

Office of Management and Budget et al.

Regulation for Federal Financial Assistance

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Introduction

The United States has entered a new era of strategic competition in which scientific leadership is inseparable from national power. China has made clear that it views science and technology not merely as engines of economic growth, but as decisive tools for military modernization, industrial self-sufficiency, and geopolitical advantage. Beijing's investments in basic research, applied innovation, talent development, and ensuring technology is shared everywhere it is needed, are designed to narrow — and eventually surpass — the United States.

Washington has enormous advantages. The United States still benefits from the world's leading research universities, a dynamic private sector, an open innovation ecosystem, deep capital markets, and a long tradition of federal support for basic science. These strengths have produced the discoveries that underpin American military superiority and broader economic productivity. But these advantages are not self-sustaining. A science funding system marked by uncertainty, abrupt cuts, politicized allocation, weak research security, or poor diffusion mechanisms risks eroding the very foundation of U.S. technological leadership.

In reforming federal spending, the Office of Management and Budget should be guided by a core principle: scientific excellence is a national security asset. To maintain its edge, Washington should strengthen peer review, preserve grant stability, improve research security, promote Gold Standard Science principles, protect critical research infrastructure, and ensure federally funded discoveries can be disseminated and scaled across the American economy and defense industrial base.

Importance of U.S.-China Science Competition

China increasingly believes its rivalry with the United States will be determined by science — its foundations, its funding, and its infusion into the broader economy and military industrial base. For Chinese paramount leader Xi Jinping, it is science — both basic research and applied innovation — that will determine China's future, allowing Beijing to ensure strategic self-sufficiency, deliver long-run economic growth, and command the next generation of the People's Liberation Army (PLA). It is this rationale that has prompted Beijing to invest so heavily in the foundations of contemporary science: basic research, funding certainty, and clear diffusion mechanisms.

China's science strategy has increasingly pivoted towards embracing these aspirations. Speaking to the Chinese Communist Party (CCP) Central Committee in 2023, Xi argued that, "Strengthening basic research is an urgent requirement for achieving greater self-reliance," explicitly noting reforms to the country's research ecosystem as a critical facet of its national

power.¹ Alongside sweeping directives, the CCP has also embraced a slate of regulatory reforms intended to promote competitiveness, including establishing new visa pathways for promising foreign scientists and instituting protectionist measures for research data.²

Despite facing severe economic headwinds, China also continues to invest in its scientific ecosystem. China now spends nearly at parity with the United States as measured by total government expenditures, a figure that reflects Beijing's commitment given the dimensions of its economy in comparison to Washington.³ Aside from fiscal support for research, Beijing has increased funding for higher education and military-related research projects, bolstering the overall value of its investment due to the additive nature of such spending.⁴ This spending is also bolstered by more diverse sources of funding, from municipal tax incentives for research parks to commercial research and development financing.⁵

China has also heavily invested in the diffusion mechanisms necessary to deliver discoveries at scale. Beijing prioritizes promoting innovation spill-over across the depth and breadth of its economy, such as metallurgy to improve nuclear reactors or LiDAR systems sensors appearing on main battle tanks.⁶ Its policy of military-civil fusion requires commercial firms to cooperate with the country's military industrial base; its deep manufacturing base is capable of scaling emerging technologies; and its effective clustering strategy of co-locating related industries is infused throughout its urban planning model.⁷ Even as such policies have led to structural imbalances, namely "involution," a process of destructive competition as provinces and

¹ "Xi stresses basic research for self-reliance in science and technology," *Xinhua* (China), February 22, 2023. (https://english.www.gov.cn/news/topnews/202302/22/content_WS63f60960c6d0a757729e7188.html)

² Jack Burnham and Annie Fixler, "China Is Winning the AI Race With America's Own Manhattan Project Lessons," *The National Interest*, September 1, 2025. (<https://nationalinterest.org/blog/techland/china-is-winning-the-ai-race-with-americas-own-manhattan-project-lessons>); Jack Burnham, "China's State Support and Pricing Practices in the Biotechnology Sector," *Testimony before the U.S. International Trade Commission*, May 27, 2026. (<https://www.fdd.org/analysis/2026/05/27/chinas-state-support-and-pricing-practices-in-the-biotechnology-sector>)

³ Jack Burnham and Johanna Yang, "Aiming for Parity With U.S., China Announces Increase in Science and Technology Spending," *Foundation for Defense of Democracies*, March 19, 2025. (https://www.fdd.org/analysis/policy_briefs/2025/03/19/aiming-for-parity-with-u-s-china-announces-increase-in-science-and-technology-spending)

⁴ Ibid; Ryan Fedasiuk, Alan Omar Loera Martinez, and Anna Puglisi, "A Competitive Era for China's Universities," *Center for Security and Emerging Technology*, March 2022. (<https://cset.georgetown.edu/publication/a-competitive-era-for-chinas-universities>)

⁵ Robert D. Atkinson, "China's Biopharmaceutical Strategy: Challenge or Complement to U.S. Industry Competitiveness?" *Information Technology and Innovation Foundation*, August 12, 2019. (<https://itif.org/publications/2019/08/12/chinas-biopharmaceutical-strategy-challenge-or-complement-us-industry>)

⁶ Craig Singleton and Jack Burnham, "From Parade to Battlefield: LiDAR at the Core of China's Military Modernization," *Foundation for Defense of Democracies*, September 22, 2025. (<https://www.fdd.org/analysis/2025/09/22/from-parade-to-battlefield-lidar-at-the-core-of-chinas-military-modernization>); Jack Burnham, "Regulatory Framework for Fusion Machines," *Foundation for Defense of Democracies*, May 26, 2026. (<https://www.fdd.org/analysis/2026/05/26/regulatory-framework-for-fusion-machines>)

⁷ Emily de La Bruyere and Nathan Picarsic, "Defusing Military-Civil Fusion: The Need to Identify and Respond to Chinese Military Companies," *Foundation for Defense of Democracies*, May 2021. (<https://www.fdd.org/wp-content/uploads/2021/05/fdd-monograph-defusing-military-civil-fusion.pdf>)

municipalities race to construct their own duplicative industrial champions, Beijing continues to focus on such efforts as a means of maintaining its global scientific and technical edge.⁸

Enduring Strengths of U.S. Science Strategy

It is no accident that China has prioritized these pillars as part of its science strategy — it is simply a reflection of the factors that have contributed to Washington’s long-running leadership position. America’s science ecosystem has historically converted open inquiry, federal investment, private-sector dynamism, and trusted institutions into strategic advantage.⁹ The same system that produced lifesaving medical advances, the digital economy, advanced aerospace systems, and modern computing also underpin U.S. military superiority.¹⁰

The foundations of American innovation are rooted in basic science. After the Second World War, Washington established its science strategy based on two parallel tracks: promoting large national science projects, such as the Apollo Program or the Human Genome Project, along with financing grant-based laboratories that conduct fundamental experimentation.¹¹ Rather than work cross-purpose, this distinction was intended to focus on key projects with immediate strategic value while continuing to support the flow of foundational findings that could eventually culminate in larger discoveries.¹²

These tracks were not intended to be apolitical but rather borrow from a “mission command” style of leadership, combining flexibility with preexisting priorities. Even when politically driven decision-making contributed to the cutting edge, such as the development of mRNA vaccines during Operation Warp Speed, it often built on a foundation of basic science that emerged prior to a particular mission. This lesson is directly relevant to national security. The United States cannot surge its way to scientific superiority in a crisis if it has neglected the underlying research base for years beforehand. Breakthroughs in artificial intelligence, quantum information science, biotechnology, advanced materials, hypersonic missiles, space systems, and next-generation energy will all depend on sustained investment in foundational research before those discoveries are translated into operational military or commercial applications.

⁸ Yanmei Xie, “An Anatomy of Industrial Involution in China,” *RAND Corporation*, October 24, 2025. (<https://www.rand.org/pubs/commentary/2025/10/an-anatomy-of-industrial-involution-in-china.html>)

⁹ L. Rafael Reif, “America Is Losing the Innovation Race,” *Foreign Affairs*, April 1, 2026. (<https://www.foreignaffairs.com/united-states/america-losing-innovation-race>)

¹⁰ Albert Sciarretta, Richard Chait, Joseph N. Mait, and Jordan Willcox, “A Methodology for Assessing the Military Benefits of Science and Technology Investments,” *National Defense University Center for Technology and National Security Policy*, September 2008. (<https://digitalcommons.ndu.edu/cgi/viewcontent.cgi?article=1053&context=defense-tech-papers>)

¹¹ Jack Burnham, Georgianna Shea, RADM (Ret.) Mark Montgomery, and Craig Singleton, “Accelerating the American Scientific Enterprise,” *Foundation for Defense of Democracies*, December 22, 2025. (<https://www.fdd.org/analysis/2025/12/22/accelerating-the-american-scientific-enterprise>)

¹² Ibid.

This system also cannot effectively function without its commitment to the peer-review process, which allows scientists to assess their colleagues' work on the merits of such proposals rather than their commitment to a particular political or industrial objective. While not inherently perfect — peer review tends to display a bias towards novelty and can struggle to differentiate between a broad range of high-quality proposals — the process performs markedly better than other forms of politically driven resource allocation.¹³

This model also works best with grant certainty, a key facet of contemporary science. While any science grant is fundamentally a public expenditure that should be prevented from being misused, allocation structure often determines long-term success. This lesson was made quite clear with the last major expansion of the NIH. While the Bush administration committed to doubling NIH funding, a major landmark in federal science spending, a subsequent revision in 2013 under budgetary sequestration led to significant disruptions.¹⁴ One-time infusions cannot adequately match projects that occur over multiple years and effectively waste the increase in human capital produced by such spending, as those seeking laboratories and grants of their own either fail to secure funding within an environment of sudden scarcity or exit the field entirely.¹⁵

The United States has also benefited from the free diffusion of federally funded scientific advances. More than simply enhancing the quality of scientific research, the private sector overwhelmingly relies on basic science to underpin its commercial success. This is more critical within the biomedical industry, as public and private investment operate as complements rather than crowding out one another and early-stage public investment offers the most elastic advantages.¹⁶ For national security, diffusion is the bridge between discovery and power. Federally funded research must be able to move from laboratories to startups, contractors, defense suppliers, manufacturers, and allied partners capable of fielding new capabilities before adversaries do.

¹³ Ferric C. Fang, Anthony Bowen, and Arturo Casadevall, "NIH peer review percentile scores are poorly predictive of grant productivity," *eLife*, February 16, 2016. (<https://pmc.ncbi.nlm.nih.gov/articles/PMC4769156>); Susan Guthrie, Ioana Ghiga, and Steven Wooding, "What do we know about grant peer review in the health sciences?" *F1000 Research*, March 27, 2018. (<https://pmc.ncbi.nlm.nih.gov/articles/PMC5883382>); A. Abigail Payne, "Do US Congressional earmarks increase research output at universities?" *Science and Public Policy*, October 2002. (<https://ideas.repec.org/a/oup/scippl/v29y2002i5p314-330.html>)

¹⁴ Richard C. Larson, Navid Ghaffarzadegan, and Mauricio Gomez Diaz, "Magnified Effects of Changes in NIH Research Funding Levels," *Service Science*, January 31, 2014. (<https://pmc.ncbi.nlm.nih.gov/articles/PMC3908662>)

¹⁵ Ibid; Wei Yang Tham, Joseph Staudt, Elisabeth Ruth Perlman, and Stephanie D. Cheng, "Scientific Talent Leaks Out of Funding Gaps," *U.S. Census Bureau Center for Economic Studies*, February 2024. (<https://www.census.gov/library/working-papers/2024/adrm/CES-WP-24-08.html>)

¹⁶ Pierre Azoulay, Joshua S. Graff Zivin, Danielle Li, and Bhaven N. Sampat, "Public R&D Investments and Private-sector Patenting: Evidence from NIH Funding Rules," *The Review of Economic Studies*, June 15, 2018. (<https://doi.org/10.1093/restud/rdy034>); Ekaterina Galkina Cleary, Jennifer M. Beierlein, Navleen Surjit Khanuja, Laura M. McNamee, and Fred D. Ledley, "Contribution of NIH Funding to New Drug Approvals 2010–2016," *Proceedings of the National Academy of Sciences*, February 12, 2018. (<https://www.pnas.org/doi/abs/10.1073/pnas.1715368115>)

Taken together, this strategy is responsible for unparalleled growth within the American economy and the rapid accumulation of national power. In contrast to other major developed economies, the United States maintains a high average rate of productivity growth — a phenomenon directly tied to basic science spending.¹⁷ Along with raising living standards, higher rates of productivity produce greater wealth, increasing the possibility of fueling critical investments in national defense without raising taxes or dipping deeper into debt. This spending also generates indispensable strategic leverage — American technological innovation forms the foundation of its effective export control strategy to deny adversaries a military edge.

Recommendations

To maintain its edge over China, the United States should strengthen the foundations of its overall science funding strategy by revamping its allocation of grant resources, adequately and fairly enforcing quality standards, and monitoring the results. These reforms should not be understood solely as budgetary or administrative adjustments but as necessary steps to preserve the scientific foundations of American military superiority, economic competitiveness, and technological leadership.

- **Federal agencies should ensure that discretionary awards target a broad range of recipients to maximize impact.** Grant-making agencies should prioritize a combination of shorter-term projects intended to produce immediate results and longer-term investigations intended to produce foundational knowledge to maximize federal investment in the sciences. This investment strategy also prevents the types of job cuts associated with previous significant spending disruptions, offering a more stable long-term approach to financing innovation.
- **OMB should prohibit the obligation or expenditure of federal funds to support certain collaborations involving covered foreign countries or covered foreign entities.** The administration should revise § 200.220 to strengthen research security measures, including issuing new guidance on prohibited activities to recipients and withdrawing support for previously approved research initiatives involving adversarial countries or entities as defined by Public Law No. 117-167.¹⁸

¹⁷ Philip Barrett, Niels-Jakob Hansen, Jean-Marc Natal, and Diaa Noureldin, “Why Basic Science Matters for Economic Growth,” *International Monetary Fund*, October 6, 2021. (<https://www.imf.org/en/blogs/articles/2021/10/06/blog-ch3-weo-why-basic-science-matters-for-economic-growth>); Nida Cakir Melek and Sydney Miller, “A New U.S. Productivity Chapter? What Industry Data Say About AI,” *Federal Reserve Bank of Kansas City*, February 11, 2026. (<https://www.kansascityfed.org/research/economic-bulletin/a-new-us-productivity-chapter-what-industry-data-say-about-ai>)

¹⁸ CHIPS and Science Act of 2022, Pub. L. 117-167, 136 Stat. 1366. (<https://www.congress.gov/117/plaws/publ167/PLAW-117publ167.pdf>)

- **Federal agencies should primarily rely on peer review mechanisms in conducting pre-issuance reviews of scientific grants.** While peer review should not be considered binding given its noted shortcomings in systemically misidentifying truly novel research, it should remain the basis for reviewing scientific grants. Peer review remains a foundational aspect of top-tier scientific research and a key safeguard against misallocating resources towards wasteful projects.
- **Applicants should commit to complying with Gold Standard Science.** The principles articulated in Executive Order 14303 — reproducibility, transparency, interdisciplinary, falsifiability — represent the core of the scientific method. As China struggles with significant credibility issues due to top scientists routinely being forced to retract papers because of errors, the United States should cement its status as a scientific superpower due to the strength of its commitment to the scientific method.
- **Federal agencies should consider indirect cost rates as a partial factor in determining discretionary awards.** In its responsibility to taxpayers and as a matter of economizing its science strategy, the federal government should ensure that its investment generates the maximum possible return. While this process should include weighing indirect costs — funding that does not directly finance research — they are often the result of managing sophisticated research rather than a sign of waste. Moreover, cutting indirect costs will likely disincentivize investment in maintaining strong research infrastructure, making cutting-edge research more expensive over the long term.
- **Federal agencies should consider alternative dispute resolution mechanisms for science funding.** While the federal government maintains a series of contract termination mechanisms, particularly embedded within 48 CFR 49.502, science funding is distinct in that abrupt cuts are more likely to produce waste than other forms of investment. Rather than contracts that can easily shift between competing recipients due to their standardization, scientific grants require long-term planning to produce more exquisite products, ensuring that sequestration often produces stagnation rather than savings.
- **Federal agencies should broaden the terms of federal awards to include distribution of funded research.** The ultimate purpose of federal research is to produce knowledge capable of being accessed by its funders: the American public. To this end, federal agencies should ensure that grant recipients can reliably distribute their findings in professional conferences, open-access journals, and other publications.

Conclusion

The United States must prepare to develop and execute a science strategy capable of maintaining its lead over China. This strategy can only rest on a Washington willing and able to identify foundational discoveries, nurture scientific talent, and ensure that the American public and private industry can scale innovation.

Thank you for considering our comments. We look forward to seeing how our input is incorporated into the administration's ongoing policy work.