HOUSE COMMITTEE ON THE BUDGET
Chairman John Yarmuth

July 6, 2020

Hearing: Fueling American Innovation and Recovery – The Federal Role in Research and Development

Government investments in research and development (R&D) have been central to American innovation and prosperity. Today, reinvigorating and improving our science and engineering capabilities can help our nation address the crises we now face – systemic inequality, an ongoing pandemic, and an historic economic downturn – while better preparing our nation for the future. Despite this immense potential, federal R&D funding as a share of the economy has fallen from barely 1.9 percent in the mid-1960s to less than 0.7 percent in 2018. On July 8th, the House Budget Committee will hear testimony on the importance of government investments in R&D for our public health, economic recovery and productivity, quality of life, and ability to respond to current crises and emerging challenges.

The federal R&D budget is declining despite historical successes — Past federal R&D investments have generated important new knowledge, tools, and technologies. For example, the primary technologies for a smart phone, including the microprocessor, battery, hard drive, touchscreen, GPS, and the internet itself, all stem from government-funded R&D and procurement. Advances in genomics and structural and synthetic biology laid the groundwork for improved vaccine development and other medical advancements. Since the early 1980s, federal R&D funding has remained between approximately 11 and 13 percent of discretionary spending and currently totals more than $150 billion.[1] But as discretionary spending has declined as a share of GDP, so has federal R&D investment. Consequently, the United States slipped from 4th to 10th since 1995 in a global ranking of R&D expenditures, and U.S. patent productivity fell by half since 1990.

The private sector relies on public investments — The unique capacity of the federal government to invest in long-term, basic research is critical for the flow of new ideas and discoveries that fuel our economy. While private sector R&D investments have increased, they have shifted toward nearer-term development, leaving gaps in early-stage development efforts. Despite the value of technological innovation, companies often lack the incentives to invest in R&D because of knowledge spillover to competitors. As a result, the government is often the "investor of first resort," filling the gaps in long-term funding for early-stage technology development as well as more fundamental research.

Federal R&D accelerates innovation, productivity, and job growth — Aside from the inherent value of knowledge and scientific discovery, public R&D investments also increase the rate and quality of innovation. Federally funded research leads to more and higher-impact patents, and nearly 30 percent of U.S. patents now rely on this research. Localized clusters of federally

supported R&D in labs and universities increase regional economic opportunities, creating jobs in the short- and long term, while federal R&D attracts rather than displaces additional private investment, especially in small companies. Ultimately, federal R&D spending increases aggregate economic output, generating an estimated 3 to 8 times the initial investment.

National progress and competitiveness require a diverse R&D portfolio — The federal R&D portfolio includes major science agencies like NIH, NASA, and the National Science Foundation, as well as mission-oriented R&D offices advancing defense technologies, agricultural productivity, and natural resource stewardship. Within this portfolio, three types of federal investments help transition scientific knowledge into practical use and value: First, **use-inspired and high-risk, high-reward R&D** connect revolutionary research to solving major societal challenges. For example, the ARPA (Advanced Research Projects Agency) model of mission-relevant, transformational R&D simultaneously accelerates both scientific discovery and technological invention. Second, **funding for pre-commercial technology development, testing, and demonstration** helps to overcome investment barriers and meet public goals (like national security or public health) that the market alone cannot. Third, **federal support for technology transfer and commercialization, small business entrepreneurship, and regional innovation hubs and technology clusters** further ensures competitiveness. This is especially true for emerging disruptive technologies such as AI, advanced semiconductors, and genomics.

People are ultimately the source of discovery and invention — To fully tap our nation's potential, we must develop a diverse science, technology, engineering, and mathematics (STEM) workforce by investing in education and training, attracting and retaining immigrants, and eliminating entry barriers for minorities and women. Currently, children from high-income families are 10 times more likely to become inventors than those from lower-income families. Black and Latino Americans represent only 1 to 2 percent of the entrepreneurial and venture capital labor pool. Targeting federal investments to increase diversity, equity, and inclusion in the research and innovation ecosystem would advance social justice, accelerate discovery, and boost productivity – while also increasing GDP per capita by as much as much as 3 to 4 percent.

Federal support for R&D is a powerful example of the value and impact of discretionary investments that work to enhance the efficiency and equity of the economy – especially in a time of national need. At this upcoming hearing, the Budget Committee will hear from expert witnesses and discuss long-term trends in federal R&D funding, the economic and social returns on R&D investments, and the importance of the government-university-industry partnership. Expert witnesses who will inform our discussion are:

- **Sudip Parikh, Ph.D.** – CEO, American Association for the Advancement of Science
- **Paul Romer, Ph.D.** – Professor, NYU
- **The Hon. Deborah Wince-Smith** – President and CEO, Council on Competitiveness
- **Willy Shih, Ph.D.** – Professor of Management Practice, Harvard Business School

[1] Includes a small amount of mandatory spending. Does not include related tax expenditures.