

BRAIN FREEZE

THE DOWNTURN'S IMPACT ON R&D AND WHAT WE CAN DO ABOUT IT

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EXECUTIVE SUMMARY

Even before being sworn in, President-elect Obama told NBC's Tom Brokaw on *Meet the Press*, "The key for us is making sure that we jump-start the economy in a way that doesn't just deal with the short-term, doesn't just create jobs immediately, but also puts us on a glide path for long-term, sustainable economic growth."¹

After only nine months on the job, the president has managed to pull the economy back from the brink of disaster, enacting the *American Recovery and Reinvestment Act of 2009*, whose stimulative effects continue today. And he has embraced a long-term strategy to grow the economy, promoting an expansion of community colleges, investing in green jobs, and reducing the cost of health care, even while expanding coverage.

But the consequences of the recession have taken a toll on one of the most important drivers of long-term economic growth: investment in research and development (R&D). After reviewing recent data, we have come to three important findings:

1. Sustained R&D Investment Is Key to Economic Growth: Economic data reveals that an economy's growth is driven, in large part, by the percentage of its output invested in R&D. Unfortunately, when businesses are forced to tighten their belts, R&D funding frequently falls off, making it more difficult for an economy to bounce back.

2. R&D Investments Are Slated for the Steepest Falloff in 30 Years, but Would Have Been Worse Without the Recovery Package: Since the beginning of the current economic recession in December of 2007, American R&D spending has dropped by 2.4 percent, marking only the third time since 1980 that the nation's investment in R&D has declined. However, the fall off would have been much worse – as much as 7.4 percent – had the federal government not invested heavily in R&D as part of President Obama's economic recovery package, signed into law last February.

3. The U.S. Lags Behind Our Competitors when Measuring R&D Intensity: "R&D Intensity" measures the percent of a nation's general economic output invested in research and development. Today, with an R&D intensity just barely over 2.5 percent, the U.S. lags behind several of our foreign competitors – Japan, Korea, and Sweden among them.

The nation's long-term economic growth depends on a host of factors, but tomorrow's jobs depend largely on today's investment. Despite the short-term recession, the nation needs to end the decline in R&D.

¹ President-elect Barack Obama, "Interview with Tom Brokaw," *Meet the Press*, 7 Dec. 2008.

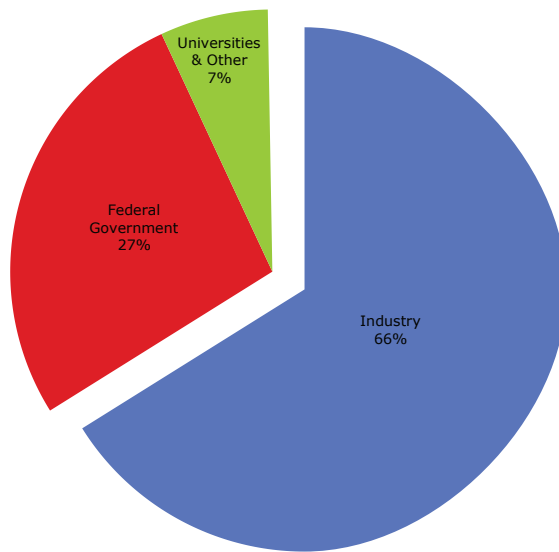
A SNAPSHOT OF AMERICA’S RESEARCH AND DEVELOPMENT

Research and development refers broadly to efforts taken, in a deliberate way, to increase the nation’s stock of knowledge and find applications for new ideas. In the United States, total R&D investment is broken down broadly into two parts, two-thirds of which is directed by private sources, and one third driven by public investment. In other words, more than 60 percent of the nation’s spending on research and development is done by the nation’s businesses and corporations, and the bulk of the remainder is funded through government grants.

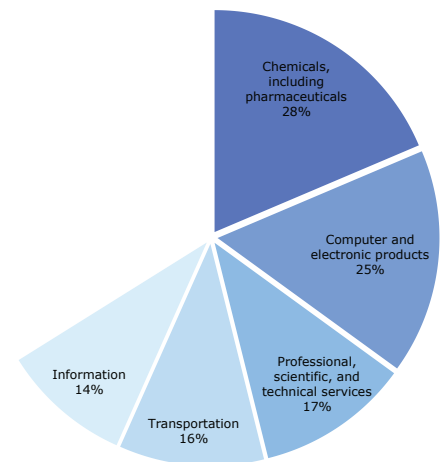
The federal government’s contribution was, at one time, much larger. It never fell below half of total investment until 1979. In turn, private industry’s contribution grew to become a full 75 percent of total R&D in 2000, before falling away to today’s level.²

Fig. 1

U.S. R&D Expenditure by Source of Funds



Top Five Industries for Corporate R&D Spending



Source: National Science Foundation, Division of Science Resources Statistics, *National Patterns of R&D Resources*, 2007.

Research may or may not be designed with a clear application in mind, but development refers to the process of applying research to the invention of new products or processes. A closer look reveals that more research is done at the nation’s colleges and universities (the bulk of which is federally funded), while private industry has dominated the development of new goods and services. In fact, businesses funded 83 percent and performed 90 percent of development in 2006.³ The top five R&D intensive industries are: chemicals and pharmaceuticals; computer and electronics; professional, scientific and technical services; transportation; and information.

² *Science and Engineering Indicators 2008*, National Science Board, Jan. 2008 Chapter 4.

³ *Ibid.*

Venture capital funding also plays a key role in helping to launch new, innovative small businesses. In 2006, venture capital investment totaled \$26 billion and helped launch nearly 3,000 businesses. The industries that received the largest share of venture capital investment were computer software (20 percent), biotechnology (18 percent), and communications (16 percent).⁴ Studies have shown that venture capital dollars produce more bang for their buck, with one dollar of venture capital generating as many new patent applications as three dollars of regular corporate R&D spending.⁵

⁴ *Science and Engineering Indicators 2008*, National Science Board, Jan. 2008, Chapter 6.

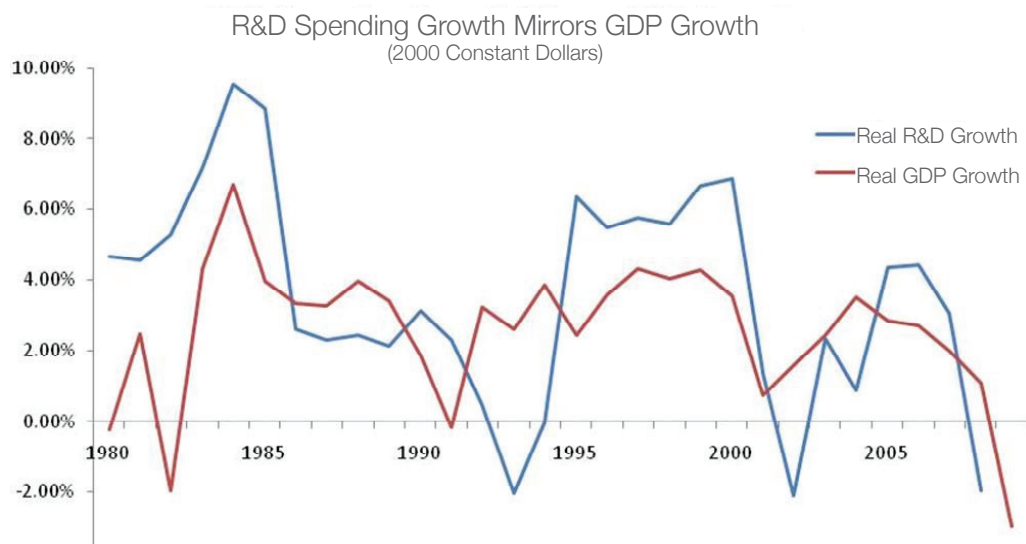
⁵ Kortum, Samuel and Josh Lerner, "Assessing the contribution of venture capital to innovation," *RAND Journal of Economics*, Vol. 31, No. 4, Winter 2000.

FINDING #1: RESEARCH AND DEVELOPMENT DRIVES LONG-TERM GROWTH

As Alan Greenspan once said, “Capitalism expands wealth primarily through creative destruction – the process by which the cash flow from obsolescent, low-return capital is invested in high-return, cutting-edge technologies.”⁶ Long-term economic growth is tied intimately to our willingness to innovate.⁷

Research completed by the Organization for Economic Cooperation and Development (OECD) has borne out the theory. “Multivariate growth regressions for a panel of 15-16 OECD countries over the period 1981 to 1998 found that the level of R&D intensity has a significant effect on growth in real per capita GDP.”⁸ Because R&D intensity – the proportion of gross domestic product (GDP) which is invested in R&D activities – has a significant and positive effect on growth, we can promote economic growth by increasing our investment in R&D.

Fig. 2



Sources: (1) National Science Foundation, Division of Science Resources Statistics, National Patterns of R&D Resources, 2007. (2) "2009 Global R&D Funding Forecast," R&D Magazine, December 2008, Data updated June 2009. (3) Bureau of Economic Analysis (BEA), Gross Domestic Product (GDP) data. Growth calculated using 2000 constant dollars.

⁶ "Stock Options and Related Matters," Remarks by Chairman Alan Greenspan at the 2002 Financial Markets Conference of the Federal Reserve Bank of Atlanta, Sea Island, Georgia, 3 May 2002.

⁷ For discussion of endogenous growth theory see Romer (1987, 1990), Aghion and Howitt (1992), Grossman and Helpman (1991, Ch 3, 4), and Barro and Sala-i-Martin (1995, Ch 6, 7).

⁸ "OECD Work on Innovation – A Stocktaking of Existing Work," STI Working Paper 2009/2, OECD, 2009, and "The Sources of Economic Growth in OECD Countries," OECD, 2003.

However, investment must be sustained in good times and bad for the economy to continue to grow. Unfortunately this is not always the case. As Figure 2 shows, R&D spending is heavily influenced by the business cycle. Firms typically finance R&D from retained earnings which are smaller when business is slow, and outside sources of capital can also be more difficult to come by when banks and investors are more risk adverse or simply have less credit themselves to extend. As a result, when the economy cools, new R&D spending slows down, frequently compounding the recession. As *The Economist* recently wrote: “when growth declines by 2%, R&D spending drops by 3%.”⁹ So investment dries up, just when the economy needs a boost.



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Moreover, the American economy has become even more dependent on innovation in recent years. According to new data from the Bureau of Economic Analysis (BEA) and the National Science Foundation (NSF), “R&D accounts for 5 percent of real GDP growth between 1959 and 2004, and 7 percent between 1995 and 2004. This ramp-up in R&D’s contribution [to GDP growth] helps explain the pick-up in economic growth and productivity since 1995.”¹⁰ Conversely, it also helps to explain why it has been difficult for the economy to recover while investment in R&D is stalled.

⁹ “Can governments help revive innovation and trade?,” *The Economist*, 1 Oct. 2009.

¹⁰ Research and Development Bolsters U.S. Economic Growth,” National Science Foundation Press Release 07-129, 1 Oct. 2007.

FINDING #2: AMERICAN R&D IS SLATED FOR ITS STEEPEST DECLINE IN 30 YEARS

Recent R&D spending forecasts for 2008 and 2009 reveal U.S. R&D spending (in real terms) may have dropped as much as 2.4 percent since the beginning of the recession in December 2007, marking only the third time in the last 30 years that real R&D growth has been negative (1993-4, 2002, and 2008-9).¹¹ Moreover, had the Obama administration not pumped in additional federal investment, the decline could have been much worse – as much as 7.4 percent.¹²

Fig. 3

U.S. R&D Expenditures by Source of Funds

(2000 Constant \$billions)									
Year	Industry	Federal Government	Universities & Colleges	Other nonprofits	Other government	Total R&D	R&D Growth	GDP	Total R&D/GDP
1980	57.2	55.5	1.7	1.6	1.0	116.9	4.65%	5,161.7	2.27%
1981	60.8	57.1	1.8	1.6	1.0	122.3	4.55%	5,291.7	2.31%
1982	64.9	59.2	1.9	1.7	1.0	128.7	5.27%	5,189.3	2.48%
1983	69.4	63.6	2.1	1.9	1.0	137.9	7.17%	5,423.8	2.54%
1984	77.1	68.7	2.2	2.0	1.1	151.1	9.55%	5,813.6	2.60%
1985	83.1	75.5	2.5	2.1	1.2	164.5	8.84%	6,053.7	2.72%
1986	85.6	76.6	2.8	2.3	1.4	168.7	2.59%	6,263.6	2.69%
1987	85.5	80.1	3.1	2.5	1.5	172.6	2.30%	6,475.1	2.67%
1988	89.8	79.4	3.3	2.7	1.5	176.8	2.45%	6,742.7	2.62%
1989	95.4	77.0	3.6	3.0	1.6	180.6	2.12%	6,981.4	2.59%
1990	102.0	75.5	3.9	3.2	1.7	186.2	3.12%	7,112.5	2.62%
1991	109.3	72.0	4.1	3.4	1.8	190.5	2.28%	7,100.5	2.68%
1992	111.4	70.5	4.1	3.6	1.8	191.4	0.47%	7,336.6	2.61%
1993	109.2	68.5	4.2	3.8	1.8	187.5	-2.03%	7,532.7	2.49%
1994	109.9	67.3	4.4	4.1	1.8	187.5	-0.02%	7,835.5	2.39%
1995	120.4	68.4	4.5	4.3	1.9	199.3	6.34%	8,031.7	2.48%
1996	131.5	67.5	4.7	4.5	2.0	210.3	5.47%	8,328.9	2.52%
1997	142.8	67.7	5.1	4.8	2.0	222.3	5.75%	8,703.5	2.55%
1998	153.2	68.8	5.4	5.3	2.0	234.7	5.57%	9,066.9	2.59%
1999	168.2	68.5	5.7	5.7	2.1	250.4	6.67%	9,470.3	2.64%
2000	186.1	66.4	6.2	6.5	2.2	267.6	6.86%	9,817.0	2.73%
2001	184.0	71.1	6.7	7.1	2.3	271.2	1.37%	9,890.7	2.74%
2002	173.4	74.6	7.0	8.0	2.5	265.5	-2.12%	10,048.8	2.64%
2003	175.0	78.6	7.2	8.3	2.6	271.6	2.32%	10,301.0	2.64%
2004	174.8	81.1	7.2	8.2	2.6	274.0	0.87%	10,675.8	2.57%
2005	183.9	82.9	7.6	8.8	2.6	285.8	4.33%	10,989.5	2.60%
2006	195.0	83.8	8.0	9.0	2.6	298.4	4.41%	11,294.8	2.64%
2007	204.7	82.2	8.2	9.7	2.7	307.5	3.04%	11,523.9	2.67%
2008	n.a.	n.a.	n.a.	n.a.	n.a.	301.4	-1.98%	11,652.0	2.59%
2009q2	n.a.	n.a.	n.a.	n.a.	n.a.	300.2	-0.40%	11,314.5	2.65%

Sources: (1) National Science Foundation, Division of Science Resources Statistics, National Patterns of R&D Resources, 2007. (2) "2009 Global R&D Funding Forecast," R&D Magazine, December 2008, Data updated June 2009. (3) Bureau of Economic Analysis (BEA), Gross Domestic Product (GDP) data

¹¹ National Bureau of Economic Research (NBER) dates the start of the current recession to December 2007. R&D spending forecasts for 2008 and 2009 from "2009 Global R&D Funding Forecast," R&D Magazine, Dec. 2008, data updated online in June 2009.

¹² See Fig. 3. R&D spending forecast from "2009 Global R&D Funding Forecast," R&D Magazine, Dec. 2008, data updated online in June 2009, would have been \$357.6 without ARRA or \$285.1 in constant 2000 dollars which would yield negative 5.41 percent real R&D spending growth in 2009.

The *American Recovery and Reinvestment Act of 2009* (ARRA) allocated \$18.4 billion of government stimulus funds for R&D investment in addition to federal R&D funding through the FY2009 budget. The Department of Defense (DOD) and the National Institutes of Health (NIH), the two biggest recipients of federal R&D funding, each received budget increases of over \$1 billion in FY2009. NIH also received another \$10.4 billion, or 56.7 percent, of ARRA stimulus funds, making NIH the big R&D winner of the year (literally, since stimulus funds must be allocated and spent by September 30, 2010).

Even so, overall spending has slipped because of cuts in the private sector. For one, those investors most likely to take a risk by devoting money to high-risk research have shown a new reticence to jump in. Venture capital funding fell to a 12-year low in first quarter 2009.¹³ According to a Money Tree report sponsored by PricewaterhouseCoopers and the National Venture Capital Association, “Quarterly investment activity was down 47 percent in dollars and 37 percent in deals from the fourth quarter of 2008.”¹⁴

R&D spending may have dropped by as much as 2.4 percent since the beginning of the recession.

But, while less dramatic, many of the nation’s large businesses have also been forced to rein in spending or delay new initiatives in R&D. This has been the case despite the fact that many business leaders are reluctant to cut R&D budgets amidst turmoil: they hate to abandon investments midstream because they know that innovation is the key to long-term competitive advantage in the marketplace.

Nevertheless, early evidence suggests that the recession has begun to take its toll: an April 2009 McKinsey survey of global CEOs found that one-third have cut R&D budgets in 2009, while another 43 percent are in a holding pattern trying to match last year’s budget and ride out the storm.¹⁵ McKinsey noted that this defensive strategy often involves “turning to shorter-term, lower-risk projects or focusing on minor changes to existing products.”¹⁶ If we want to get the economy moving again, we have to get U.S. companies back on the offensive with longer-term investments, bigger visions, and new products.

¹³ “Venture Capital Investment Plummets in Q1 2009 to 12 Year Low, According to the MoneyTree Report,” National Venture Capital Association and Pricewaterhouse Coopers, 18 Apr. 2009.

¹⁴ Ibid.

¹⁵ “R&D in the Downturn,” McKinsey Global Survey Results, Apr. 2009.

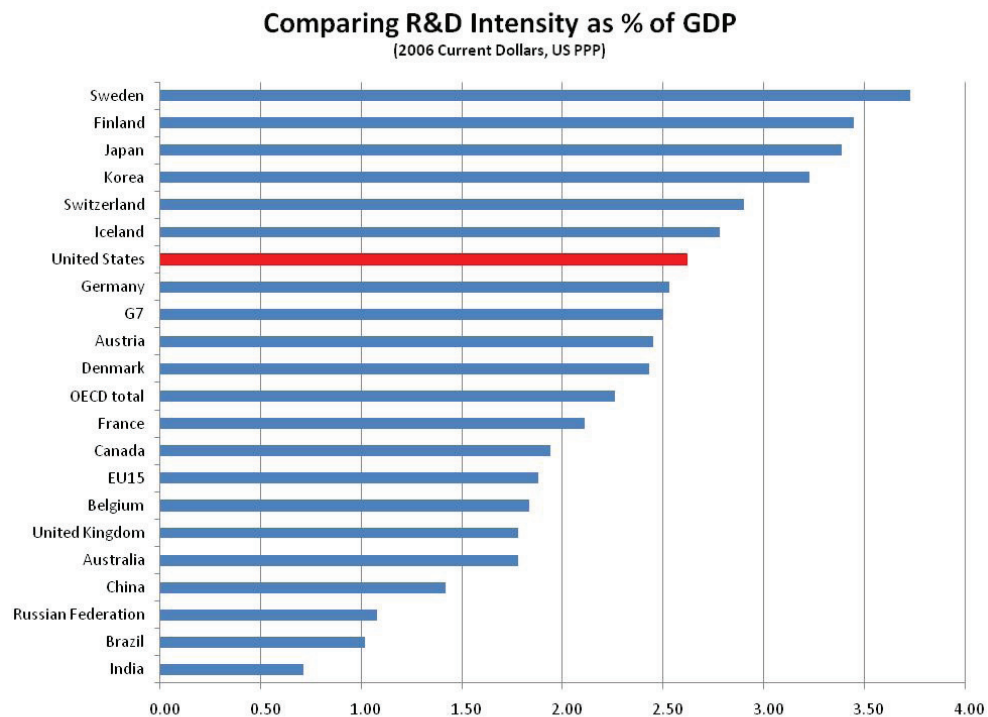
¹⁶ Ibid.

FINDING #3: AMERICAN COMMITMENT TO R&D LAGS BEHIND FOREIGN COMPETITORS

Despite research and development's importance, an analysis that compares the nation's investment in R&D with competing economies around the globe reveals that the United States has fallen behind. Figure 4 compares "R&D Intensity," national investment in R&D as a percentage of overall GDP – and reveals that important competitors – including Japan and Korea, devote a greater portion of their resources to R&D than the United States.

While the United States spends, in gross, more on R&D than any other single country, as a share of GDP, the U.S. is ranked seventh in the world behind Sweden, Finland, Japan, and Korea, among others. And note a qualitative difference in how those R&D dollars are invested: four of the top six countries expend less than 5 percent of public R&D investment dollars on defense (compared to 60 percent in the United States), leaving many more funding available for other industries.¹⁷ In many cases, the government's sustained investment during periods of recession has helped to blunt the drop off in private expenditures.

FIG. 4



Source: OECD in Figures 2008

¹⁷ Main Science and Technology Indicators, OECD, Paris, 2008.

Boosting R&D funding in the next decade will be particularly important as economic growth in Asia is poised to challenge our dominance in new innovation. In two short years, the recession has already shaved a point off our share of global R&D spending, allowing Asia to surpass us. While U.S. share slipped from 34.3 to 33.4 percent, Asia's grew from 31.6 to 34 percent.¹⁸ Further, according to one recent analysis: "China has one of the fastest-growing research budgets in the world, and by 2020 the government's goal is to invest 2.5% of GDP annually in research, which will cause China to rank third in the world in terms of total annual investment."¹⁹ If successful, it would also further increase the funding gap between the U.S. and Asia.

“*While the United States spends more, in gross, than any other single country on R&D, as a percentage of our GDP, the U.S. is ranked 7th.*”

¹⁸ “2009 Global R&D Funding Forecast,” R&D Magazine, Dec. 2008, data updated online in June 2009.

¹⁹ Engineering and Research Trends, Plunkett Research, Ltd., accessed July 2009, <<http://www.plunkettresearch.com/Industries/EngineeringResearch/EngineeringResearchTrends/tabid/215/Default.aspx>>.

RECOMMENDATIONS

The analysis above makes clear that *now* is the time for the nation to invest in R&D. Innovation will not only help to lift us out of the current turmoil. It will help set us on a path to long-term economic growth.

President Obama has set the goal for our investment in R&D to reach 3 percent of GDP, and we believe this is very achievable.²⁰ Our data forecasts that American investment in R&D – even with this recession – will be 2.65 percent of GDP this year. To achieve the 3 percent goal would require, roughly, an additional \$50 billion investment. \$50 billion is a lot of money, but put in context – it amounts to only 6 percent of the value of the stimulus bill – it is well within reach.

Meeting this goal will require the private and public sectors to work together. Below are several ideas policymakers could adopt to help meet this challenge.

1. Simplify the R&D Tax Credit, and Make it Permanent. When filing their taxes, companies engaged in research and development are currently required to choose between one of two possible credits:

- The federal “Research and Experimentation” (R&E) tax credit, which was first introduced in 1981 as a temporary tax break, and has subsequently been extended thirteen times. The R&E credit, currently set to expire at the end of the year, applies to 20 percent of qualified research expenditures (QREs) performed in the United States above a base amount. The formula for determining the base amount requires firms to multiply the average R&D-to-sales ratio from 1984 to 1988 by the average gross receipts for the most recent four years. Firms established after 1988 are considered “start-ups,” and are therefore required to employ a modified formula.
- The Alternative Simplified Credit (ASC) was first introduced in 2006 in order to provide additional incentives for R&D investment to companies that derived little benefit from the existing R&E credit. Companies that claim the ASC do *not* have to measure their gross receipts against a set base period. Instead, the ASC applies to 14 percent of QREs performed in the United States, over 50 percent of the average QREs for the prior three years.

Both credits are set to expire soon, leaving many businesses in the lurch, unsure of whether additional investments will receive the same favorable tax consideration. Congress has even let the R&E credit lapse in recent years, diminishing the incentive for businesses considering when and how much to invest in new projects.

While the system is complex – its various iterations have had the effect of applying different standards, and providing varying credits, to competing companies – most experts agree that the credit has, on the whole, been successful. Studies have revealed that (1) nearly 80 percent of the credit is, as a rule, applied to domestic salaries in the United States; and (2) the credit benefits small businesses as well as large corporations.²¹ In 2005, 29 percent of firms claiming the credit had assets of less than \$1 million.²²

Given the success of the credit in meeting its policy objectives, we should make it permanent, allowing small businesses to budget for long-term innovative projects, including hiring salaried workers,

²⁰ “Obama promises major investment in R&D,” Associated Press, Apr. 27, 2009.

²¹ “Research and Development Tax Credit,” R&D Credit Coalition, July 2009.

²² “Supporting innovation and economic growth: The broad impact of the R&D credit in 2005,” Ernst & Young, Apr. 2008.

without the risk of over-budgeting. But beyond making it permanent, we should level the playing field, requiring all firms to calculate their benefit using the same simple formula, the ASC.

If we want to spur U.S. investment in R&D and give more firms an incentive to perform their R&D here rather than in countries with more generous credits abroad, we should also increase the realized value of the credit to firms. According to a study by Ernst & Young, “the average company that claims the U.S. R&D credit only realizes a credit rate of 6%.”²³

That is why we recommend that Congress pass, and the president sign, a reconciled version of the Baucus-Hatch and Meek-Brady bills awaiting consideration in the Senate and House, respectively. Their proposals would make permanent the ASC at 20 percent of 50 percent of QREs performed in the United States above the average QREs invested over the previous three years, while phasing out the regular credit after 2010. The Meek-Brady and Baucus-Hatch bills have the potential to increase the effective rate of the credit to 10 percent, which, if realized, could boost R&D spending, by our estimates, as much as \$20 billion – nearly halfway towards reaching our 3 percent of GDP goal.²⁴

2. Create a Special ‘Green R&D’ Credit. In addition to the regular credit, Congress should also pass a special ‘Green R&D’ credit good for two years to support new greening initiatives. This one-time

The Meek-Brady and Baucus-Hatch bills have the potential to increase the effective rate of the R&E tax credit to 10 percent, which, if realized, could boost R&D spending, by our estimates, as much as \$20 billion.

only credit would be equal to 20 percent of the *full* cost of QREs for innovation related to improving a product’s environmental impact. Firms would not be able to claim both credits for the same project.

An example of a qualified green R&D project comes from Proctor & Gamble (P&G). When P&G discovered 80 to 85 percent of greenhouse gas emissions associated with its laundry detergent products came from heating the water to do the laundry, not manufacturing or transport, they set out to develop cold water detergents. They began selling cold water detergents in Europe in 2003 and the United States in 2005. Consumers benefit from the fact that the new product not only reduces emissions but saves consumers money on their energy bills.²⁵

A project like this is an excellent example of how a short-term stimulus credit could become a great catalyst for innovation, environmental sustainability, and jobs.

3. Establish a National Institute of Science and Engineering. Basic research, performed largely by universities and academic centers, is heavily dependent on federal funding. And the return on

²³ “International R&D Tax Incentives,” Ernst & Young, Apr. 2008.

²⁴ A recent Congressional Research Service (CRS) survey of the literature on price elasticity of the credit found a range from 0.2 to 2. Our estimates assume a dollar credit yields a dollar investment in R&D. In addition to being a simple calculation and the midpoint of the CRS research, we chose to rely on University of California, Berkeley professor Bronwyn Hall, an expert on the economics of innovation who has approximated elasticity to be about 1 in her research. See Hall, Bronwyn, “R&D Tax Policy During the Eighties: Success or Failure?,” NBER Working Paper No. 4240.

²⁵ Shapiro, Andrew, “Make Green R&D a Competitive Advantage,” *Leading Green*, Harvard Business Publishing Blogs, 11 Aug. 2008.

that investment has been made plain by the success we have had in spurring innovation in the life sciences: Today, the United States boasts some of the most sophisticated medical treatment in the world, in large part because the National Institutes of Health have seen their budgets rise astronomically over the last two decades.

It is time for Washington to apply the lessons learned from our experience with medical technology and research to the physical sciences. The National Science Foundation (NSF) should be molded into a National Institute of Science and Engineering (NISE), doubling the NSF's budget, and then tasking the new organization with overseeing the federal government's investments in basic scientific research.²⁶ The new funds should flow into the private marketplace, contributing to high-risk, high-reward partnerships with the nation's institutions of higher learning – from universities to community colleges – even while ensuring that educational institutions around the nation have the equipment needed to inspire and teach tomorrow's entrepreneurs.

The NISE should be charged with:

- **Funding Basic Scientific Research.** The goal of the NISE should be to increase federal funding for non-defense and non-health related basic scientific research. Federal spending on R&D peaked at almost 2 percent of GDP in 1964 and has been steadily declining to its present level of 0.7 percent in 2007.²⁷ This is significant for two reasons: first, it is hardly a coincidence that the mid-1960s, when total R&D intensity came closest to approaching 3 percent of GDP, also were a period of robust economic expansion; and second, corporate R&D spending, which now dwarfs federal spending, tends to focus on *development* of products with a clear application for sale, not on *basic research* into as yet unmarketable breakthroughs.²⁸

Examples of areas which could benefit from basic research support include energy, engineering (non-defense), environmental sciences, physical sciences, and computer and information sciences. The NISE's grant making capabilities should be modeled on NIH's basic research grants with a combination of research grants, resource grants, training fellowships, and support for small business innovative research. Whenever possible, matching grants should be encouraged to foster public-private collaboration and to keep costs in check.

- **Creating a Network of University Based Venture Capital Funds.** As first suggested in a PPI report authored by Ed Gresser, Paul Weinstein, and Will Marshall, we should follow Michigan's lead by creating a network of regionally focused, university-based venture capital funds to extend credit to entrepreneurs without access to private investors.²⁹

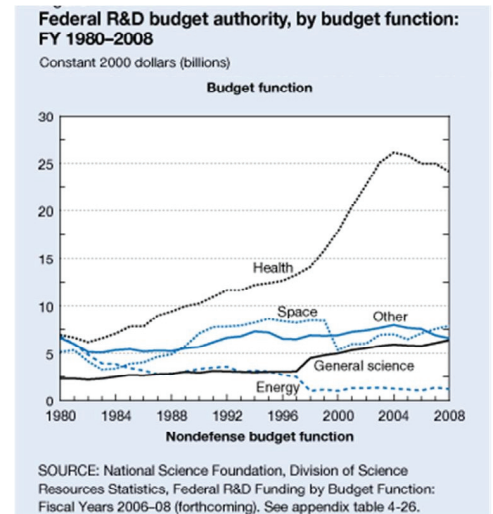
²⁶ Rahm Emanuel and Bruce Reed, *The Plan*, Pgs. 173-174.

²⁷ National Science Foundation, "National Patterns of R&D Resources: 2007 Data Update," Detailed Statistical Tables, NSF 08-318, November 2008.

²⁸ For a discussion of economic expansion in the mid-sixties, see Romer, Christina, "Growth without Bubbles," Remarks delivered at the Council of Foreign Relations, 12 May 1 2009.

²⁹ Gresser, Ed, Paul Weinstein, Jr, and Will Marshall. "Raising Our Game: A National Competition Strategy," Progressive Policy Institute, June 2006.

Fig. 5



In 1997, the University of Michigan established the Wolverine Venture Fund (WVF) to provide seed capital to local startups focused on scientific and technological research. Through the WVF, a local entrepreneur develops an investment proposal (with the assistance of the University's business students), which is then evaluated by an advisory board of professional investors. With the board's approval, WVF invests in the company, giving funds — typically totaling between \$50,000 and \$200,000 — for seed and first round expenditures. The students gain real experience in the world of finance, applicants receive capital for their business, and the university develops deeper ties to the surrounding community. In turn, successful businesses are asked to re-seed the fund with the proceeds of their venture.

Among the most noteworthy aspects of WVF is its innovative funding method. 'Seeded' with a one-time University of Michigan endowment, the proceeds of the fund funnel directly back into its own reserves. The federal government could do much more to promote this sort of innovative investment mechanism. Providing matching grants to local universities willing to set up similar programs — training students in the process of finance, seeding local businesses, and driving innovation — would do a great deal to encourage additional investment in R&D. And for a relatively small sum of federal dollars — approximately \$50 million per year — local communities would be encouraged to invest their own capital.

- **Awarding Fellowships for Science & Engineering Doctorates.** In 2005, more than half of the doctoral degrees earned at American universities in the fields of engineering, mathematics, computer sciences, physics, and economics were awarded to foreign citizens.³⁰ To encourage universities to create integrated science centers, schools which established successful venture funds could earn federal scholarship dollars annually based on the performance of their investments. The more successful the venture fund program, the more money could be won each year to fund fellowships for U.S. science and engineering doctoral candidates. In this way, the science departments, the business students, and the local community all benefit.

In 2005, more than half of the doctoral degrees earned at American universities in the fields of engineering, mathematics, computer sciences, physics, and economics were awarded to foreign citizens.

- **Funding Innovative Strategies to Improve Science and Math Education in High Schools.** According to the National Science Teachers Association, only one quarter of high school graduates have the skills needed to complete a freshman science course.³¹ If we want more science and engineering majors in college and beyond, we need to start improving the performance of high school students. NISE should award competitive matching grants to States that create innovative programs to improve science and math test scores, including establishing more science and math charter schools.

4. Expand Work Visas for Science and Engineering Doctorates. While we should make science and math education the focus of our efforts to increase the ranks of our doctorates and engineers, we must also recognize that these efforts can take years to pay off. In the meantime, America must be

³⁰ *Science and Engineering Indicators 2008*, National Science Board, Jan. 2008, Chapter 2.

³¹ Rahm Emanuel and Bruce Reed, *The Plan*, Pg.175.

able to recruit the top talent from around the world. We should increase the number of visas issues for skilled immigrant labor to 200,000.

H-1B visas are temporary skilled worker visas sponsored by companies on behalf of employees. In the 1990s and early 2000s, as the tech sector soared, the number of visas available were temporarily increased to 115,000 in 1999 and 195,000 in 2001. But in 2004, the Bush administration allowed the number of visas available to revert to 65,000. In 2008, companies made 163,000 applications for the 65,000 slots – nearly 40 percent were denied hiring workers they had invested time in recruiting and interviewing. Google was denied nearly a third of the visas it sought.³² And this does not include the number of firms who were scared off from spending time and money on lawyers and paperwork when they knew the probability of being denied was so high.

According to a study by the National Venture Capital Association, 40 percent of publicly traded, venture capital-backed high tech firms operating in the United States today were started by immigrants.³³ The economy needs this vital source of innovation and ingenuity today. We cannot afford to turn away top talent.

CONCLUSION

History has shown that research and development offers one of the surest ways to sustain long-term economic growth. But the nation's recent recession has taken its toll: growth in the nation's investment in R&D has been curtailed, and the United States is currently investing less of its GDP in R&D than many of our competitors.

For all of our short-term challenges, innovation remains part of the long-term solution. For that reason, it is crucial for Washington to provide the leadership today that ensures that American businesses can compete and win in the global economy in the years to come.

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³² Tech Recruiting Clashes with Immigration Rules," New York Times, Apr. 11, 2009.

³³ "American Made: The Impact of Immigrant Entrepreneurs and Professionals on U.S. Competitiveness," National Venture Capital Association.