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## While Summer 2023 Saw Record Global Temperatures, A Cold Tech War Intensified

OPINION: The US-China Tech War shows no signs of receding, prompting new challenges and opportunities



### **A Brief History of Chips**

Going back to the era of the Cold War, the United States (U.S.) heavily invested in chip design and faster microprocessors, which in turn powered cutting-edge weaponry, communication systems, and advanced surveillance technology, significantly outpacing its Soviet counterparts in technological prowess. Furthermore, the acceleration of microprocessor capabilities played a pivotal role in various domains, from enhancing industrial automation to providing essential functionality for space missions encompassing satellites, spacecraft, and different navigation and imaging systems.

Semiconductor technology formed the bedrock of America's competitive advantage in critical technology sectors, industrial productivity, and the space race. It established a direct correlation between computational power and influence in the modern world, encompassing military, economic, and geopolitical dimensions, all resting upon the foundational significance of computer

chips. The U.S. diligently strived to maintain its preeminent status in computer chip design, given the indispensable role these chips play across diverse domains, from automobiles to smartphones.

### **Interconnected Supply Chain Governs Global Manufacturing**

The manufacturing of semiconductors has historically required a highly intricate and interconnected global value chain with a division of labor among various economies. The initial phase, chip design, predominantly occurs in the U.S. However, the subsequent stages, including chip manufacturing, are operated in East Asia, with Taiwan commanding over 65 percent of the market, and South Korea more than 15 percent.<sup>1</sup> China's role comes into play at the tail end of the supply chain, where it assembles and packages chips into consumer products like smartphones, PCs, and smart devices. Moreover, China and the U.S. rely heavily on Europe, particularly the Netherlands, for essential semiconductor production equipment. ASML, a Dutch firm, holds a monopoly as the sole provider of lithography machines required for high-end semiconductor manufacturing.<sup>2</sup>

The post-pandemic world exposed the underbelly of closely interconnected global supply chains, as the semiconductor shortage wreaked havoc on several industries, most notably the auto industry, where global car manufacturers had estimated losses of over \$200 billion.<sup>3</sup> The mutual dependencies have also conflicted with geopolitical interests, most evident in the U.S.-China tech war, which has compelled leading companies to reevaluate multinational supply chains and technological infrastructure in favor of more autonomous, nation-state-based alternatives. Historically, China's expenditure on importing chips has surpassed its spending on oil, and its overreliance on foreign chips presents a formidable challenge.<sup>4</sup> Consequently, it's hard to imagine that China's ambitions for an "integrated development" of Taiwan are unrelated to a strategic opportunity that would bolster its self-interests and alleviate a gaping vulnerability.

Yet in reality, it has been the U.S. on the offensive as of late. In August 2022, the U.S. government implemented an industrial strategy to reinvigorate research and domestic semiconductor manufacturing. This strategy included signing the CHIPS and Science Act, accompanied by a \$280 billion funding injection.<sup>5</sup> The act imposed restrictions on major American companies receiving this funding, preventing them from establishing "leading-edge" factories in China. By October, restrictions extended to American entities assisting Chinese companies in developing sophisticated chip technology. The U.S. administration has continued to expand restrictions, affecting the export of semiconductors used in artificial intelligence (A.I.) and the sale of advanced chipmaking machinery to the Chinese market. In January 2023, it solidified agreements with the Netherlands and Japan, further limiting China's access to advanced chip materials and imposing export restrictions.<sup>6</sup> China retaliated with its trade bans, prohibiting certain high-end chip sales from U.S. companies like Micron.<sup>7</sup>

### **Summer 2023 Developments**

The ongoing restrictions between the U.S. and China severed access to advanced chips critical for high-level A.I. development. Given the intricate nature of the semiconductor supply chain, concerns loom over the potential consequences of expanded tariffs and trade restrictions, including disruptions in international trade and increased industry complexity and costs. Nevertheless, an alternative perspective can be presented, as these constraints could create opportunities for private markets, enabling emerging domestic companies to tap into new markets and secure significant government contracts. For instance, in September, Beijing approved additional funding for the China Integrated Circuit Industry Investment Fund, aimed at boosting growth and technological self-sufficiency, with a targeted raise of \$41 billion.<sup>8</sup> China is also actively pursuing the establishment of A.I. chip factories and particle accelerators to position itself as a global leader. As Western technology and investments recede, state funding is flowing in to nurture homegrown alternatives and reduce dependence on American technologies.

Simultaneously, the U.S. is intensifying its focus on the A.I. manufacturing sector. In August 2023,

President Joe Biden issued an executive order prohibiting certain new U.S. investments in China's sensitive technology sectors, encompassing semiconductors, microelectronics, quantum information technologies, and specific artificial intelligence systems.<sup>9</sup> The directive seeks to prevent American capital and expertise from supporting China's development of technologies that could undermine U.S. industry and national interests. This measure encompasses private equity, venture capital, and joint ventures. While restrictions are rarely favorable, there could be a scenario that encourages targeted venture funding for local U.S. semiconductor startups, which, as of May 2023, had faced considerable challenges, as reported by Crunchbase. U.S. semiconductor startups had raised only \$260 million in 17 deals as of May 2023, marking one of the lowest totals since 2019.<sup>10</sup>

Bilateral agreements among U.S. allies also aim to create fresh opportunities in the semiconductor industry. An illustrative example includes a recent multi-billion dollar business deal forged during a U.S. visit to Vietnam in September. The partnership aims to advance the fields of A.I., semiconductors, and cloud computing.<sup>11</sup> These strategic initiatives are likely to bolster local U.S. funding and spawn new business prospects in the long term, prompting the importance of monitoring further industry developments.

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<sup>1</sup><https://www.wsj.com/articles/the-world-relies-on-one-chip-maker-in-taiwan-leaving-everyone-vulnerable-11624075400>

<sup>2</sup><https://www.economist.com/business/2020/02/29/how-asml-became-chipmakings-biggest-monopoly>

<sup>3</sup><https://www.reuters.com/business/autos-transportation/supply-chain-snarls-could-cost-automakers-210-billion-this-year-forecast-finds-2021-09-23/>

<sup>4</sup><https://www.nytimes.com/2023/07/12/magazine/semiconductor-chips-us-china.html>

<sup>5</sup><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/>

<sup>6</sup><https://www.nytimes.com/2023/01/28/business/economy/netherlands-japan-china-chips.html>

<sup>7</sup><https://www.nytimes.com/2023/05/21/business/china-ban-microchips-micron.html>

<sup>8</sup><https://www.reuters.com/technology/china-launch-new-40-bln-state-fund-boost-chip-industry-sources-say-2023-09-05/>

<sup>9</sup><https://www.whitehouse.gov/briefing-room/presidential-actions/2023/08/09/executive-order-on-addressing-united-states-investments-in-certain-national-security-technologies-and-products-in-countries-of-concern/>

<sup>10</sup><https://news.crunchbase.com/semiconductors-and-5g/us-startup-funding-ai-charts/>

<sup>11</sup><https://www.reuters.com/world/us-vietnam-elevate-ties-during-biden-visit-with-eye-china-2023-09-09/>

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