

Statement of

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and

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Chairwoman Stevens, Ranking Member Feenstra, Chairwoman Johnson, Ranking Member Lucas, and Members of the Committee, thank you very much for inviting me to testify at this hearing.

I am the Henerger Distinguished Professor in the Department of Public Policy at the University of North Carolina, a Professor of Finance at Kenan-Flagler Business School and a Research Director at UNC Kenan Institute of Private Enterprise. I am appearing today in part as an expert in innovation and a scholar of the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, and in part because of my role as the co-chair of several assessments of the programs that are either completed or underway at the National Academies of Sciences, Engineering, and Medicine. The National Academies assessments include two completed reports: an assessment of the DOE programs which was completed in 2020, and an assessment of NIH's programs, which was released earlier this year. The assessment of NSF's programs is underway. Additional evaluations are planned for NASA and DOD.

I will make my best effort to differentiate between comments and recommendations today that are my own, and those that reflect consensus findings and recommendations of those National Academies assessments. For a full description of the findings and recommendations in the National Academies assessments, I would refer the committee to those reports, which are available via the National Academies Press at [www.nap.edu](http://www.nap.edu).

It is my opinion that overall, the SBIR and STTR programs demonstrate that effective public-private partnerships play an important role in promoting the commercialization of science and leveraging America's innovation economy. The programs have been extremely successful on a variety of measures and deserve Congress's continued and enthusiastic support.

Let me begin by discussing the role that SBIR and STTR play in the U.S. innovation system. In each of our released National Academies' reports, the study committees found that the programs were effective at funding small businesses that provide and stimulate research, experimentation, and innovation in the energy and health sciences sectors.

For DOE, our committee found that the programs contribute to DOE's R&D needs and advance the national energy innovation system. We found that some awarded firms have achieved significant commercialization outcomes; however, there has not been large-scale commercialization on a systemic basis by the awardees. This may be due to a lack of follow-on private sector investment.

At the same time because the vast majority of DOE awards are in response to targeted solicitations for particular technologies, we were able to assess the broader

impact of the programs on other firms in the energy innovation system, finding significant technological spillovers -- especially to nearby firms located in the same state and region.

Similarly, our study committee looking at the NIH SBIR and STTR programs found that they provide funds for U.S. small business to conduct rigorous and commercially relevant life sciences biomedical research and innovation, contributing to US leadership in life sciences innovation. Awarded firms have produced a significant number of new drugs and devices. In fact, 12 percent of new drugs and 18 percent of orphan drugs approved from 1996 to 2020 are associated with NIH SBIR/STTR awardees. However, because of data constraints, our committee was unable to establish that the receipt of NIH SBIR/STTR funding was responsible for these outcomes. NIH selected high quality firms, and other funding (from both the public and the private sectors) is available from the vibrant biomedical ecosystem. Awarded firms may have achieved the same outcomes even in the absence of NIH SBIR/STTR awards. In the NIH report, the committee noted that a significant number of awards go to firms that are new to the programs and in the first few years of their existence. The SBIR program often provides first funding.

The program has been relabeled as “America’s Seed Fund.” It is my personal belief that this label is misplaced as it limits the program to simply addressing a capital constraint. SBIR also provides a context for developing cutting edge technology, connecting small firms to federal agencies that can make further introductions. Most DOE SBIR/STTR awardees receive their first awards in the early years of their existence and in some cases the program provides the impetus for the formation of the firm.

Let me address the issue of SBIR “mills” – a pejorative term that implies that a significant number of awards go to a small number of small businesses who are dependent on government funding for their entire lifespan and do not end up commercializing anything. There is no generally accepted definition of what qualified a firm to be a “mill,” but there is a perception that the number of awards should be limited. Here it is important to remember that innovation is complex and often requires multiple, reinforcing inventions and projects. This is especially true for energy innovation and biomedical innovation, which require a great deal of funding support and a long-time horizon to achieve commercial success.

In the DOE report, our committee noted that there are a small number of firms that receive significant awards, but these firms are often supplying specialized equipment (primarily for the national labs) where there is not a large commercial market. In the NIH report, we found that the outcomes are much higher for the firms who win the largest number of awards.

My own research on multiple award recipients indicates that firms at the extreme tail of the distribution defy this label – they patent extensively, sell commercial products and engage in government procurement. Often overlooked in discussing the “mills” is the fact that awards are made to specific Principal Investigators, who go on to start new firms or join other companies, both large and small, or go on to academic jobs. Applying for an SBIR award requires familiarity with the program; firms that win multiple awards function as incubators for human capital and ideas.

As part of its charge, each of these National Academies’ reports has recommended ways that the programs could be improved to increase commercialization of federally funded research, and I will highlight some of those now.

In the case of NIH, although the combined NIH SBIR/STTR budget is over \$1 billion per year, each institute or center operates as a smaller life sciences program. There is significant variation across the institutes with its own approach to outreach, selection, and support of awardees and applicants.

- Commercialization outcomes would be significantly improved by adopting processes and procedures that reduce the time frames that NIH uses for reviewing and selecting awardees, and by placing more emphasis on the commercial potential and the steps needed to achieve a technology’s commercial potential expertise. These would include making sure that reviewers and staff have adequate experience with the needs of innovative small businesses. Improvements along this dimension are likely to need action by Congress to remove the requirement that SBIR applications are subject to the identical scientific review as academic and more basic projects.
- There are other needed commercialization improvements. Our committee found that many of the commercialization programs offered within NIH for SBIR/STTR awardees are duplicative and fragmented across the institutes and centers, as well as duplicating programs offered by regional and local life sciences incubators and accelerators. Focusing on building bridges to the national and local biotech ecosystem would be better than duplicating the resources that are already available.
- Additionally, in the DOE report, the committee noted that the technical and business assistance is required to be subcontracted to outside vendors in order to receive the congressionally allotted funds – a requirement that may be detrimental to commercialization and business development of the firm. The vast majority of DOE SBIR/STTR funded small businesses are founded by the technical expert, and the management structure is heavily weighted toward technical – rather than business – expertise. Allowing firms to use TABA funds for in-house expertise would encourage a more diversified top management, and such diversity is associated with more growth potential among small firms.

Research has found that the SBIR program serves to certify that firms are high quality and deserving of further investment. The program is important to seeing local entrepreneurial ecosystems. The program is so important that virtually every state has initiated programs to help firms win SBIR awards and half of states provide matching funds to top off SBIR awards and further incentivize firms.

As far as achieving their goal to foster and encourage participation in innovation and entrepreneurship by women and socially or economically disadvantaged persons, in both DOE and NIH, the committee found that the programs could be significantly improved by better outreach, especially to minority-serving institutions. DOE's progress may be constrained by a shortage of women and minorities in the relevant fields: for example, the vast majority of electrical engineers are white men. Diversity of the pipeline, including improving the diversity of employment at the national labs, may be needed to help improve the diversity of applicants and awardees in DOE's SBIR and STTR programs. The bulk of DOE's SBIR/STTR reviewers come from either national labs or universities, and there is a lack of gender and racial diversity in those institutions.

However, pipeline issues are likely not the cause of NIH's lack of progress on this goal. More than half of PhDs in biology are awarded to women. Notably, although a significant share of historically black colleges and universities have medical schools, collaborations between these institutions and small businesses are rare. While NIH has made significant improvements in the share of abstracts and awards addressing health issues for women and minorities, the share of applications and awards to businesses owned by women or underrepresented minorities has not improved in the last 20 years.

Women and minorities may be facing funding constraints that white male business owners do not, and those constraints are compounded by long processes for selecting and awarding applicants. Additional funding does not seem to improve the situation for NIH – additional funding supplied by the Recovery Act led to an increase in acceptance rates for small businesses owned by men, not women. And the larger institutes and centers at NIH do not have higher application or award rates for women and minorities.

I would like to say something about the lack of available data to assess the SBIR and STTR programs' successes and/or challenges. Assessments of how the programs are doing is difficult to do without information on potential awardees, such as those who apply to the program but are not selected or how peer review scores affect the selection of awardees. Periodic assessment of the programs is important, and Congress needs to ensure that the appropriate data are collected and available to perform these assessments. Otherwise, there is little information about whether changes in processes and procedures have led to the desired outcomes.

NIH's RePORTER and PubMed databases have improved our ability to evaluate NIH funding, but significant improvements are needed to the collection and reporting of

this information. And the only information on DOE's awardees was available from the Small Business Administration. We were able to identify significant gaps and errors in the Small Business Administration's public database on SBIR and STTR awards by comparing it to the RePORTER database, but a comprehensive database of DOE awards is not available. Significant improvements in the collection and reporting of data would improve our ability to perform such assessments.

Additionally, I would like to note that we only have information on small business partnerships with research institutions for STTR awardees, not for SBIR awardees. It is likely that a significant amount of federally funded university research is associated with SBIR awards, but we have little information on this topic. Conversations with university tech transfer experts indicate that universities use both SBIR and STTR programs. Because the pool of money is larger for SBIR, it is likely that this program is more attractive to university researchers. Additionally, during both the DOE and NIH assessments, our committee members interviewed program managers in all parts of the organizations, and program managers did not indicate a separate use for SBIR versus STTR. The distinction between these programs seems to be artificial.

At the same time, the agencies have to allocate different amounts of money to each of the different programs and each part of each organization. Which means that for some parts of DOE and NIH, an institute or office may be unable to offer Phase II STTR awards. Congressional action is needed to allow agencies more flexibility within SBIR and STTR, or across the different institutes or offices, which could improve the outcomes from the programs. In both DOE and NIH, because the funding is a fixed percentage of extramural research and development, there is little incentive for the agency to allocate awards to advance its broader missions, rather than the needs of a particular office or institute.

In conclusion, we know that over the past 40 years, these programs have played a critical role in advancing the innovation ecosystem and have helped small businesses contribute significantly to U.S. competitiveness. Many people want to talk about return on investment, but when dealing with innovative small businesses, we must recognize that there will be many failures but also a few "home runs" that essentially pay for the whole program. Innovative outcomes are skewed with a few billion-dollar valuations. Many small firms fail, but people and their ideas recirculate to make the innovation system more vibrant.

Thank you for the opportunity to testify. I look forward to the opportunity to address your questions.