DOI:10.1145/3571077

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How Not to Win a Tech War

A PARADOX: FOR THE U.S. to compete with China, the U.S. is using Chinese talent.

But let's start from the beginning. In May 2022, I predicted[a] a "tech war" between the U.S. and China. "If computing technology is viewed as strategic technology," I wrote, "then we may have to say goodbye to the research world in which we openly collaborated and openly published." The tech war has come faster than I personally would have predicted.

In early August 2022, the U.S. authorized USD280B in taxpayer money to subsidize American computer-chip companies and invest in technology research for the sake of "keeping America strong and innovative." Following that, in early October 2022, the U.S. imposed limits on semiconductor exports to China, aimed at limiting China's ability to make advanced semiconductors. The White House issued sweeping restrictions on selling semiconductors and chip-making equipment to China, in an attempt to curb the country's access to critical technologies.

Critics have questioned both legs of this strategy. On one hand, an investment of USD52B is considered relatively small, considering that a single major Taiwanese semiconductor manufacturer—TSMC—announced in 2022 new capital investments of more than USD40B. On the other hand, China has been a major market for the U.S. tech industry, and the growing separation between American and Chinese tech markets will also hurt U.S. companies.

But tech wars are ultimately won by innovation, which requires *both* financial and human capital. The U.S. benefited tremendously by being a magnet for worldwide talent. According to the 2021 Taulbee Survey[b] of the Computing Research Association, approximately 65% of doctoral students in computing in North America are international students. My estimate is that this pool of international students is dominated by Chinese students. My own research program has been greatly enriched by my Chinese students. This means the technological competition with China is aided, to a significant degree, by Chinese students. Hence, the opening sentence of this column.

But while American universities are still eager to attract Chinese talent, several U.S. actions imply otherwise. In 2018, the U.S. Department of Justice launched the "China Initiative," reflecting the strategic priority of the U.S. in "countering Chinese national security threats." Yet several prosecution cases under the China Initiative have ended in acquittals. Chinese-origin and Chinese-descent scientists and students studying and working in the U.S. bore and continue to bear the brunt of the suspicion. A September 2022[c] report by the Asian-American Scholars Forum (AASF) pointed out that feeling the pressure of potential federal investigations since the launch of the China Initiative, Chinese-origin scientists in the U.S. now face higher incentives to leave the U.S. and lower incentives to apply for federal grants. Furthermore, it has recently been reported[d] that the number of new Chinese students at U.S. colleges has plummeted from pre-pandemic levels.

A week after the AASF report was published, the U.S. National Academies issued a report[e] entitled "Protecting U.S. Technological Advantage." The main point of that report is that maintaining U.S. global leadership in science and technology requires a greater focus on strengthening innovation, and not solely on restricting access to specific technologies, calling on the U.S. to strive to maximize the amount of work that can be appropriately performed in an open research environment.

The National Academies' report also called on the U.S. to develop policies and programs aimed at developing domestic research talent. But the domestic doctoral talent pipeline has been shriveling for decades. In the mid-1990s, David Goodstein, a CalTech physicist, wrote in a blog: "The best American students have proved their superior abilities by reading the handwriting on the wall and going into other lines of work instead of choosing graduate school … The humming machinery kept right on going, fed by ore imported from across the oceans … Foreign graduate students have, temporarily at least, rescued our way of life."

In 2020, addressing the dearth of domestic doctoral students, I wrote[f] "The U.S. should welcome international doctoral students because they enrich our doctoral programs, not because they sustain our doctoral programs." I received dozens of responses to that column, all pointing out we cannot hope to attract domestic doctoral students by asking them to engage in an undertaking of six-plus years, while paying them approximately one-third of starting-computing-professional salaries.

To protect U.S. technological advantage, the U.S. should continue to welcome and attract international research talent. But the U.S. also must seriously address the issue of the domestic-research-talent pipeline. C

a https://bit.ly/3G3iCL9
b https://bit.ly/3FYXndm
c https://arxiv.org/abs/2209.10642
d http://bit.ly/3UDkDBH
e http://bit.ly/3EcTTCT
f https://bit.ly/3EdeEOG

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