

# THE CHIPS AND SCIENCE ACT OF 2022 AND THE U.S. SEMICONDUCTOR INDUSTRY



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Semiconductors are a key ingredient in all electronic devices, from laptops to mobile phones to automobiles. They are a critical part in the development of 5G networks and artificial intelligence (AI), and the industry is therefore essential to both the U.S. economy as well as our national security. The supply chain disruptions over the last few years of a pandemic have highlighted the need for a reliable chip supply. Recent geopolitical tensions between China and Taiwan could further affect the global chip supply chain, leading to bipartisan support for the CHIPS and Science Act.

On August 9, 2022, President Biden signed into law the \$280B CHIPS and Science Act. This act is estimated to be worth about \$78B to the U.S. semiconductor industry through 2027, and its goal is to invest in research as well as domestic production opportunities. In this piece we will talk more about the importance of this industry as well as the implications of the CHIPS and Science Act.

## Semiconductor Manufacturing

Advances in engineering have dramatically increased chip efficacy while reducing their size. End consumer demand is ever changing, so as a result chips have a very short life and become obsolete in a very short time. Manufacturing of semiconductors in foundries is very capital intensive. As a result, despite being the global leader in semiconductor revenue and R&D investment, chip manufacturing has shifted away from the U.S. to Asia. U.S. share of global chip manufacturing has declined from 37% in 1990 to about 12% in 2020 (Figure 3)<sup>2</sup>. This is even more acute for the leading edge logic chips where U.S. has no foundry capacity for the most advanced logic chips (<10nm). Most of this manufacturing has migrated to Asia. Taiwan is the leader in chip manufacturing with 63% of foundry revenue market share followed by South Korea (Figure 4)<sup>3</sup>.

The U.S. has continued to be the revenue market leader of the global semiconductor industry which was about \$433B in 2020 (Figure 1)<sup>1</sup>. The U.S. is also the market leader of R&D investment (Figure 2)<sup>1</sup>.

Figure 1: 2020 Global Marketshare by Revenue <sup>1</sup>

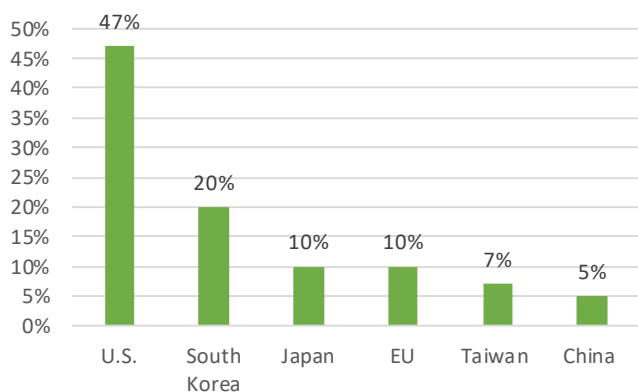
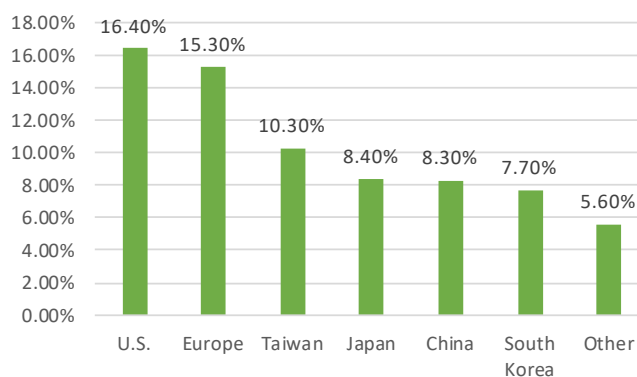
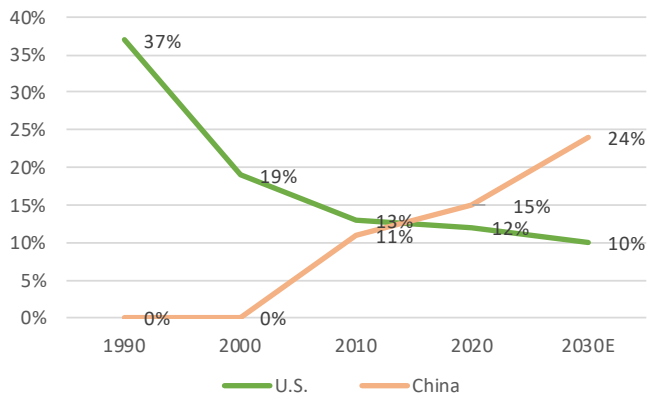
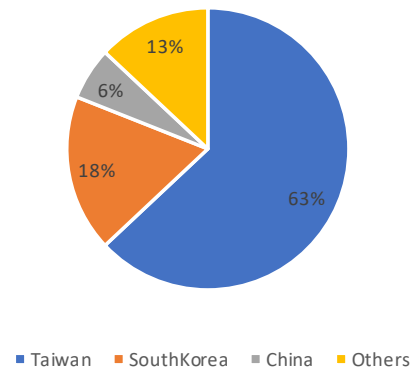


Figure 2: 2020 R&D Expenditure as Percent Of Revenue <sup>1</sup>



According to the Semiconductor Industry Association (SIA), growth of Asian foundries has been spurred due to government subsidies. It is 30% more expensive to build and operate a fabrication plant for 10 years in the U.S. than it is in Taiwan, Singapore, or South Korea, and 37-50% more expensive than it is in China. As much as 40-70% of the cost differential is due to government incentives in those countries<sup>2</sup>. Under its Made in China 2025 plan, the Chinese government wants to, by 2025, produce 70% of all the chips it uses compared to the current 40%. Chinese government incentives are mainly in form of tax breaks<sup>4</sup>. As a result of these incentives, China is expected to grow its foundry capacity market share from 15% in 2020 to 24% by 2030 (Figure 3)<sup>2</sup>.

Figure 3: U.S. Marketshare of Global Chip Production <sup>2</sup>Figure 4: 2020 Foundry Revenue Marketshare <sup>3</sup>

The European Union also passed its European Chips Act in March 2022, to provide funding to support chip manufacturing in the EU. The main aim of the European Chips Act is to increase its global manufacturing market share from 9% to 30% by 2030.

The COVID pandemic that started in 2020 disrupted global supply chains and was most damaging to the semiconductor manufacturing industry. These disruptions have continued for over two years and have affected earnings even in the 2nd quarter of 2022. The pandemic has highlighted the need for reliable chip supply. Recent geopolitical tensions between China and Taiwan could further affect the global chip supply chain. This has led to bipartisan support for the CHIPS and Science Act.

### The CHIPS and Science Act of 2022

On August 9, 2022, President Biden signed into law the \$280B CHIPS and Science Act. Division A of the CHIPS Act allocates \$54.2B in subsidies and approximately 25% investment tax credits, estimated to be worth about \$24B, to the U.S. semiconductor industry through 2027. It is aimed at increasing research and development as well as the domestic production of semiconductors<sup>5</sup>. Some of the highlights are:

1. Of the \$54.2B, \$39B is allocated as direct subsidies for semiconductor manufacturing and related activities. These subsidies are front loaded with about \$24B allocated for 2022. However, outlays will start in 2023 and last through 2031<sup>6</sup>. Most of these subsidies will be used for the development and manufacturing of leading edge chips. The remaining \$15B is allocated for R&D, international communication, wireless innovation and education<sup>5</sup>.
2. There are certain restrictions for the use of these funds. First, companies awarded these funds are prohibited from expanding manufacturing capacity in other countries specifically China or any other country of concern for 10 years after the award. The only exception is for manufacturing of legacy chips.
3. Companies awarded these funds are prohibited from using them for dividends or stock buybacks. Companies can use other cash for these activities.

### The Investment Case

The CHIPS Act is aimed at increasing domestic semiconductor manufacturing and reducing dependence on Asia. It also aims to build a semiconductor supply chain in the United States. The companies that will benefit the most are U.S. semiconductor companies that manufacture their own chips. These include Intel (INTC), Texas Instruments (TXN) and Micron (MU). Several of these companies have already announced plans to expand manufacturing capacity in the U.S. (Table 1)<sup>7</sup>. Both INTC and TXN had already announced significant increases to their capital spending budgets over the next 2-3 years, which will now be subsidized in part by the CHIPS Act. The CHIPS Act is further expected to improve margins during the construction of these foundries. As construction of a chip foundry typically takes 2-3 years, any effect on earnings growth is to be expected in that period.

**Table 1: Recent Manufacturing Capacity Expansion in the U.S.<sup>7</sup>**

Company	Number of Foundries	Purpose	Amount
Intel	4	Logic, Packaging, Legacy	\$46.5B
Texas Instruments	3	Analog	\$38-39B
Micron		Memory	\$40B
Samsung	1	Logic	\$17B
Taiwan Semiconductor	2	Logic	\$17B
Global Foundries	1	Logic	\$4.5B
			\$164B

The CHIPS Act also encourages Asian manufacturers to expand production of leading edge chips in the U.S. For example, Taiwan Semiconductor (TSM), the world's largest chip manufacturer will be eligible for subsidies for its plant in Arizona as well as any future plants it builds in the U.S. Other Asian manufactures like Samsung and Global Foundries are also expected to benefit. The CHIPS Act will fund about 38% of all the recent manufacturing announcements through subsidies and tax credits (Table 1).

The majority of the funding (70%) from this act is for manufacturing (direct subsidy or tax credit) with very little funding for R&D (11% including advanced packing and workforce development). Therefore, fabless semiconductor companies like Qualcomm (QCOM) and Nvidia (NVDA) will not see any significant earnings impact. These companies will benefit from being able to source leading edge chips from the U.S. which will mitigate the impact of any future global supply chain crisis. For example, Qualcomm (QCOM) announced \$4.2B agreement with GlobalFoundries to expand capacity in New York foundry (Table 1).

## Conclusion

Semiconductors are a key component of all devices and thus have become crucial to the economy. Due to high costs, chip foundries have migrated to Asia. The 2020 COVID pandemic as well as the ongoing China/Taiwan geopolitical tensions have shown the importance of reliable chip supply to the U.S. economy. The CHIPS Act is aimed at reviving the U.S. semiconductor foundry business. It will give subsidies to U.S. companies for expanding manufacturing of advanced chips in the U.S as well as tax credits to non-U.S. firms for expansion in the U.S. Increased chip production in the U.S. should help mitigate the effect of any future supply chain disruptions on the U.S. economy.

## References:

- [https://www.semiconductors.org/wp-content/uploads/2020/04/2020-SIA-Factbook-FINAL\\_reduced-size.pdf](https://www.semiconductors.org/wp-content/uploads/2020/04/2020-SIA-Factbook-FINAL_reduced-size.pdf)
- <https://www.semiconductors.org/wp-content/uploads/2020/09/Government-Incentives-and-US-Competitiveness-in-Semiconductor-Manufacturing-Sep-2020.pdf>
- <https://www.cnbc.com/2021/03/16/2-charts-show-how-much-the-world-depends-on-taiwan-for-semiconductors.html>
- <https://www.semiconductors.org/taking-stock-of-chinas-semiconductor-industry/>
- <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/#:~:text=Bolster%20U.S.%20leadership%20in%20semiconductors,%2C%20manufacturing%2C%20and%20workforce%20development.>
- [https://www.cbo.gov/system/files?file=2022-07/hr4346\\_chip.pdf](https://www.cbo.gov/system/files?file=2022-07/hr4346_chip.pdf)
- <https://www.intel.com/content/www/us/en/newsroom/news/intel-breaks-ground-two-new-leading-edge-chip-factories-arizona.html#gs.axz38w>  
<https://www.intel.com/content/www/us/en/newsroom/news/intel-announces-next-us-site-landmark-investment-ohio.html#gs.axzcr6>  
<https://news.ti.com/texas-instruments-to-begin-construction-next-year-on-new-300-mm-semiconductor-wafer-fabrication-plants>  
<https://news.ti.com/blog/2019/04/18/ti-has-selected-richardson-texas-as-location-for-our-next-300mm-analog-wafer-fab-1;>  
<https://investors.micron.com/news-releases/news-release-details/micron-announces-40-billion-investment-leading-edge-memory>

<https://news.samsung.com/global/samsung-electronics-announces-new-advanced-semiconductor-fab-site-in-taylor-texas>

<https://azgovernor.gov/governor/news/2020/05/tsmc-build-advanced-semiconductor-factory-arizona>

<https://www.qualcomm.com/news/releases/2022/08/globalfoundries-and-qualcomm-announce-extension-of-long-term-agr>

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