China's Semiconductor Economic Statecraft

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ABSTRACT

China's investments into supercomputing and semiconductor technologies have been rapidly advancing, and grossly overshadow similar investments by the United States. These technologies are the gateway to not just the future of warfare, but to the very premise of a modern functioning society. In 2016 China struck a deal with Advanced Micro Devices (AMD) Inc. to gain access to semiconductor technology and has since worked to take that technology and develop their own in an attempt to ensure they no longer need to rely on the U.S. for computing capabilities. If China is able to become self-reliant and even force the U.S. to be reliant upon them, they would have the ability to not just prevent our warfighting ability from evolving, but society's technological advancement. The United States needs to be aware of this strategy of Economic Statecraft employed by China to effectively develop a response.

Advanced Micro Devices (AMD) Inc. is a United States based company founded in 1969 (Advanced Micro Devices, 2021) famous for the development of top of the line semiconductors. Semiconductors are used in all kinds of technology including phones, aircraft, and even the development of Artificial Intelligence. The People's Republic of China was historically behind the U.S. in advanced computing, but has recently heavily invested in technological firms such as Huawei (and often through its investing company Tencent) to bridge that technological gap (Vincent, 2019). This paper will discuss China's investment into AMD, China's economic statecraft strategy, and the implications of their recent investment in the computing realm and what that means for the U.S.

AMD and Intel were two of the largest developers of computer processors in the world for many years. These companies are both U.S. based, and have consistently remained at the forefront of computing innovation. In 2016, despite the healthy competition AMD was struggling to survive financially and made a deal with a deal with Sugon Information Industry Company. In exchange for AMD's processor technology, AMD would receive a nearly $300M payout, plus royalties from sales using AMD's technology. While this sounds mutually beneficial and unassuming on the surface, the concern stems from the fact that Sugon is a Chinese state sponsored entity whose primary purpose was stated at the time to be to support, "China's national defense and security" (O'Keeffe & Spegele, 2019). While this move was highly concerning to the United States, which responded negatively by claiming AMD's actions violated a number of laws, it ultimately proved beneficial to AMD as its stock price rose from under $2 in 2015 to over $11 in 2016 a year later (Advanced Micro Devices, Inc. (AMD) Stock Price & News - Google Finance, n.d.).

Making a deal with China has its own hardships though. China exerts control over a number of companies that operate within its borders. According to the Center for Strategic & International

Studies (Livingston, 2020), more companies have been implanted with Chinese Communist Party members, giving China increased influence, and even more still have been subjected to the pressures of Chinese officials or increased regulations that allow China to exert a hand into those businesses. Xi Jingping even, "called for establishing a "modern state-owned enterprise system with Chinese characteristics" and explained that what was meant by "Chinese characteristics" was "integrating the Party's leadership into all aspects of corporate governance" and "clarifying" its legal status within the corporate governance structure. Around this time, hundreds of Chinese State Owned Enterprises (SOE) amended their corporate charters to codify a role for the Party in corporate governance—a requirement subsequently made binding on all SOEs under a January 2020 CCP regulation" (Livingston, 2020). China's involvement in its own domestic companies is indicative of its global strategy of Economic Statecraft and its focus for world influence.

While the action above is relatively recent, it reflects a longer term strategy that allows China to make improvements in various sectors using its economic power. Sugon reaching an agreement with AMD gave China access to the supercomputing technologies that AMD had developed, which has industrial as well as military implications. Yet China does not have loyalty to a U.S. based company. While AMD's agreement may have been advantageous for both parties at the time, to China it served as a stepping stone towards that longer strategy. As AMD settled into the market, the Chinese Government grew able to influence the company in unexpected ways, such as preventing long-term growth through acquisitions or mergers (Braham, 2021), ensuring that even as AMD immediately benefitted from the deal with China, their expansion into the Chinese market can be limited based on China's goals. Even prior to that, many companies operating in China report that China often makes attempts to pry their technologies out of them using either pressure from state officials or citing regulatory compliance measures, with China even going as

far as to say, "Foreign companies are allowed to access China's markets but they would need to contribute something in return: their technology" (Wei & Davis, 2018). Now, China looks to grow past its reliance on AMD's technology as it seeks to develop its own technology. With China able to exert pressure to try and get companies to share their technology by preying on the desire to enter the Chinese market (which is substantial), soon they will no longer even have a need for those U.S. based companies at all as they develop their own technologies.

China seeks not to break its relationships, but to break its dependence upon foreign entities using gateways that were previously established through its investments in those entities (Browne, 2020). Long term, China's ideal seems to be for other nations to rely on China as opposed to the reverse, as indicated by projects such as the Belt Road Initiative. China has taken a number of actions in recent years to support this effort, including introducing massive tax cuts for domestic semiconductor developers (Williams, 2018), and creating a ~$29B state fund for semiconductor development (Kubota, 2019). In March of 2021, China published its five-year economic plan which also largely focused on that concept of technological self-reliance (Buck & Chenne, 2021).

China has invested a large sum of time, effort, and money into supercomputing technologies and other technological innovations. China is also focusing on being self-reliant in these areas. These actions naturally lead the U.S. to wonder: Why? On a surface level that answer may seem rather simple: China wants to make money, or otherwise compete with the U.S. But this strategy is indicative of a larger plan. There are a number of lenses through which a person can examine China's strategy on the world's stage. One valuable method is through the DIME model: Diplomatic, Informational, Military, Economic (Scott, 2018). For instance, taking the military lens into account shows that China only established its first permanent overseas base in 2017, in

Djibouti (Sutton, 2020). This lens shows both that China has not historically relied primarily on military statecraft to pursue its international policy objectives, but also that these efforts are intensifying. When regarding the sheer number of investments China has made in AMD and the semiconductor industry, the computing industry, and even infrastructure through the Belt Road Initiative, the Economic portion of the model grows in relevance. This is where it becomes crucial to recognize that China's overall strategy largely relies on Economic Statecraft. More than that, by recognizing this strategy the U.S. can shift its thinking on how best to maintain its power and influence on the world stage against a competitor that is employing a strategy that, while used, is not as heavily emphasized by the U.S. itself.

That is not to say the U.S. fails to employ economic statecraft. "Economic statecraft is a crucial pillar of U.S. foreign policy, and one that has grown ever more important in a globalized economy with the U.S. at the financial center" (Lew, 2019). The U.S. varies in its application of economic statecraft, but tends to default to using it as a negative through actions like sanctions or tariffs, as opposed to using investment as a tool (Cordell & Rublee, 2019). The distinction is that the U.S. does not focus its efforts on this method and also emphasizes other methods of statecraft, such as the military statecraft, more heavily than its competitors. On one hand, it is arguable that the U.S. is simply pouring more resources into foreign affairs and is heavily using each method of the DIME model to an amount that equals the output of any other nation. On the other hand, it is feasible that competitors focusing on one or two of these are much more heavily invested in that route and therefore at an advantage because they can focus more of their resources on one particular method. Using China as an example, they are focused on building resources through both foreign and domestic companies, some of which are state owned or operated. They also maintain the ability to pour a substantial amount funding behind these efforts

that the U.S. has yet to emulate, aside from military spending itself. This is a difficult point for the U.S. to meet, as the U.S. does not itself control the companies which it employs to the extent a Government like China's does. In the National Defense Authorization Act for Fiscal Year 2021, the U.S. established the Creating Helpful Incentives to Produce Semiconductors (CHIPS) For America Act, which did aim to renew investment to some extent as well as provide tax credits to U.S. manufacturers, as well as The American Foundries Act which allowed the Commerce Department to provide grants to semiconductor manufacturers (House, 2020). However, the amount being invested is still far below competitors, and China even stated they planned to out-invest the U.S. 50-1 (Lewis, 2020).

Why does it matter that China is outspending the U.S. in advanced computing technologies? Why should it matter that the Asian-Pacific region went from $29.8B in spending in 2001, to $282B in 2018 alone, now accounting for 34% of the entire global market for semiconductors (Semiconductor Industry Association Factbook 2019)? Regarding the technology itself, the applications are found in every facet of modern society, to include basic electricity supplies, aircraft, advanced weapon systems, and more. If China were to attain the self-reliance in this Industry they are striving for and worse, make the U.S. dependent upon them either through the possession of raw materials (such as those in Africa where China is investing heavily) or through China's own development of superior computing technology, then what leaders in the U.S. need to keep in mind is that China would potentially have the ability to cut off access to the technological advancement used by U.S. citizens and organizations (Blunt, 2021), effectively shutting down economic progress for the entire nation and widen the military power gap in their favor in a way that could scarcely be expected to happen through military spending alone.

China's increasingly heavy investments into the semiconductor industry hurts the U.S. economically by reducing Chinese dependence upon U.S. companies, while also opening the doors to indirect military advancement through the development of more effective technologies that they could feasibly bar the U.S. from having access to. China is able to affect the U.S. on multiple fronts using only a single overarching strategy: Investing in innovation and technology. The U.S. needs to meaningfully act in order to prevent this from being a near irreversible capability gap.

The U.S. has a number of strategies it could employ. The first involves simply copying China's strategies to an extent: multiplying the Nation's investment efforts substantially in domestic manufacturers and Research & Development companies to stay ahead of competitors. The U.S. cannot assume an arrogant posture that it is so advanced nothing can be learned from competitors. This is true even when it comes to the technology itself: While China has oft been accused of trying to pry technology away from U.S. companies because they are more advanced than what China already has access to, and that is not a strategy the U.S. can emulate, the U.S. can no longer assume it has a technological advantage just based on the historical fact that the U.S. contained most of the relevant companies such as AMD, Intel, Qualcomm, and Nvidia (other substantially sized semiconductor developers and manufacturers).

A second strategy involves encouraging investment in another area where the U.S. is sure to retain an advantage in. IHS Markit (Nurkin, 2020) researched China's investments in Advanced Weapon Systems, part of which included the development of semiconductor technology, and proposed, "the United States should seek to encourage China in subtle ways to continue investment in advanced conventional military capabilities, such as aircraft carriers, because these are competitions in which the United States is more likely to retain advantage."

The third potential strategy is for the U.S. to correctly prioritize a different advancement, be it technological, space, quantum computing, or otherwise. This is a very broad suggestion by necessity: Recognizing where the world is going technologically is key to retaining the U.S.' status as an economic powerhouse. If the U.S. wishes to compete with all the other Nations vying for supremacy of one kind or another on the world stage, then the U.S. needs to lead, adapt, and successfully maintain an economic edge in order to retain its military, diplomatic, and informational capabilities as well.

China is out-investing the United States. It funds foreign entities, then uses its leverage for its own benefit covering all aspects of the DIME model. The U.S. has rested on its laurels with an insufficient economic focus for too long, and now the world is catching up to make the challenge. If the United States is to retain its influence, it needs to account for the economic strategies of its adversaries and understand how those strategies will affect the U.S. Not only that, but China's strategy provides an avenue to potentially limit both the military and the economic statecraft efforts of the U.S. through non-military means; so the U.S. military needs to be aware that its capabilities may be limited through means that it cannot control or even necessarily affect. Only a renewed focus on the economic statecraft of both China and the U.S. can realistically provide an assurance of stability and security for the United States.

Bibliography

Advanced Micro Devices. (2021). *About AMD | AMD.* Retrieved October 7, 2021, from https://www.amd.com/en/corporate/about-amd.

Advanced Micro Devices, Inc. (AMD) Stock Price & News - Google Finance. (n.d.). Www.google.com. Retrieved October 8, 2021, from https://www.google.com/finance/quote/AMD:NASDAQ?sa=X&ved=2ahUKEwid6uak8bvzAhWkdd8KHRO8ABoQ3ecFegQIExAU&window=MAX

Roy, B. (2021, April 29). Semiconductors: Key to Economic and National Security. Www.rpc.senate.gov. https://www.rpc.senate.gov/policy-papers/semiconductors-key-to-economic-and-national-security

Braham, L. (2021). New Uncertainties Increase Challenges For Merger Funds. *Barron's, 101*(40), S9-S10. http://aufric.idm.oclc.org/login?url=https://www.proquest.com/trade-journals/new-uncertainties-increase-challenges-merger/docview/2578873161/se-2?accountid=4332

Browne, A. (2020, October 31). Bloomberg New Economy: Self-Reliance Is China's Endgame. *Bloomberg.com*. https://www.bloomberg.com/news/newsletters/2020-10-31/bloomberg-new-economy-self-reliance-is-china-s-endgame

Buck, G., & Chenne, J. (2021, March 21). *China aims for self-sufficiency – Deutsche Bank*. Flow.db.com. https://flow.db.com/more/macro-and-markets/china-aims-for-self-sufficiency

Cordell, A. M., & Rublee, B. (2019, December 1). *MONEY AS A WEAPON SYSTEM: ADOPTING CHINA'S STRATEGY IN DJIBOUTI*. Calhoun.nps.edu. https://calhoun.nps.edu/handle/10945/64125

U.S. House. 116th Congress. 2d Session. 6395, William M. Thornberry National Defense Authorization Act for Fiscal Year 2021. Washington: Government Printing Office, 2020.

Kubota, Y. (2019, October 25). China Sets Up New $29 Billion Semiconductor Fund. *Wall Street Journal*. https://www.wsj.com/articles/china-sets-up-new-29-billion-semiconductor-fund-11572034480

Lew, J. J. (2019). Preserving the power of U.S. economic statecraft. Retrieved from https://www.cnas.org/publications/transcript/preserving-the-power-of-useconomic-statecraft

Lewis, J. (2020, September 8). Semiconductors and Modern Defense Spending. Www.csis.org. https://www.csis.org/analysis/semiconductors-and-modern-defense-spending

Livingston, Scott. (2020). The Chinese Communist Party Targets the Private Sector. *Center for Strategic & International Studies.* Retrieved from https://www.csis.org/analysis/chinese-communist-party-targets-private-sector

Nurkin, T. (2018, May 12). China's Advanced Weapon Systems. IHS Markit. https://www.uscc.gov/sites/default/files/Research/Jane's%20by%20IHS%20Markit_China's%20Advanced%20Weapons%20Systems.pdf

O'Keeffe, K., & Spegele, B. (2019, Jun 28). Chip maker shared 'keys to kingdom' --- AMD helped china get world-class product, sparking battle over U.S. national security. *Wall Street Journal.* Retrieved from http://aufric.idm.oclc.org/login?url=https://www.proquest.com/newspapers/chip-maker-shared-keys-kingdom-amd-helped-china/docview/2248134773/se-2?accountid=433

Scott, K. (2018, April 25). *Joint Doctrine Note 1-18*. Joint Chiefs of Staff. https://www.jcs.mil/Portals/36/Documents/Doctrine/jdn_jg/jdn1_18.pdf

SEMICONDUCTOR INDUSTRY ASSOCIATION FACTBOOK. (2019). https://www.semiconductors.org/wp-content/uploads/2019/05/2019-SIA-Factbook-FINAL.pdf

Sutton, H. I. (2020, March 10). *Satellite Images Show That Chinese Navy Is Expanding Overseas Base*. Forbes. https://www.forbes.com/sites/hisutton/2020/05/10/satellite-images-show-chinese-navy-is-expanding-overseas-base/?sh=451179646869

Vincent, D. (2019, November 19). *How China plans to lead the computer chip industry*. BBC News. Retrieved October 8, 2021, from https://www.bbc.com/news/business-50287485.

Wei, L., & Davis, B. (2018, Sep 26). How China Systematically Pries Technology From U.S. Companies; Beijing leans on an array of levers to extract intellectual property--sometimes coercively. *Wall Street Journal (Online)* http://aufric.idm.oclc.org/login?url=https://www.proquest.com/newspapers/how-china-systematically-pries-technology-u-s/docview/2112271035/se-2?accountid=4332

Williams, S. (2018, March 30). *China Slashes Taxes for its Domestic Tech Companies*. Wccftech. https://wccftech.com/china-slashes-taxes-for-its-domestic-tech-companies/