



Hibbs Brief

Hibbs Institute for Business & Economic Research

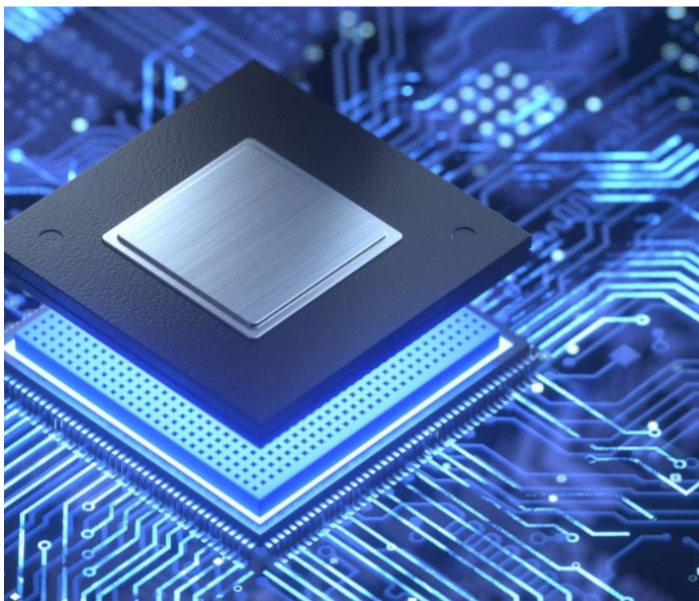
The Semiconductor Industry: A Revolutionary Market in America

By Manuel Reyes and Cecilia Cuellar

In this issue of the [Hibbs Brief](#), we discuss current and expected aspects associated with the semiconductor industry in the world and the United States. Also, we provide reasons why we believe this industry could become a great economic development opportunity for East Texas.

The Semiconductors Industry: A Great Opportunity

Semiconductors are materials with electrical conductivity that can function as a conductor (such as copper and other metals) and as an insulator (such as glass or ceramics). Due to their electrical conductivity and other properties, semiconductors are key components in the manufacturing of chips used in most electronic devices, which are vital in modern life. Currently, most electronic devices such as smartphones, tablets, personal computers, cameras, vehicles, medical diagnostic equipment and many more items use chips to function.



Source: Semiconductor Industry Association.

The semiconductor industry constitutes the fourth largest market in the world (in dollar value), just behind crude oil, vehicles and their parts and refined petroleum.¹ In 2021, the Semiconductor Industry Association (SIA) valued this market at \$555.9 billion with a worldwide growth expectation of around 12.5% by 2022². Additionally, McKinsey & Company expects the market to keep growing during the next seven years (2023 through 2030) at an average growth rate between 6-8%. In other words, the semiconductor industry is expected to be worth around **one trillion dollars** by 2030³, almost equivalent to The Netherlands', Saudi Arabia's or Mexico's economies in 2022 (according to International Monetary Fund's Gross Domestic Product estimates).⁴ Furthermore, semiconductors and chips are key components in important industries (such as automotive, healthcare, aerospace and artificial intelligence) and are considered economic drivers for many states in the nation.

In the last decade (2010s), technological changes and the resulting increase in the consumption of electronic devices boosted the production of chips, which expanded the semiconductor industry. In 2020, during the pandemic, factors such as the lockdown, work-from-home orders and other precautionary measures made people spend more time at home. This behavioral change increased the demand for electronic devices substantially, boosting the need for chips; however, the manufacturers of these chips were experiencing production difficulties. Like many other nonessential industries, the semiconductor industry was forced to close for several weeks, creating a shortage of chips. This situation caused supply chain disruptions of these components, resulting in shortages in the supply of final products (such as automobiles and electronic devices) and consequently higher prices.

Although the semiconductor industry eventually reopened factories and gradually increased production to catch up with the high demand for chips, this is not happening quickly. In addition to the pandemic aftermath, Taiwan, the principal chip producer, experienced the worst drought in the last 50 years. Taiwan's government ordered the suspension of the water supply due to the drought problem; therefore, high-tech manufacturers were

forced to save 15% of their water use. Since chip production is water-intensive, the overall global supply was severely affected. To put this in context, the Taiwan Semiconductor Manufacturing Company, the leading producer of semiconductors, uses more than 150,000 tons of water daily (this is equivalent to 80 standard swimming pools).⁵ Considering that Taiwan produces 63% of the world's semiconductors (South Korea and China produce 18% and 6%, respectively),⁶ and that the production of chips cannot be substantially increased in the short-run, we can understand why the chip supply has not been balanced yet.



Source: Taiwan Semiconductor Manufacturing Company.

Bringing Production Back

As a result, the production of semiconductors and chips may experience a drastic change in the future. Given the geopolitical and health issues experienced by the semiconductor industry (and other manufacturing industries) in the past couple of years, the United States has decided to implement diverging strategies. Several manufacturing-oriented companies are bringing production back from China and other Asian countries. A survey conducted in January to C-suite executives shows that 90% of them said they were in the process of moving production out of China or had plans to do so, and 80% mentioned they were considering reestablishing in the United States. The relocation of manufacturers from Asia to national territories or countries in Latin America (especially Mexico) is what many people know today as **near-shoring**.⁷

The U.S. federal government has supported this relocation idea via fiscal and economic stimuli. To restore global leadership in the production of advanced semiconductors through subsidies, tax incentives, infrastructure and other investments in this industry, the federal government has passed two important initiatives: the *CHIPS for America Act*⁸ in June 2020 and the *CHIPS and Science Act*⁹ in August 2022. Furthermore, during the North American Leaders' Summit (Jan. 9-11), Presidents Biden, Trudeau (Canada) and Lopez-Obrador (Mexico) discussed policies to strengthen North American supply chains and regional trade. In particular, President Biden encouraged his counterparts to support the United States' drive to boost domestic semiconductor production.¹⁰

Why East Texas?

Efforts to bring manufacturers back to the U.S., particularly in the semiconductor industry, could be greatly positive to East Texas. Governor Abbott is working with companies to take advantage of various incentive programs available (such as the *CHIPS for America* and *CHIPS and Science* acts).¹¹ This, combined with a convenient tax structure in Texas, can be very attractive to companies looking for locations to establish around the nation. For instance, Samsung Electronics Co. has announced an investment of \$200 billion in chip plants in Texas.¹²

Semiconductor companies typically look for locations in proximity to the raw materials involved in the manufacturing of chips. Silica, ceramics and petrochemicals are either produced in the region or relatively close to East Texas (Southern Texas or Deep East Texas). Also, the chip production process is water intensive, which is a remarkable competitive advantage in East Texas, and the human capital in East Texas could be very attractive to these chip manufacturing companies. For instance, Tyler Junior College, Texarkana College, LeTourneau University and The University of Texas at Tyler have outstanding programs in the manufacturing field, such as technical and bachelor's degrees in electrical, mechanical and mechatronic engineering, as well as other fields. The jobs associated with the semiconductor industry are typically well-paid. Thus, having semiconductor companies established in the area could be a great push for the local economic development of the whole community, not only those hired (ripple effect).

In subsequent editions of *Hibbs Institute* bulletins and reports, we will further examine more details regarding the advantages and challenges of the semiconductor industry in our region.

¹ “Semiconductors: Key Intermediate Goods for International Trade”, Italian Institute for International Political Studies; June 2021.

<https://www.ispionline.it/en/publication/semiconductors-key-intermediate-goods-international-trade-30709>

² “2022 State of the U.S. Semiconductor Industry [Report-Nov 2022]”. The Semiconductor Industry Association (SIA) elaborates and analyzes the problems faced by this industry at a global level. Also, it estimates the semiconductor industry’s growth expectations.

https://www.semiconductors.org/wp-content/uploads/2022/11/SIA_State-of-Industry-Report_Nov-2022.pdf

³ “The semiconductor decade: A trillion-dollar industry”, McKinsey & Company; April 2022.

<https://www.mckinsey.com/industries/semiconductors/our-insights/the-semiconductor-decade-a-trillion-dollar-industry>

⁴ According to the latest Gross Domestic Product 2022 projection, the International Monetary Fund estimates 1.0 trillion for The Netherlands, 1.0 trillion for Saudi Arabia and 1.3 trillion for Mexico. <https://www.imf.org/en/Publications/WEO/Issues/2021/03/23/world-economic-outlook-april-2021>

⁵ “No Water No Microships: What is happening in Taiwan?”, Forbes; May 2021.

<https://www.forbes.com/sites/emanuelabarbiroglio/2021/05/31/no-water-no-microchips-what-is-happening-in-taiwan/?sh=7924f7d722af>

⁶ “2 charts show how much the world depends on Taiwan for semiconductors”, CNBC; March 2021.

<https://www.cnbc.com/2021/03/16/2-charts-show-how-much-the-world-depends-on-taiwan-for-semiconductors.html>

⁷ “U.S. Factory Boom Heats Up as CEOs Yank Production Out of China”, Bloomberg; July 5, 2022.

<https://www.bloomberg.com/news/articles/2022-07-05/us-factory-boom-heats-up-as-ceos-yank-production-out-of-china>

⁸ The U.S. Congress passed H.R.7178, which contains the statutes for the Act passed on June 11, 2020.

<https://www.congress.gov/116/bills/hr7178/BILLS-116hr7178ih.pdf>

⁹ The White House science department released the full text of the Act.

<https://www.congress.gov/bill/117th-congress/house-bill/4346>

¹⁰ “Biden Quietly Urges Mexico to Pounce on US Shift From Asia Chips”, Bloomberg; January 2023.

<https://www.bloomberg.com/news/articles/2023-01-10/-three-amigos-agree-to-meeting-on-semiconductor-investment>

¹¹ “Governor Abbott Urges U.S. Congress To Pass Critical Semiconductors Legislation”, Office of the Texas Governor; July 2022.

<https://gov.texas.gov/news/post/governor-abbott-urges-u.s-congress-to-pass-critical-semiconductors-legislation>

¹² “Samsung Eyes \$200 Billion Expansion of Chip Plants in Texas”, Bloomberg; July 2022;.

<https://www.bloomberg.com/news/articles/2022-07-21/samsung-eyes-sweeping-expansion-of-chip-facilities-in-texas>

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