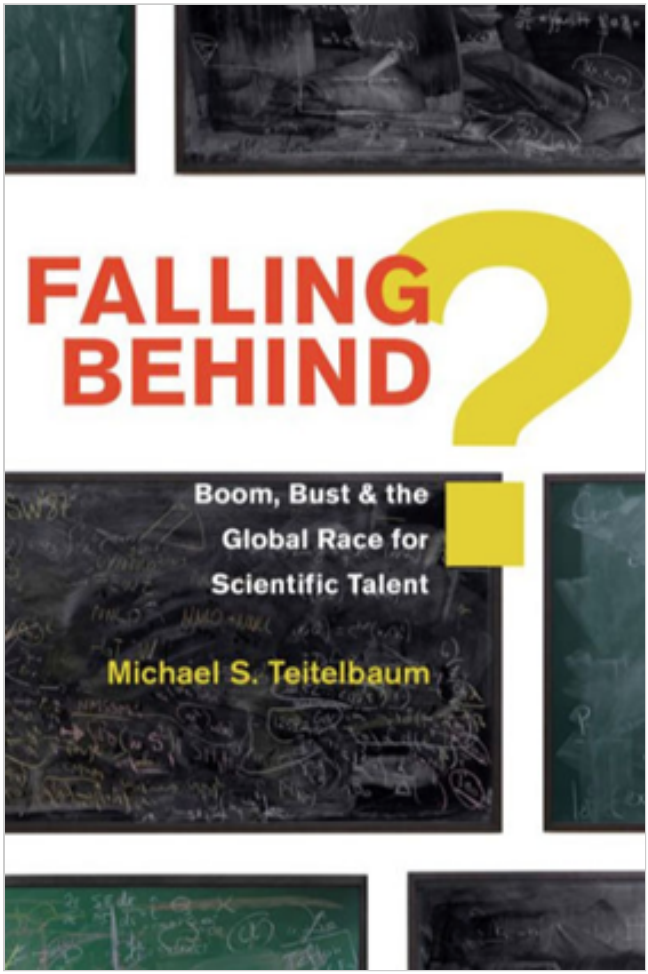
Monthly Labor Review
July 2019

Are U.S. scientists and engineers in short supply? Telling myth from reality

Falling Behind? Boom, Bust, and the Global Race for Scientific Talent. By Michael S. Teitelbaum. Princeton and Oxford: Princeton University Press, 2014, 280 pp., $31.95 hardcover.



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For much of modern history, countries have sought to improve their economic prospects by competing for access to material factors of production, such as land and natural resources. As post-World War II globalization has given greater prominence to technological innovation as a driver of growth, however, the focus of this competition has rapidly shifted from physical to human capital. In today's world of high-tech production and exchange, the top performers in the international economy arguably are those who can develop and attract the best scientists and engineers, and many in the United States, both in the private and in the public sectors, have become increasingly alarmed and vocal about an impending domestic "shortage" of such talent. But is this recent alarmism justified? Does it have a historical precedent? And what can past policy responses to skill shortages, actual or imagined, tell us about the way forward?

These are the questions taken up in Michael S. Teitelbaum's book *Falling Behind? Boom, Bust, and the Global Race for Scientific Talent*. Relying on detailed case studies, the author argues that, more often than not, alarmist claims about looming U.S. shortages of scientific and engineering talent are, at best, exaggerated and, at worst, unfounded and counterproductive. Early in the book, he shows that the recent concerns of alarmists are overblown, pointing out that the best evidence in their support—namely, the allegedly subpar quality of U.S. science and mathematics education at the K–12 levels—is misunderstood. While such quality issues do surface in

international comparisons, they are due mainly to averaging of data, masking both the high achievement inequality in the U.S. student distribution and the fact that high-tech occupations are typically sourced from the distribution's top quartile. Later in the book, Teitelbaum also dissects reports presenting conflicting evidence about the adequacy of the U.S. scientific workforce, with some of them cherry-picking data indicative of looming shortages and others showing ample or excess supply.

Going further back in time, the author also reveals that the present-day alarmism has been the rule rather than the exception. As it turns out, concerns about shortages of scientists and engineers have been a persistent feature of U.S. labor market debates since World War II. In taking apart the historical record, Teitelbaum identifies no less than five such episodes—three during the Cold War and two after it. In the earlier cases, alarmism typically originated in government and was mainly driven by national security concerns related to the Soviet Union, whereas in the later ones, it was tied to specific industries and pushed for by private entities, including nongovernmental organizations, corporations in the information technology sector, educational institutions seeking research funding, and immigration activists. Despite these differences, the calls for policy action often stemmed from parochial self-interest rather than an objective assessment of the situation, overstating the actual needs of the labor market.

The crux of Teitelbaum's argument is that all of these historical cases conform to a three-stage alarm–boom–bust cycle, each lasting between one and two decades. As the story goes, in the initial stage of alarm, government and/or industry leaders advocate for a rapid policy response and actively lobby the political elite, often exaggerating the "shortage" problem in order to have their voices heard and their demands met. In most past cases, such lobbying has been remarkably successful in invoking policy action, leading to sharp expansions of funding for scientific research, visa programs for workers with special skills, and the available pool of scientists and engineers. Eventually, however, such booms have proven short lived and unsustainable, rupturing the balance between demand and supply in the high-tech labor market. In the bust stage of the cycle, the oversupply of talent in science and engineering inevitably leads to a painful correction, with students and workers in those fields facing tougher career prospects. Perhaps worse, the resulting flight away from scientific occupations sets the stage for the beginning of a new pernicious cycle, forming a positive feedback loop.

In laying out these observations, Teitelbaum does not underplay the importance of the United States' maintaining a healthy scientific and engineering workforce. Indeed, in a chapter comparing the state of scientific research and higher education among developed countries, he notes that while America has retained its global edge on both dimensions, some of its peers, particularly China, have been catching up and chipping away at its dominance. He believes, however, that this race cannot be won through the current structure of the U.S. science and engineering enterprise, which, in his view, shows symptoms of "malaise"—all due to past cycles of alarm, boom, and bust, coupled with "a set of perverse and unintended incentives and positive feedbacks that have evolved in the U.S. research system." The book's closing chapter details this diagnosis and its symptoms, ending with an expansive list of policy recipes for confronting it. Stated briefly, these suggest that future efforts in the right direction should

(1) avoid rapid and erratic expansions in research funding and work-visa programs, opting instead for gradual increases based on objective evidence;

(2) reassess the incentives underlying outsized policy responses, possibly taking such measures as limiting the role of debt in funding research institutions and capping both the time spent in Ph.D. and postdoctoral positions and the expansion of such positions;

(3) devise mechanisms for objective assessment of career needs, leveraging the expertise of politically independent agencies such as the U.S. Bureau of Labor Statistics; and

(4) take extra caution in gauging demand and supply imbalances, particularly those with long-term implications.

Should readers open the pages of *Falling Behind? Boom, Bust, and the Global Race for Scientific Talent*? If they do, they will be well served. The book is a provocative survey of the major debates on the topic, probing dominant alarmist claims about impending workforce shortages in science and engineering—claims often taken on face value and left unquestioned. Although the book's content is not heavy on quantitative data and analyses, it provides interesting historical insights, relevant case studies, and critical assessments of previous reporting and research. It also opens possible venues for future investigations and offers policy prescriptions, moving from problem identification to problem solutions. For its part, the writing is clear and accessible, suitable for both laymen and technical experts.