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The Role of Government in Promoting R&D

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Thank you, Mr. Chairman, Senator Hatch, and members of the Committee for inviting me to testify here today. My name is Scott Wallsten, and I am vice president for research and senior fellow at the Technology Policy Institute as well as a senior policy fellow at the Georgetown Center for Business and Public Policy.

Research and development plays a crucial role in our economy and our future welfare. Two factors, however, suggest that there could be a gap between the optimal actual levels of R&D activity in the economy.

First, R&D exhibits classic positive externalities. In other words, its benefits extend beyond the innovator as others build on it. But that very feature also means that the innovator does not earn all the returns to the investment. Because firms base their R&D spending on their own expected returns, not the social expected returns, they invest less than they would if they could appropriate all the returns. That is, by themselves businesses are likely to invest fewer resources than is efficient from society's overall perspective.

The private returns to R&D are difficult to measure, but studies suggest that in industrialized countries they are probably about 20-30 percent—significantly higher than returns to other investments. Measuring the so-called research "spillovers," and thus the total returns to R&D, is even more difficult, but a wealth of studies suggest that they are substantially higher than the private returns.[1]

If the marginal private returns are so high, it is reasonable to ask why firms don't invest more. The answer is the second reason to believe there may be a gap between optimal and actual levels of R&D activity.

Primarily because of its riskiness and the inability of the researcher to provide full information to financiers, the cost of capital for research may be higher than for other goods.[2]

Both of these factors suggest that government can play an important role in supporting R&D, ranging from conducting R&D itself, to directly financing others to do it, to creating incentives for others to invest their own money in it.

And, indeed, the government does all of those things. In 2010, federal agency budgets included about $149 billion for R&D spending. That represented a general upward trend over the previous decade in real dollars, though R&D budget obligations decreased by about 3.5% in FY 2011.[3]

To be effective, however, government R&D activities must generate R&D that would not happen otherwise. If government merely subsidized R&D that firms or others would have undertaken anyway then the government support would have had zero effect and simply crowded out other sources of finance.

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[1] Bronwyn H. Hall, Jacques Mairesse, and Pierre Mohnen, *Measuring the Returns to R&D*, Working Paper (National Bureau of Economic Research, December 2009), 22, http://www.nber.org/papers/w15622.

[2] Ibid.

[3] http://www.aaas.org/spp/rd/rdreport2012/tbli10.pdf

Identifying the areas government should fund is not always easy. Industry spends far more than the government on R&D. According to the National Science Foundation's most recent data, in 2008 industry funded about $268 billion in R&D.[4]

The trick for government is to figure out how to generate R&D that would not happen without subsidies. Achieving this goal is probably easiest in the case of basic research, where private returns may be small, especially in the short run, but the total returns may be large, especially when they diffuse among lots of researchers.

And, in fact, government does spend more on basic research than industry does. While only about 4-5 percent of industry R&D spending is on basic research,[5] nearly half of all federal non-defense R&D is on basic research.[6]

But stimulating additional research is more difficult for government policy in the case of applied R&D or of projects closer to commercialization, where the private sector has stronger incentives to provide funding.

In theory, research projects do exist—even ones very close to yielding commercializable products—that industry does not expect to be profitable but whose total benefits would exceed costs and thus justify government support. Unfortunately, we generally have no good way to identify these projects.

Understandably, government typically tries to the fund projects most likely to succeed, especially if a metric of success is whether the subsidy yielded a payoff. But in that case, government risks basing funding decisions on the same criteria the private sector would use. If that happens, the program as a whole may appear to be successful, but if government funding simply replaced private funding then the program was not effective at all. In part for that reason, direct government funding of commercializable industrial research has a mixed track record, at best.

The first step in making those programs more successful would be designing them in such a way that they could be rigorously evaluated. Such evaluations would mean, at a minimum, tracking projects and firms that did not receive subsidies as well as those that did, and in the best case, introducing evaluation tools such as randomization. However, government has shown no interest in rigorous evaluation of corporate subsidies in the past, and no evidence suggests it will in the near future, either.

The R&E tax credit, however, is different from direct R&D subsidies. Unlike direct subsidies that by definition require difficult decisions that yield winners and losers, the tax credit appears to be a rather successful policy tool that most studies find does stimulate additional R&D.[7]

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[4] http://www.nsf.gov/statistics/seind10/c4/c4h.htm

[5] Derived from table 4-2 http://www.nsf.gov/statistics/seind10/tables.htm#c4

[6] In FY 2010 the government allocated about $30 billion for basic research, $31 billion for applied research, and $83 billion for development, although about 90% of development funding was for defense. http://www.aaas.org/spp/rd/rdreport2012/tbli05.pdf

[7] Bronwyn Hall and John Van Reenen, "How Effective are Fiscal Incentives for R&D? A Review of the Evidence," *Research Policy* 29 (2000): 449-469.

Although the R&D tax credit should be considered a successful policy, two factors have probably blunted its effectiveness.

First, its lack of permanent status reduces its ability to coax firms to do more R&D.

Because firms tend to smooth their R&D spending over time, their responses to temporary policies are likely to be muted. A temporary tax credit will, therefore, have limited effectiveness. That is, if firms do not have confidence that the credit will remain in effect, they will probably not increase their R&D spending by as much as they would if the credit were permanent. A permanent R&D tax credit would be more consistent with the way companies make decisions regard R&D spending and is more likely to have the intended positive effect on private spending.

A second reason the tax credit may not have been as successful as it could have been is related to how it determines which expenditures are eligible. In order to be effective, the credit must generate new R&D, not just subsidize R&D that would have happened anyway. For this reason the credit appropriately requires defining qualified expenditures and setting a baseline amount. Neither of those are simple, and a 2008 GAO report found that the credit was inadvertently subsidizing some R&D spending that would have occurred anyway, in part because the baseline level of spending was calculated using data more than 20 years old.[8]

Updating and simplifying the process for determining eligible expenditures is also likely to increase the effectiveness of the tax credit if that makes it possible to better target the credit to new R&D.

Stimulating new research in the U.S. requires additional policies, as well. For example, most R&D expenditures are for scientists and engineers, and their supply is relatively fixed in the short run. More spending on R&D without increasing the numbers of scientists and engineers may result in higher salaries for people already doing R&D, but not more R&D itself.[9] The most effective way to increase the supply of scientists and engineers in the U.S. is to attract the best from wherever they are, which requires looser immigration policies. Moreover, a 2009 study by Arlen Holen at the Technology Policy Institute found that looser immigration policies would also increase economic growth and revenues to the Treasury.[10] While immigration is beyond the scope of this committee, it nevertheless remains an important complement to tax policy if the goal is to encourage new R&D.

In short, R&D is crucial to our future well-being. The R&E tax credit is one of the few government policies that is widely recognized as successfully stimulating additional R&D. Its effectiveness would be strengthened first by making it permanent and, second, by careful consideration of what is considered baseline spending and what is eligible for the credit.

Thank you.

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[8] United States Government Accountability Office, *The Research Tax Credit's Design and Administration Can Be Improved*, November 2009, http://www.gao.gov/new.items/d10136.pdf.

[9] Austan Goolsbee, "Does Government R&D Policy Mainly Benefit Scientists and Engineers?," *American Economic Review* 88, no. 2 (May 1998): 298-302.

[10] Arlene Holen, "The Budgetary Effects of High-Skilled Immigration Reform," *SSRN eLibrary*, 2009, http://ssrn.com/paper=1407280.