

## CHIP WAR: THE FIGHT FOR THE WORLD'S MOST CRITICAL TECHNOLOGY

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**C**hris Miller is the author of the book titled "Chip War: The Fight for the World's Most Critical Technology". Currently, he is an Associate Professor of International History at the Fletcher School of Law and Diplomacy at Tufts University. His area of interest includes geopolitics, international affairs, technology, economics, and Russia.

The book is divided into eight parts with fifty-four chapters in total. The hypothesis made by the author is that "since the development of semi-conductor chip, no other item has played a more decisive role in shaping the structure of military balance, world economy and international politics". Microchips have become new oil, i.e. a scarce product, on which most of the world GDP depends. According to the author, it was in fact the role of tiny semiconductor chips that led America to defeat the Soviet Union – as chips enhanced the precision of American arsenals during the cold war. Before 1980s, the US has been the only manufacturer of fastest semiconductor chips and maintained its superiority. But afterwards numerous other players including Korea, Europe, and Taiwan have taken over the chip manufacturing industry; hence breaking American monopoly over the chip industry. Likewise, China also spends many times more money on importing semiconductors than on oil which depicts that the fundamental reliance on foreign chips is the greatest vulnerability for China's rise. Therefore, keeping this situation in view, China is also pouring billions of dollars into chip-manufacturing initiatives to get self-sufficiency; hence, challenging American economic and military superiority. In addition, Taiwan being within the range of China's missile system makes Western states to get more conscious of losing Taiwan at the hands of China. In short, war over the chips would be decisive in shaping the future of the geopolitical structure.

The first part unfolds the evolution of computing system after World War II by tracing the shift of mechanical gears towards electrical charges driven by accuracy

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needs in calculations. The Shockley's theory of semiconductor materials leads to invention of transformative transistor. Fairchild semiconductor, began its journey as a small startup, received its first order from NASA an important stamp of approval later had its profound impact not only in the military domain but also in civilian.

The book's second part explores how US' chip industries was reshaping the global power dynamics. The exponential growth in the semiconductor chip industry tightened the supply chain between the US and Asian countries including Japan, Korea, Singapore, Malaysia, and Taiwan, while the USSR's flawed "copy-it strategy" to compete in chip industry furthered US' dominance. The chapter has also highlighted that a realization, increased after Vietnam War, among the Pentagon to enhance the precision of its military technology using tiny microchips hence, also reshaped the future warfare.

In part three, Miller has shed light on deliberate efforts of US in making Japan a key player in chip sector by transferring technology and giving easy access to US' market. These US' efforts were driven by containment strategy of Communism. Such cooperation of US administration was unprecedented for Japanese companies, specifically in DRAM chips. The last chapter of this part highlights the way such rapid growth inadvertently started to challenge American economic, technological and military dominance.

In chapter four, Miller has uncovered the way US resurged and positioned itself strongly against the Japan's dominance in chip industry amid 1980s. The cost-cutting drive of US' Micron Company, along with Intel's ramping up of its innovative strategies to offer smaller but with increasing processing power played a decisive role in resurging of US chip industry. The chapter has discussed that collaboration between Intel and other Silicon Valley companies with Samsung further eroded Japan's market share in chip industry. Moreover, this part has also elucidated the way Pentagon's "Offset Strategy" has successfully revolutionized warfare with information based weapons, where Persian Gulf War had been the first major demonstration, hence, making Soviet military system inferior.

Part Five begins with the discussion of trajectories of TSMC and SMIC industry since their foundation. It has highlighted the success of Taiwan's TSMC and emergence of China as the potential challenger with the similar approach that Taiwan adopted. Then Miller elucidated Netherland's ASML's emergence as a sole monopoly lithography market due to its unique strength of being neutral in trade dispute both between USA and Japan. In the light of such changing competition in the semiconductor chip industry, Miller has concluded this part by noting the potential erosion of American hegemony in chip industry over the next decade.

Part six has discussed the shift of all American chipmakers, with exception of Intel, towards adopting the fabless model to direct its focus on innovative chip design by outsourcing fabrication. The strategic vision of TSMC and its pivotal role in supply chain of semiconductor is also highlighted. According to author, the decline of Intel in

chip industry is due to its delayed improvement of its manufacturing process and adoption of advanced Extreme Ultraviolet (EUV) tools; hence, leaving Samsung and TSMC as the dominant players to manufacture advance innovative processors.

Part seven begins with Xi's emphasis on information, intelligence, and cybersecurity to achieve modernization and national security and announcement of "Made in China 2025" i.e. a plan to decrease dependence on foreign chips. The chapter then sheds light on evolution of telecommunication sector with particular focus on transition of 4G to 5G where Huawei played a dominant role in its construction with support of Chinese government. Company identified more than 250 most significant chips that it designs for its products. Then Miller concludes this part on the discussion that how China is striving hard to advance its capabilities to offset US leverage in military technology and how Pentagon is betting the future of its military technology.

In the last chapter, Miller has explored the potential cold war between China and USA over the microchips thus increasing the risks of Taiwan Strait Crisis fueled by advanced missile range, military capabilities and its high chipmaking capacity. During past few years, Huawei was the focal point, amid US-China tensions, symbolizing not only the espionage concerns but also technological competition. The restriction imposed on Huawei by Trump's Administration demonstrates the "weaponized interdependence." Such technological rivalry could be devastating not only for Taiwan, China, or USA but also for entire international system.

Data collection of the book is based on both Primary (interviews of industry insiders and experts who provided insights on the chip industry) and Secondary sources. The main shortcoming that I observed in this book is that Miller concluded without discussing US' chip decoupling policy against China. He missed the point whether such restrictions against China would contain China's chip industry or instead it would further strengthen China's drive for the semiconductor industry or even increase China's offensive against Taiwan. The only thing I personally disliked about this book was its technical jargons (but that is obviously the requirement of this area of field), which I found challenging to read, and I had to use a glossary to make an understanding. Otherwise, this book is the complete package to know the historical overview of the development of semiconductors and its increasing role in current great power politics. I will recommend all the scholars of international relations as well as strategic studies, particularly those interested in changing great power politics to go through this book.