Insight

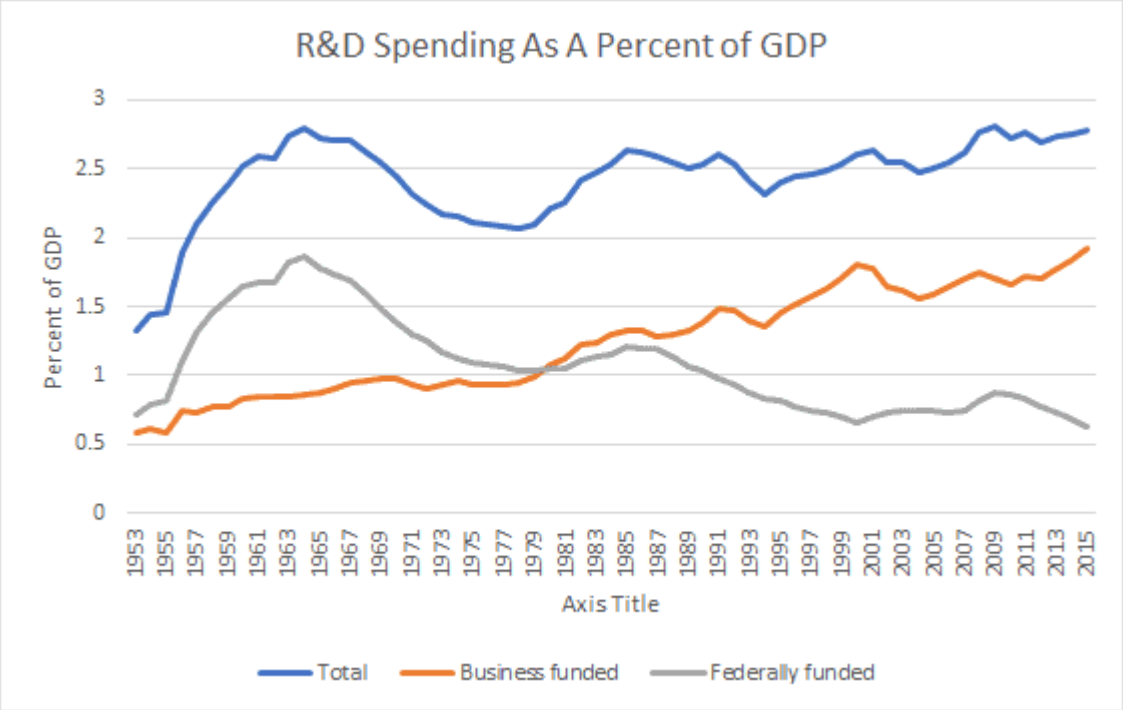
R&D Funding in the First Year of Trump's Administration

WILL RINEHART, EVAN PRETZLAFF | MARCH 29, 2017

Some have reacted to President Trump's proposed budget by claiming that it severely reduces funding for science, yet the net impact isn't likely to dramatically change the overall level of research and development (R&D) funding. Instead, the budget blueprint would likely shift the mix of funding at the federal level, away from basic research and into applied research and development. New data from the National Science Foundation (NSF) on 2015 R&D funding levels helps to flesh out potential impacts. More importantly, the data also show that broader changes in R&D funding have occurred.

Research and development spending bundles together three distinct kinds of activities: basic research, applied research and development, sometimes call experimental development. Basic research, by its very definition, is not directed towards a goal. So, while therapies for cancer might come as a result of basic research, basic research isn't aimed to cure diseases or solve practical problems. Applied research aims to achieve these goals, since it deals with solving practical problems. Development spending tallies the monies spent bridging the research into consumer products.

While the 1950s is sometimes thought of as a time of expansive research funding, official data suggest otherwise. As a percentage of GDP, the level of funding directed towards research and development was near all time highs in 2015 at 2.78 percent, just shy of the record in 2009 of 2.81 percent.

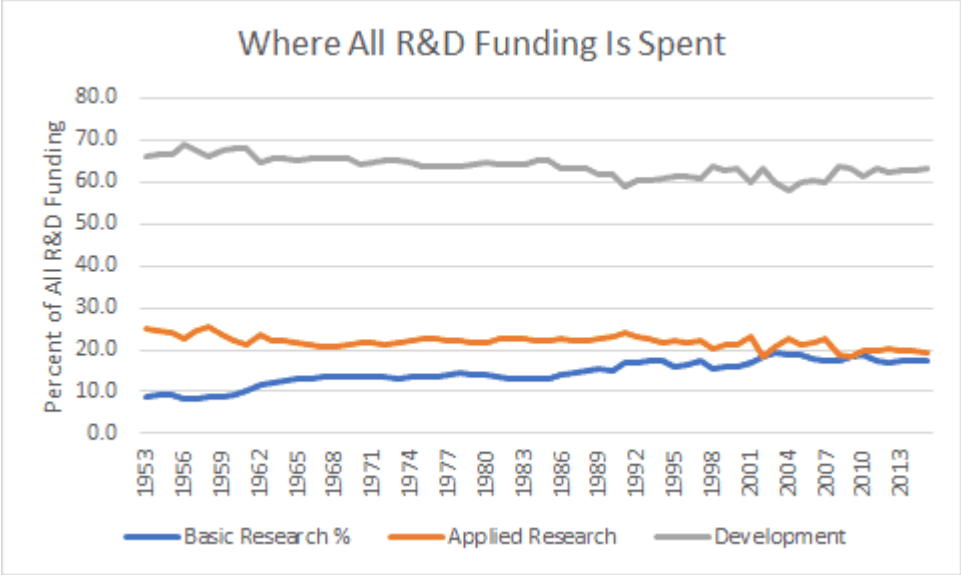


Overall funding for R&D increased by 4.5 percent between 2014 and 2015, driven completely by industry investments. Much like years before it, 2015 saw the predominant share of R&D come from business and go into development. The increase in 2015 was similar to yearly changes in 2014 and 2013, but lower than the 7 percent increases seen over 2005 to 2008.

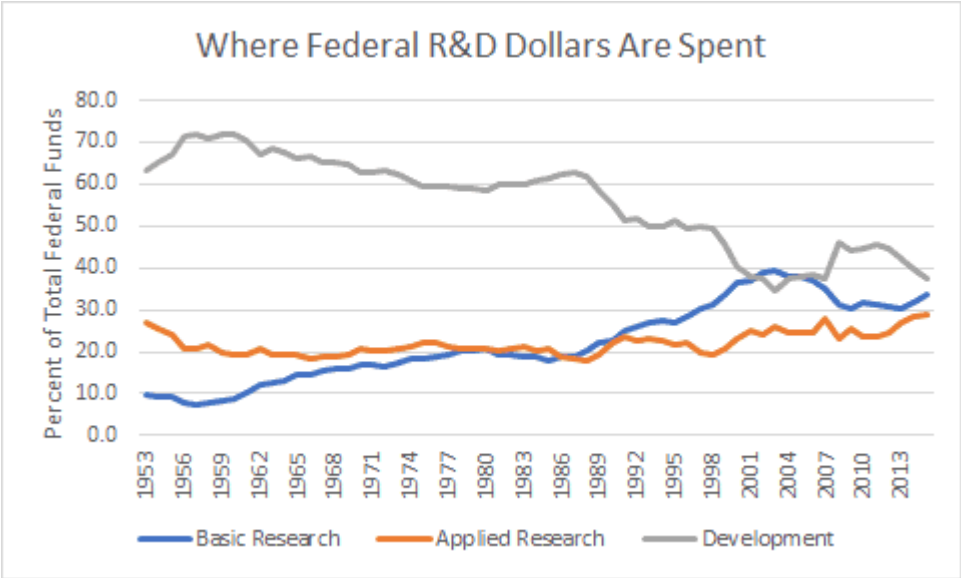
R&D performed by academic institutions has seen strong growth. After adjusting for inflation, this sector grew on average 2.56 percent annually from 2009 to 2015, ahead of total R&D, which grew at 1 percent.

Internationally, the US continues to rank near the top of R&D spending per GDP, besting both the European Union as a whole and China. Yet, Israel, Korea, Japan, Sweden, Austria, Taiwan, Denmark, Finland and Germany all spend more as a percentage of GDP.

As the chart below helps to show, dramatic shifts in the mix between these three kinds of spending haven't occurred. Contrary to a consistent trope, basic research has actually inched up in prominence over time, rising from 8.9 percent of R&D funding when the data series began in 1953 to 17.4 percent in 2015, driven by business. In total, business contributed 28 percent of the basic research, doubling the amount spent in 2009, while the federal government funded 44 percent of basic research in 2015.



Yet, the federal government is a different story. It has shifted where it spends R&D monies. The long term trend has been away from development, which has been taken up by business, and into basic research as the chart below displays.



Funding cuts at the National Institutes of Health suggested by President Trump would likely reduce the absolute amount of spending in basic research, since this agency conducts the lion share of federal spending.

Federal Spending in Basic Research in Millions by Agency*							
	2009	2010	2011	2012	2013	2014	2015

National Institutes of Health	17599	17842	17365	16937	15947	16252	15174
National Science Foundation	4451	5077	5039	4956	4568	4865	5053
Department of Energy	4237	4395	4316	4167	4033	4212	4547
National Aeronautics and Space Administration	1005	924	1298	3388	3089	3418	3261
Department of Defense	1951	2008	2036	2141	1991	2166	2261
Department of Agriculture	1013	1097	1012	987	869	1021	1009
All Other	1184	1102	1257	1302	1131	1103	1122

The Department of Defense spends the most of any agency in all three categories of research and development. So, funding increases to Defense with the aim of reducing the effect of sequestration would likely bump up some of their R&D activities. While the Environmental Protection Agency has been slated for cuts, it isn't a big part of federal R&D expenditures.

Federal Spending of All R&D in Millions by Agency*							
	2009	2010	2011	2012	2013	2014	2015
Department of Defense	90,968	91,744	85,806	79,313	68,632	68,473	67,194
National Aeronautics and Space Administration	9,811	10,250	9,869	12,052	11,518	12,101	11,594
Department of Energy	11,500	11,992	11,576	11,516	11,210	12,349	14,612
Health and Human Service	34,674	35,145	33,822	33,420	31,208	31,577	30,655
National Science Foundation	5,322	5,967	5,959	6,077	5,580	5,972	6,085
United States Department of Agriculture	2,721	2,889	2,565	2,483	2,216	2,450	2,493
Department of the Interior	783	859	821	873	822	865	878
Department of Transportation	1,033	1,188	1,035	979	857	821	901
Environmental Protection Agency	628	660	631	605	555	554	529
Department of Commerce	1,550	1,479	1,320	1,336	1,358	1,598	1,551

Department of Homeland Security	1,224	982	825	512	716	1,063	934
Department of Veterans Affairs	1,053	1,144	1,258	1,236	1,219	1,134	1,197
Other	1,287	1,252	1,098	1,408	1,795	1,651	1,515

Some argue that public spending on R&D is too low, but the data show it is at historic highs. It is commonly thought that in previous generations basic research found more support from the government, but this isn't the case. Over time, funding has shifted towards basic research, while product development costs have been taken on by industry. In our advanced economy, reality is far more complex than a simple linear relationship between R&D spending, innovation, and economic growth. As budget talks begin, a realistic innovation policy will need to begin with a firm grounding in reality.

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* Data tabulated by American Association for the Advanced of Science: https://www.aaas.org/page/historical-trends-federal-rd#Agency