, and data handling capabilities, which are essential for the evolving demands of the digital economy. However, in the consistently evolving ICT sector, which requires greater efficiency every day, the U.S. semiconductor industry needs to consistently innovate and develop the next generation of chips in order to keep up with customer demand.

As this report explains, the U.S. semiconductor industry's ability to innovate could be hindered due to export controls or decoupling with China by depriving the industry of the revenues necessary to finance the R&D needed to produce the next generation of innovative chips. Corroborating this, a BCG study estimates that a technology decoupling between the U.S. semiconductor industry and China would lead to a decline of $12 billion, or 30 percent, in R&D investment.[35]

While other countries' semiconductor firms could eventually supply advanced chips, it would take significant time for them to catch up to the already sophisticated designs and capabilities of U.S. firms.[36] During that period, U.S. industries would face higher costs, limited access to cutting-edge technology, and reduced competitiveness.

Below are five examples of ICT industries that would be negatively affected by decreasing R&D in the semiconductor industry:

1. **Cloud computing and data centers.** Cloud providers such as Amazon Web Services, Microsoft Azure, and Google Cloud rely on high-performance chips to run large-scale data centers efficiently. Less-efficient semiconductors increase energy costs and reduce processing speed, limiting the ability to offer faster, cheaper, and more scalable cloud services.
2. **AI and machine learning.** AI systems, including natural language processing and computer vision, require advanced GPUs and AI accelerators. Slower or less-efficient chips reduce the speed of model training and inference, thereby constraining innovation and the adoption of AI tools across various industries.
3. **Telecommunications and 5G networks.** Next-generation 5G infrastructure depends on powerful chips to handle massive amounts of data with low latency. Reduced chip performance can slow network deployment, limit bandwidth, and degrade service quality for consumers and enterprises.

Although national security concerns are very important, strategic approaches that balance these concerns with the need for technological advancement are essential to sustain the U.S. ICT sector's leadership in the global market.

4. **Enterprise software and high-performance computing (HPC).** Applications such as financial modeling, scientific simulations, and big data analytics rely on fast, energy-efficient processors. Less-capable semiconductors increase computation time and costs, lowering productivity and innovation potential for these industries.
5. **Consumer electronics and smart devices.** Smartphones, laptops, smart home devices, and wearables depend on efficient semiconductors for battery life, speed, and advanced features. Reduced R&D in next-generation chips could delay product innovation, increase costs, and make U.S. products less competitive globally.

The U.S. ICT sector's reliance on advanced semiconductor technology necessitates continuous investment in R&D. Export controls and other measures that restrict market access could impede the development of next-generation chips, potentially hindering the growth and competitiveness of this critical industry. Policymakers should consider the long-term implications of such policies on semiconductor innovation and the broader digital economy. Although national security concerns are very important, strategic approaches that balance these concerns with the need for technological advancement are essential to sustain the U.S. ICT sector's leadership in the global market.

CONCLUSION

U.S. semiconductor export controls or broader decoupling from China would weaken the U.S. semiconductor industry and the wider economy. Limiting market access would reduce revenue for U.S. chipmakers, which would directly constrain their ability to fund R&D. Reduced R&D activity would hinder the creation of next-generation semiconductors, technologies that power critical ICT sectors such as cloud computing, AI, telecommunications, and high-performance computing. Reduced innovation in semiconductors cascades through these downstream industries, slowing technological advancement and weakening the global competitiveness of U.S. ICT firms.

Lower revenue in the semiconductor industry would also force U.S. semiconductor companies to cut jobs, as they would be unable to maintain the same workforce without sufficient financial resources. Since each semiconductor job supports additional employment across the economy, the contraction in industry jobs would also reduce broader U.S. employment and economic activity. The U.S. semiconductor industry needs to continue to maintain its share of the Chinese semiconductor market in order to sustain ongoing R&D investment, which helps it maintain leadership in the industry and enables the United States to maintain its leadership in the digital economy. As such, U.S. policymakers should keep semiconductor export controls to a minimum in order to enable U.S. semiconductor firms to obtain high levels of revenue to invest in R&D.

APPENDIX: METHODOLOGY

U.S. Semiconductor Firms' Revenue Loss From Various Export Control/Decoupling Scenarios in the Base Year

To estimate the impact of export controls or a decoupling with China on U.S. semiconductor companies, ITIF first obtained the revenue of the global semiconductor market in 2024; China's aggregate global demand and its market share; U.S. semiconductor firms' share of and revenue from the Chinese market; U.S. semiconductor firms' global market share and revenue; and Chinese semiconductor firms' global share and revenue for our baseline assumptions. (See table 8.) These values come from SIA's publications.

Table 8: Economic model's key variables and descriptions

Variable	Description
Global semiconductor market	Size of the global semiconductor market
China's demand of global market	China's portion of global demand
U.S. firms' share of China market	Estimated share of China's market held by U.S. firms
U.S. firms' global market share	U.S. semiconductor firms' global market share
Chinese firms' global market share	Chinese semiconductor firms' global market share

Using SIA's 2025 Factbook, ITIF then obtained global semiconductor sales by type of product (e.g., logic, memory, etc.).[37] We then estimated the total global semiconductor market for each type of semiconductor product. Assuming that the Chinese market demands the same share of each type of semiconductor product, China's demand for each type of product in the global semiconductor market was estimated.

Using U.S. semiconductor firms' share of China's market, ITIF also estimated U.S. firms' revenue from the Chinese market for each type of product. These estimates were done for four different decoupling or export control scenarios: full decoupling (100 percent reduction in Chinese market access to U.S. semi), 50 percent decoupling (50 percent reduction), 25 percent decoupling (25 percent reduction), and Entity List (assuming Entity List only reduces U.S. semiconductor revenue from the Chinese market by 10 percent). (See table 9.) To simplify the analysis, ITIF assumed that U.S. firms have the same proportion of the Chinese market for all product types (though, obviously, this varies).

Table 9: Economic model's decoupling scenarios and U.S. firms' share loss of Chinese market

Decoupling Scenario	U.S. Firms' Share of Chinese Market Losses
Full decoupling	100 percent loss of revenue from the Chinese market
Considerable decoupling	50 percent loss of revenue from the Chinese market
Partial decoupling	25 percent loss of revenue from the Chinese market
Entity List	10 percent loss of revenue from the Chinese market

Next, ITIF used data from BCG and SIA's "Emerging Resilience in the Semiconductor Supply Chain" report to obtain the global semiconductor market share that China, the EU, Japan, Taiwan, South Korea, the United States, and others hold for each semiconductor product type.[38] Logic semiconductor product types include general purpose logic chips, microprocessor unit chips (MPUs), microcontroller unit chips (MCUs), and digital signal processor chips (DSPs). Memory semiconductor product types only include memory chips. Discrete, analog, and optoelectronics (DAO) semiconductor product types include analog chips, optoelectronic (opto), discretes, and sensors. (See table 10.) With these observations, ITIF reduced the United States' share and scaled the remaining nation's share proportionally to 100 percent. In other words, the remaining nations are assumed to have taken over the United States' shares based on their starting proportions (not including the United States).

Table 10: Semiconductor product categories and product types for each category

Logic	Memory	DAO
▪ General purpose logic chips	▪ Memory chips	▪ Analog chips
▪ Microprocessor units		▪ Optoelectronic chips
▪ Microcontroller units		▪ Discretes
▪ Digital signal processor chips		▪ Sensors

Using the scaled shares of the remaining nations (not including the United States) and the U.S. firms' revenue from China's market for each type of product, ITIF obtained the redistribution of the U.S. firms' revenue from China's market to these remaining nations for each product type. This process was completed for each decoupling scenario.

U.S. Semiconductor Firms' R&D Spending Change/Losses

To estimate the impact of U.S. semiconductor firms' revenue losses on R&D investments for the four decoupling scenarios, ITIF first obtained the share of sales invested in R&D for U.S. firms and their corresponding value in 2024.

Then, for each decoupling scenario, ITIF subtracted the U.S. semiconductor firms' revenue loss from the 2024 U.S. semiconductor industry's revenue before taking the share of sales invested in R&D for U.S. firms. We then subtracted this value from U.S. semiconductor firms' original R&D spending in 2024 to obtain the potential foregone R&D investment.

U.S. Semiconductor Industry Job Losses

To estimate the impact of U.S. semiconductor firms' revenue losses on the semiconductor industry jobs, ITIF first obtained the total number of semiconductor industry employees in 2024. Then U.S. firms' revenue per employee was used to estimate job losses. Since it was not possible to determine the elasticity of demand for semiconductor firm's employees, this model assumes a linear relationship between chipmakers' employment demand and revenues.

ITIF first obtained the U.S. semiconductor firms' revenue per employee by dividing the U.S. semiconductor firms' global revenue by the number of employees. Next, the U.S. semiconductor

firms' revenue loss for each decoupling scenario was divided by the U.S. semiconductor firms' revenue per employee to obtain the number of employees foregone from the decline in revenue.

Additional Job Losses in the U.S. Economy

To assess the impact of U.S. semiconductor firms' revenue loss on non-semiconductor industry jobs, ITIF first determined the semiconductor job multiplier in 2024, which was estimated to be 5.7.[39] This means every job in the semiconductor industry generated 5.7 additional jobs in the U.S. economy. Next, the number of foregone semiconductor jobs was multiplied by 5.7 to determine the number of foregone downstream jobs.

Foregone Losses in Years 5 and 10 After Decoupling in the Base Year

U.S. Semiconductor Firms' Revenue Foregone

To estimate U.S. semiconductor firms' revenue foregone from decoupling with China after 5 and 10 years, ITIF first estimated the average annual growth rate of U.S. semiconductor firms' revenue from the Chinese market from 2020 to 2024.

Then, for each decoupling scenario, ITIF took U.S. semiconductor firms' losses for each semiconductor product and multiplied it by (1 + the average annual growth rate) raised to the power of 5 or 10 (years) to determine the U.S. semiconductor firms' foregone revenues 5 and 10 years after decoupling.

Moreover, the U.S. semiconductor firms' losses that were shifted to other nations were also multiplied by the average annual growth rate to estimate how much each nation gained after 5 and 10 years from U.S. semiconductor firms' losses from decoupling in the base year. This was done for each decoupling scenario and each semiconductor type.

R&D Spending Foregone

To determine U.S. semiconductor firms' foregone R&D investments, ITIF first estimated the average annual share of sales invested in R&D (i.e., R&D intensity) by U.S. semiconductor firms from 2015 to 2024. The rate was then multiplied by U.S. semiconductor firms' foregone revenue after 5 and 10 years for each decoupling scenario.

Semiconductor and Additional Jobs Foregone

To estimate the foregone semiconductor jobs from decoupling in the base year, ITIF first estimated the average annual growth rate from 2015 to 2024 for U.S. semiconductor jobs. Then the number of jobs lost after decoupling in the base year was multiplied by (1 + the average annual growth rate). This was done for each decoupling scenario.

To determine the additional jobs in the economy foregone, ITIF multiplied these values by the job multiplier (5.7). This was done for each decoupling scenario.

U.S. and China Semiconductor Market 5 and 10 Years After Decoupling in the Base Year

New Overall Market Shares After Decoupling

To estimate the impact of decoupling after 5 and 10 years, ITIF first obtained the average annual growth rate for the global semiconductor market from 2005 to 2024 and U.S. firms' revenue from China's market from 2020 to 2024. ITIF also obtained the average China market demand

of the global market, U.S. firms' global market share, and Chinese firms' global market share from 2015 to 2024.

Using the growth rates, ITIF first estimated the new global semiconductor market after 5 and 10 years. It was then assumed that China's demand of the global market would continue to be the average of its last 10 years. Next, the new demand was multiplied by the new global semiconductor market value to determine the revenue from China's demand of the global market.

Then, ITIF estimated U.S. semiconductor firms' share of and revenue from China's market for each decoupling scenario after 5 and 10 years. To do so, U.S. semiconductor firms' losses for each decoupling scenario were first subtracted from the U.S. semiconductor firms' revenue from the China market in Year 0 before decoupling to determine the remaining Chinese market that U.S. semiconductor firms retained after decoupling in Year 0. That value was then multiplied by (1 + the annual average growth rate of U.S. firms' revenue from the China market) for 5 or 10 years after decoupling to determine the new revenue from the Chinese market for U.S. firms. These values were divided by China's demand of the global market to determine U.S. semiconductor firms' share of China's market.

Next, the U.S. semiconductor firms' global market share was estimated. To do so, the average U.S. firms' market share in the last 10 years was first multiplied by the global semiconductor market to determine U.S. firms' new global revenue. With that value, ITIF subtracted U.S. semiconductor firms' losses for each decoupling scenario in Year 0 multiplied by (1 + the average annual growth rate of U.S. firms' revenue from the China market) raised to 5 or 10 (years). These values were divided by the total global semiconductor market to determine U.S. semiconductor firms' market share.

ITIF also estimated China's market share 5 and 10 years after decoupling. To calculate this, the average Chinese firm's market share over the last 10 years was first multiplied by the global semiconductor revenue to determine the new global revenue of Chinese firms. With that value, ITIF added the U.S. semiconductor firms' losses that were gained by Chinese firms for each decoupling scenario in Year 0 multiplied by (1 + the average annual growth rate of U.S. firms' revenue from the China market) raised to 5 or 10 (years). Then, these values were divided by the total global semiconductor market to determine Chinese firms' market share.

R&D Spending After Decoupling

To estimate the impact of decoupling with China on U.S. semiconductor firms' R&D spending, ITIF first estimated the average annual share of sales spent on R&D by U.S. semiconductor firms from 2015 to 2024. That average was then multiplied by the new U.S. global market share to determine U.S. firms' new R&D amount 5 and 10 years after an initial decoupling. This was done for each decoupling scenario.

Semiconductor Jobs

To estimate the impact of decoupling with China on U.S. semiconductor industry jobs, ITIF first estimated the average annual growth rate from 2015 to 2024 for U.S. semiconductor firms' total employees.

Next, the total number of U.S. semiconductor firms' employees in year 0 after decoupling was estimated by subtracting U.S. semiconductor firms' job losses from each decoupling scenario from the U.S. semiconductor firms' total employees before decoupling in year 0. These values

were then multiplied by (1 + the average annual growth rate) raised to the power of 5 or 10 (years) to determine the new number of semiconductor industry employees 5 and 10 years after an initial decoupling.

Additional Jobs

To estimate the additional jobs created 5 and 10 years after an initial decoupling, ITIF first assumed the job multiplier did not change. Then, the new number of semiconductor industry employees 5 and 10 years after decoupling was multiplied by the job multiplier for each decoupling scenario.

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About ITIF

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