



Testimony of

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**BEFORE THE COMMITTEE ON SMALL BUSINESS
UNITED STATES HOUSE OF REPRESENTATIVES**

Washington, D.C.

**Regarding
Improvements to the Small Business Innovation Research Programs
and
“Unleashing American Innovation”**

21 May 2014

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SBTC, the nation's largest association of small, technology-based companies in diverse fields, is proud to serve as the technology council of the National Small Business Association, the nation's oldest nonprofit advocacy organization for small business, serving more than 150,000 small companies throughout the United States.

Introduction

Chairman Graves, Ranking Member Velazquez, members of the Subcommittee, good afternoon. Thank you for inviting me to appear here today. I am Bob Schmidt, Co-Chair of the Small Business Technology Council, and Founder, Chairman, and CEO of five SBIR companies. The SBIR/STTR programs have allowed us to develop products in the medical and aerospace markets. We sell on all seven continents. Examples of our products are: (a) CleveMed's SleepView® providing over 1,000 home sleep apnea tests per month, making us one of the largest sleep apnea testing services in the world. We have tripled our sleep sales every year for the last three years. (b) Great Lakes NeuroTechnologies HomeView® allows Parkinson's disease patients to improve the titration of drugs and tuning of deep brain stimulators to live more productive lives. (c) NeuroWave Systems monitors consciousness levels of anesthetized patients and is developing new systems for the military to automate closed-loop anesthesia/analgesia delivery, identify silent seizures, and quickly check injuries for mild TBI. Orbital Research makes dry electrodes for cardiac monitoring and oxygen sensors for hypoxia monitoring on the F-22 Raptor, as well as low-cost steering systems for advanced munitions. Flocel makes systems to grow human blood brain barrier cells for drug discovery. My companies employ about 75 people and we train about a dozen students each year.

Harvard University and *Inc.* Magazine, among others, have recognized the companies' growth, and we have received three Tibbetts Awards, which are given annually to outstanding companies in the SBIR Program.

I am primarily here today on behalf of the Small Business Technology Council, the nation's largest organization of small, technology-based companies in diverse fields. Our mission is to protect the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs to help grow the American economy, create jobs, and facilitate the public/private partnerships to develop the next generation of new technologies. SBTC is the largest organization representing SBIR/STTR award winners working across government agencies.

SBTC serves as the Technology Council of the National Small Business Association. NSBA is a nonprofit small business organization that serves over 150,000 companies. For over 75 years, NSBA has provided small business advocacy, and was the founder of the "small business movement" in the United States.

For simplicity, I am combining my comments on the SBIR and STTR programs, and simply referring to SBIR instead of both.

Summary of Testimony

The climate for small business and especially SBIR and technology companies' growth and job creation is not good and extremely challenging. Bank lending to small business is severely depressed. Since 2008 lending to small business has declined by \$126 Billion. The problem is compounded because many of the extremely large banks that received TARP funding from the federal government have pulled out of small business. Small businesses like mine who had never missed a payment suddenly found their notes are called by their bank.¹ Unfortunately this pattern has continued. Venture capital has also continued to make few investments in seed and start up enterprises. The majority of these investments have been in software and IT industries with the vast majority of these seed and start up deals being made in the Silicon Valley. In the first quarter of 2014 there were only 41 of these startup/seed deals totaling \$125 million.² The Federal government has not made its procurement goals for small business purchases. The decline of home values has even reduced home equity as a source of funds to grow small business. These changes have occurred at the same time that regulatory burdens by the state and federal government have been increasing.

Given these circumstances, it is easy to see why small business hasn't been able to lead the country out of the recession as it has always done in the past.

Small business technology companies have had experience all of these problems. The only bright spot for technology companies is the SBIR program. With reauthorization 30 months ago SBIR companies expected to see help and support provided in the law to transition their SBIR technology. Despite strong direction by congress and the requirement for reporting, goals and incentives to help transition their technology, there has been little progress. Today, 30 months later, there are no implementing regulations, no goals, no incentives and no leadership. As a recent DOD IG report found, there are still no reporting requirements for prime contractors or the governments on how many technologies are being transitioned.

We are pleased that the DOD in its FAR regulations did recognize the need to set goals for transitioning SBIR/STTR technology. The DFAR 5000.2 instructions require all program managers to set goals for themselves. We also recognize that DoD has taken steps to improve SBIR Phase III, much more needs to be done quickly.

1. The culture that is currently adverse to small business in the agencies must be changed. Regulations and procedures should be updated to reflect the law, and personnel trained in its implementation. Incentives should be provided to encourage this cultural shift. The law is clear; SBIR phase III awards should be used "to the greatest extent practicable." To implement this, SBTC recommends:

- a. Agencies should be required to timely update the Federal Acquisition Regulations (FAR) the individual agency's procurement regulations and contracting manuals to incorporate the law. After two and a half years, this has not yet been done.
 - b. Agency Contracting Officers, Contract Specialists, Contracting Officers Representatives, Program Officers, and other technical personnel dealing with contracts must be trained in the SBIR laws.
 - c. Phase III contracting requirements should be included ("flow-down") to prime contractors and other subcontractors.³ We recommend adding to all solicitations a proposal evaluation factor for prime contractors to include SBIR Phase III subcontracts in their subcontracting plan. [If SB companies are identified as named subcontractors, under new legislation no "bait and switch" can occur without COs approval]
 - d. As we pointed out in our comment to the SBA, the last sentence in FAR 19.502(b)(2) has been changed to allow contracting officers to ignore the requirements in the Reauthorization law that they use SBIR technology to the "greatest extent practicable" and instead use "best scientific and technical approach."⁴
2. The SBA is not timely reporting information to Congress.
 3. The DoD has not set goals and incentives as required by the law.
 4. SBIR number of awards and dollar amounts has continued to decline.
 5. SBIR Phase III awards tracking is sporadic, and must be tracked and reported.
 6. Phase III Full SBIR data and intellectual property rights must be accorded to SBIR contractors in Phase III funding, and
 7. The SBA approved a blanket waiver for the NIH to exceed the caps on award amounts in violation of the law.
 8. Agencies, and particularly DoD, have not been protecting SBIR Intellectual Property (IP) rights.
 9. Improve the banking environment for small businesses.
 10. Keep a strong patent system, protecting small business technology.

Importance of SBIR/STTR to the Economy

The SBIR/STTR programs are the most successful R&D programs in the world. 25% of the key innovations (see **Figure 1**) come from this small (2½-3%) percentage of federal extramural R&D expenditures. The SBIR/STTR programs have been copied in over a dozen countries. Historically their purpose is to involve small businesses in the R&D effort of the Federal Government, maximizing the government's investment in innovations by American small businesses, emphasis on "American" and on "small businesses".

The SBIR program also has an outstanding record of commercializing its technology compared with other government programs. But it needs more help and support to create the new industries and new jobs to compete

against China and the rest of the world. Universities receive well over 10 times more federal R&D dollars than the SBIR/STTR programs every year. SBIR/STTR companies receive 3% of Federal extramural R&D funding while universities receive between 32-36%. Simply stated, SBIR/STTR companies produce 58% more patents, more than three times as many key innovations, and have a far better record of commercialization, on about 12% of the federal funding that universities receive. While we certainly recognize the contribution of universities to knowledge and basic scientific research, and encourage strong support of universities we believe that SBIR is better able to create commercialization and jobs.

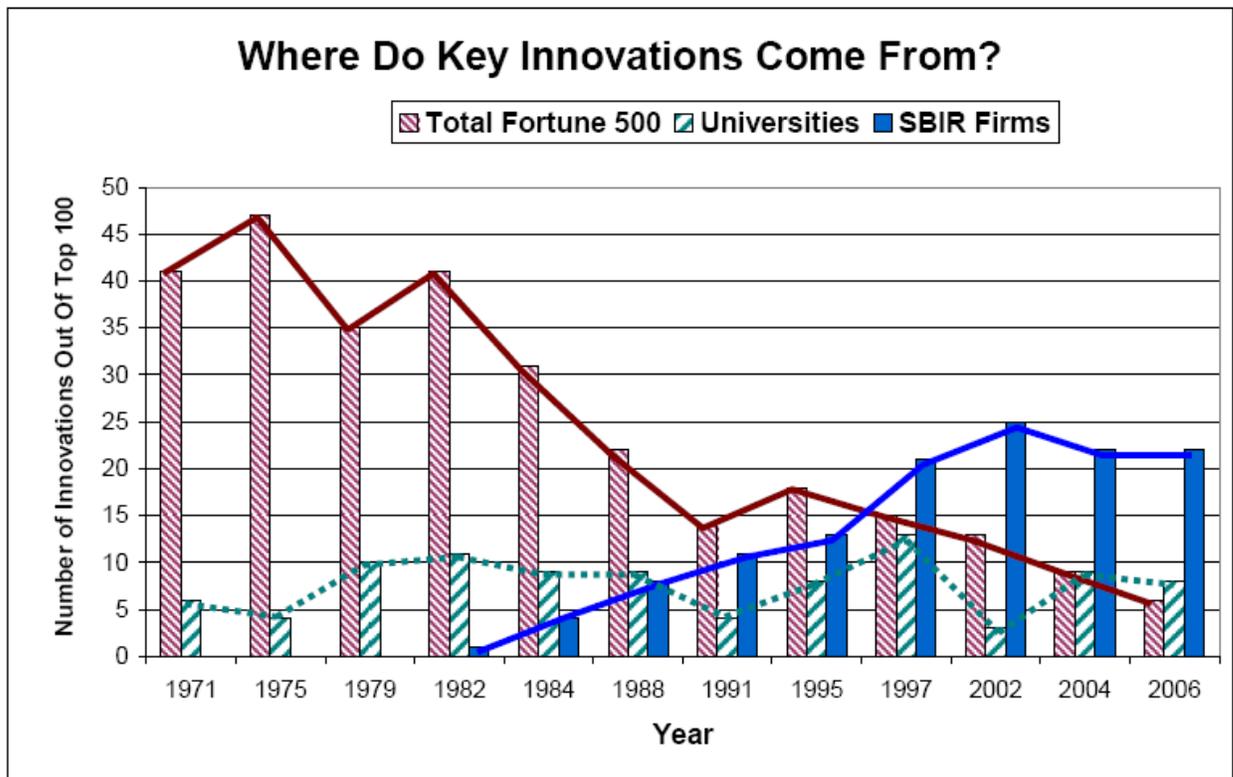


Figure 1: For the last decade, SBIR firms have received 3.45 times as many R&D 100 awards as Universities, on about 1/8 of the budget.

ECONOMIC BACKGROUND – RECENT SHIFTS

The climate for small business and especially SBIR and technology companies' growth and job creation is not good (or extremely challenging). Bank lending to small business is severely depressed. Since 2008 lending to small business has declined by \$126 Billion.⁵ The problem is compounded because many of the extremely large banks that received TARP funding from the federal government have pulled out of small business. Small businesses who had never missed a payment suddenly found their notes are called by their bank. Unfortunately this pattern has continued. Venture capital has also been making fewer investments in seed and start up enterprises. The

majority of these investments have been in software and IT industries with the majority of these seed and start up deals being made in the Silicon Valley. The Federal government has not made its procurement goals for small business purchases. The decline of home values has even reduced home equity as a source of funds to grow small business. These changes have occurred at the same time that regulatory burdens by the state and federal government have been increasing.

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Table 1. US Exports vs. Other Leading Export Countries	
High Technology Exports ⁶	Billions of US Dollars
China	505.6
US	148.7 = 29.4% of China
Germany	183.4
Japan	123,4
Korea	121.3
France	108.3

There have been fundamental shifts in the American economy over the last decades that make Congressional action all the more important to reverse the slide that is destroying our dominant position in the world economy. As shown in **Table 1**, High-tech exports continue to decline relative to the rest of the world.⁷ In fact, America exports less than 30% of the dollar value of China's high-tech exports. Thus, we continue to fall behind in producing and exporting value added technology products. Let's look at the US-China comparison.

China

Everyone understands the movement of large corporate America's manufacturing base to China, and the impact it had on job destruction and the American economy. So that will not be discussed here.

However, the World Bank and its International Comparison Program has just produced a report that provides some data that shows China's economy will outgrow the US in 2016.^{8,9} (See **Figure 2.**) At 27 percent, China now has the

largest share of the world's expenditure for investment (gross fixed capital formation); followed by the United States at 13 percent.¹⁰ Thus, China is out investing us, more than 2:1. If America desires to continue to claim "Exceptionalism", it will need to start taking action to make sure we can legitimately claim that. This will require increasing investment in those tangible attributes that make us exceptional, like R&D, infrastructure, and education.

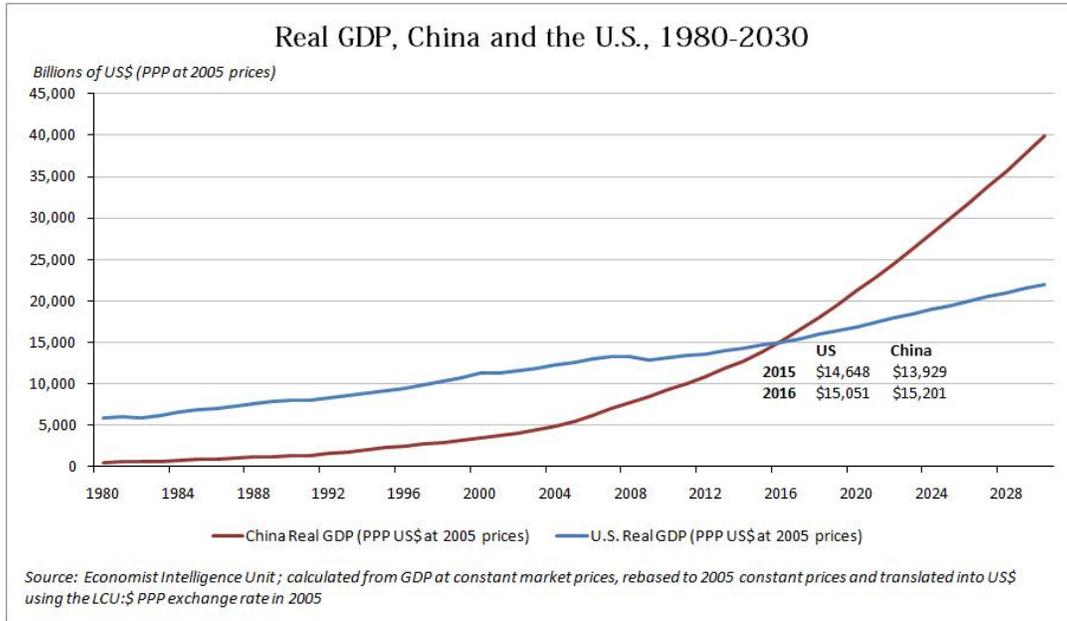


Figure 2. China will outgrow the US economy in less than two years using the Purchasing Power Parity (PPP) Exchange Rate.

Investment

Various groups have shown that the US current budget projections are not investing in a sustainable way.¹¹ Almost all of the growth in the budget will be used to support Social Security, Medicare, Medicaid, and interest on the debt.

As a scientist and engineer, I am a major believer in biomimicry, designing products based on nature's designs. It is hard to out-design three billion years of evolution, so if one wants to make the best creations, follow nature. Nature has taught us that one invests in the young, not on the old. Nature stops investing in biological organisms once they reach puberty.¹² We are not doing this for our children, and we are not doing it for our infrastructure or R&D. Excessive spending on the old at the expense of investing in the young is not sustainable.

The National Small Business Association has long called for the reduction of the Federal Debt.^{13, 14} However, reducing entitlement and debt spending is part of the solution, but not sufficient. In order to promote growth, which is a very important component of any long term solution, we need to invest in

more R&D and the development of new technologies to foster continued economic expansion. SBIR should be a significant portion of this R&D investment.

However, the least painful way to raise new revenues is to grow the economy, which takes investment. Investment in R&D is one of the most productive ways to grow the economy. "[T]here is a strong positive relationship between innovation (patent stock) and per capita GDP."¹⁵ Technological change is an important determinant of long-run productivity growth and therefore of increases in living standards over time. "Advances in technology arise from innovation, which is the process of inventing new products, improving existing products, and reducing the cost of producing existing goods and services."¹⁶

*SBIR Firms produce
25% of America's most
valuable patents on
just 2.5% of the
Federal R&D, a 10:1
Bang for the Buck*

Small Business and the Economy

According to the Brookings Institution, the American economy is less entrepreneurial now than at any point in the last three decades.^{17, 18} They evaluated the rates of new business creation and destruction since 1978. It was found that during the period 2009-2011, for the first time ever, businesses were collapsing faster than they were being formed. Overall, new businesses creation (measured as the share of all businesses less than one year old) declined by about half from 1978 to 2011. The authors state that if the decline persists, "it implies a continuation of slow growth for the indefinite future." As these new businesses are one of the biggest job creators, it is no wonder America is having a job creation problem as the annual job growth rates remain below 2 percent for the duration of the recovery.

Small businesses account for 48.5% of all private-sector American jobs, and small business creates 63% of all new private sector jobs.¹⁹ So, nurturing and fostering those small companies that create those jobs is perhaps the most important thing that Congress can do to ensure that the American economy grows and prospers.

In fact, it is the technology company subset of those small businesses that create the most new jobs.²⁰ It is those inventing companies that are commercializing their new products that are the ones that Congress needs to focus on and assist most.

We must remember that:

- Startups are to an economy what births are to a population; and
- Small businesses are to an economy what children are to a population.

Phase I SBIRs work as a midwife to give birth to new technology startups. Phase II programs get the companies into kindergarten. What we now must do is create the programs that help get these high-tech companies through high school, college, and provide the environment to get them their post doc work and being highly productive members of the economy.

Over the last 32 years, SBIR has fostered more than 21,400 companies. These companies are arguably the largest single concentration of technical talent in the world, with over 500,000 advanced degreed engineers & scientists. SBIR involved firms have been issued almost 100,000 patents, making this collection of firms one of the largest creators of intellectual wealth in the nation. They produce 10-12 USPTO issued patents per day.²¹ These firms produce 25% of America's R&D 100 Awards, on an historical 2.5% of the Federal R&D budget, providing a 10 to 1 "Bang for the Buck".²² With regard to wealth creation, SBIR firms have been involved in 1,713 M&A transactions, 7.8% of all awardees. The most acquirers are large corporations, many of whom have acquired multiple SBIR firms. The median value of these sales is \$42 million, with an average price of \$365 million. In addition, 1978 major/mid-sized corporations have working relationships and/or business transactions and relationships with SBIR-involved firms.²³

Furthermore, SBIR meets its goal of promoting women and minority businesses. Over 9% of the firms are women owned and almost 45 are minority owned.²⁴

Job creation

According to the Kauffman Foundation, new, young, high-tech businesses—as opposed to small businesses generally—play an outsized role in net job creation in the United States.²⁵ This is because the substantial majority of nascent entrepreneurs do not intend to grow their businesses significantly or innovate, and many more never do. Differentiating growth-oriented "startups" from the rest of young businesses is an important distinction that has been underrepresented in research on business dynamics and in small business policy.

It is the innovative high-tech sector—defined as the group of industries with very high shares of employees in the STEM fields of science, technology, engineering, and math that are the important contributors to entrepreneurship in the U.S. economy. These are the companies that make up the SBIR community. Thus, technology innovation is the key to competitiveness in leading today's global economy. In the last 25 years, the percentage of U.S. scientists and engineers employed by small business has grown by over 500% from 6% to 38% of the nation's technical talent as a whole. The Federal government spends approximately \$135 Billion in R&D, yet less than 5% has been directed to small business and has remained constant over many years, even with the inclusion of the 2.5% for the Small Business Innovation Research (SBIR) program. The Federal government

needs to more effectively utilize the small business sector to develop and commercialize innovations that lead to job creation and economic growth.

The Small Business Innovation Research (SBIR) Program has a proven track record of producing technological innovation and job growth. But more must be done to bring these innovations to the marketplace.

Thus, it is companies like the SBIR community which create the most jobs. However, due to cutbacks in R&D funding, and due to the reduced numbers of grants being awarded, the number of SBIR firms has shrunk 17% to 5,009 firms^{26, 27} over the last seven years due to the funding cutbacks in R&D and the agencies failing to meet their goals.²⁸

Cutbacks in R&D Funding

The budget has continually reduced R&D funding. The following charts can be found at: <http://www.aaas.org/page/historical-trends-federal-rd>. **Figure 3** shows the trend in R&D spending, falling about 25% in the last 5 years. **Figure 4** plots R&D funding as a percentage of GDP, showing the decline of 40% over the last four decades. **Figure 5** shows Non-Defense R&D as a percent of discretionary spending has fallen about 56% over the last five decades. Finally, **Figure 6** shows Federal R&D spending has fallen about 70% as a percentage of the Federal budget in the last 50 years.

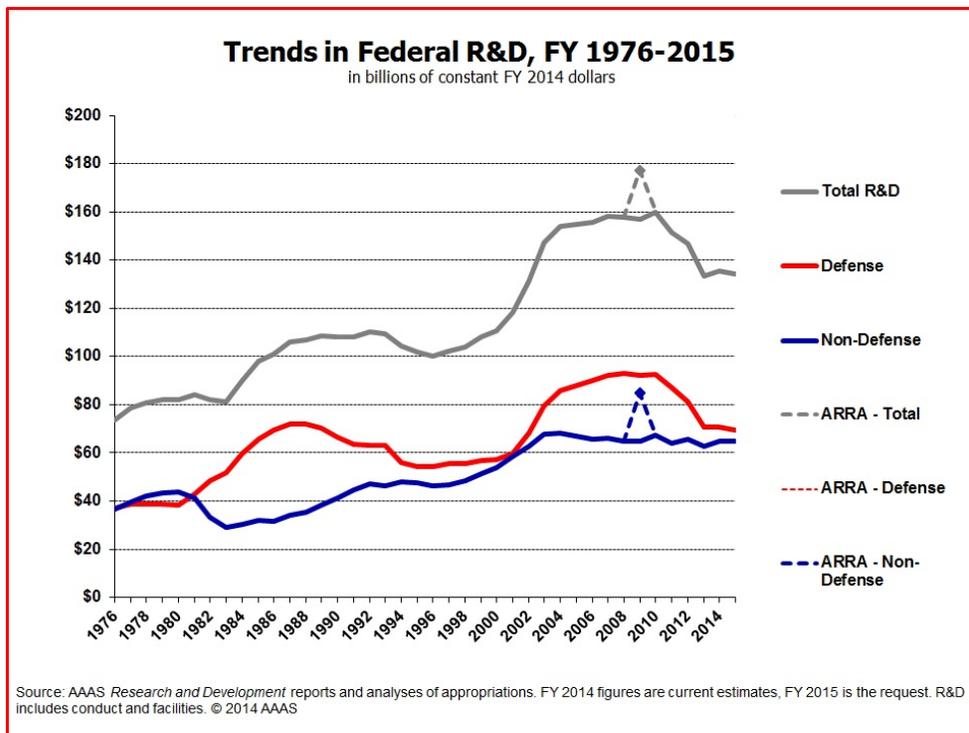


Figure 3: R&D spending has fallen 25% in the last 5 years.

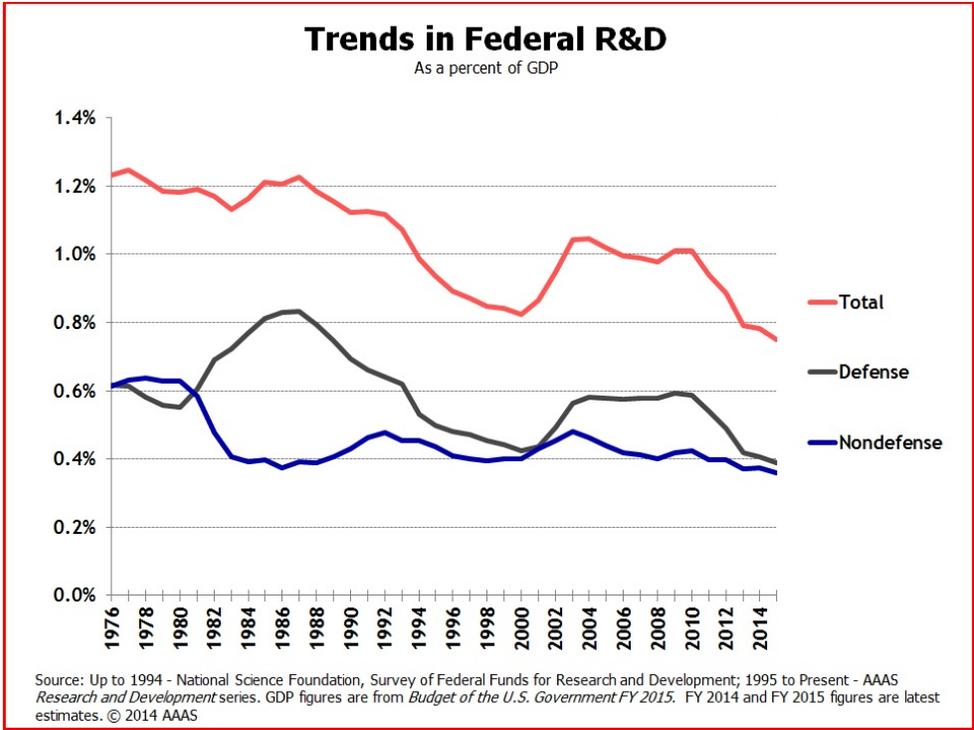


Figure 4: R&D funding as a percentage of GDP has fallen 40% over the last four decades.

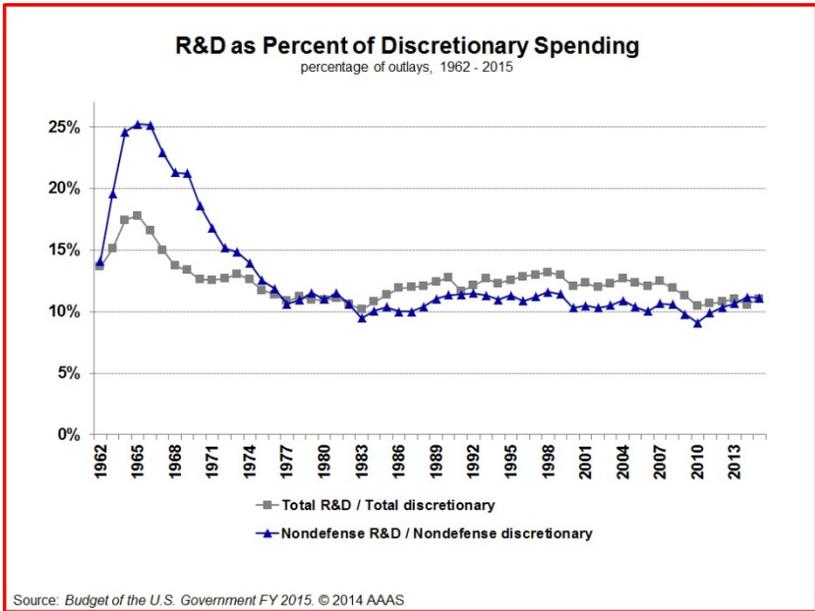


Figure 5: Non-Defense R&D as a percent of discretionary spending has fallen about 56% over the last five decades.

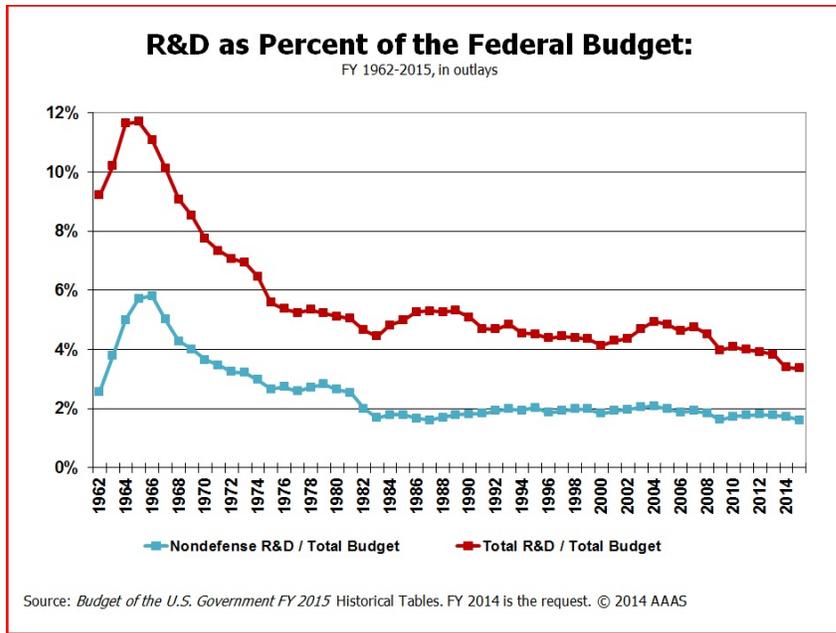


Figure 6: Federal R&D spending has fallen about 70% as a percentage of the Federal budget.

Let's compare and contrast America's R&D investment to China's. China's total R&D funding is expected to surpass that of the U.S. by about 2022, according to the 2014 Global R&D Funding Forecast, prepared by Battelle, a research and technology development organization, and *R&D Magazine*.²⁹ Last year, America's total R&D grew at 1.4%, while China's grew at 11.6%. **Figure 7** shows the result of slower R&D growth in America versus China. Even more importantly, since the Federal Government's share is primarily in earlier stage research than America as a whole, and since the Federal R&D is declining, this bodes even worse for America's long term prospect.

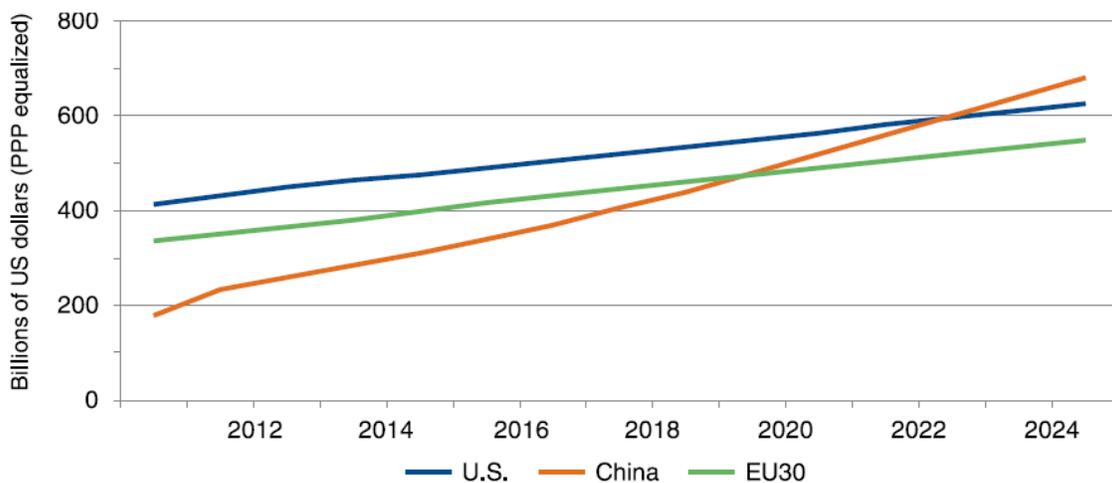


Figure 7: China's rapidly growing R&D will surpass the US in about 2022.

Cutbacks in SBIR Funding

Although the SBIR spending is tied to the overall Federal External R&D funding, “GAO found that 8 of the 11 agencies participating in the Small Business Innovation Research (SBIR) program and 4 of the 5 agencies participating in the Small Business Technology Transfer (STTR) program did not consistently comply with spending requirements for fiscal years 2006 to 2011. In calculating their annual spending requirements for these programs, some agencies made improper exclusions from their extramural research and development budgets.”

SBA is required to submit annual reports to Congress on the SBIR program. The GAO found: “SBA has not submitted an annual report on these programs for fiscal years 2009 to 2011 but plans to submit the reports to Congress later in 2013—making the data available to Congress on the programs 2 to 4 years late.” To my knowledge, no SBIR report has been submitted by the SBA since the GAO report was issued in September 2013, making these reports that were 2-4 years late, an additional eight (8) months late. It is difficult for Congress to provide proper legislative oversight when the Agencies untimely withhold information.

Both number of awards for the SBIR program and the dollar amount of the awards continue to decline.³⁰ See **Figure 8**.

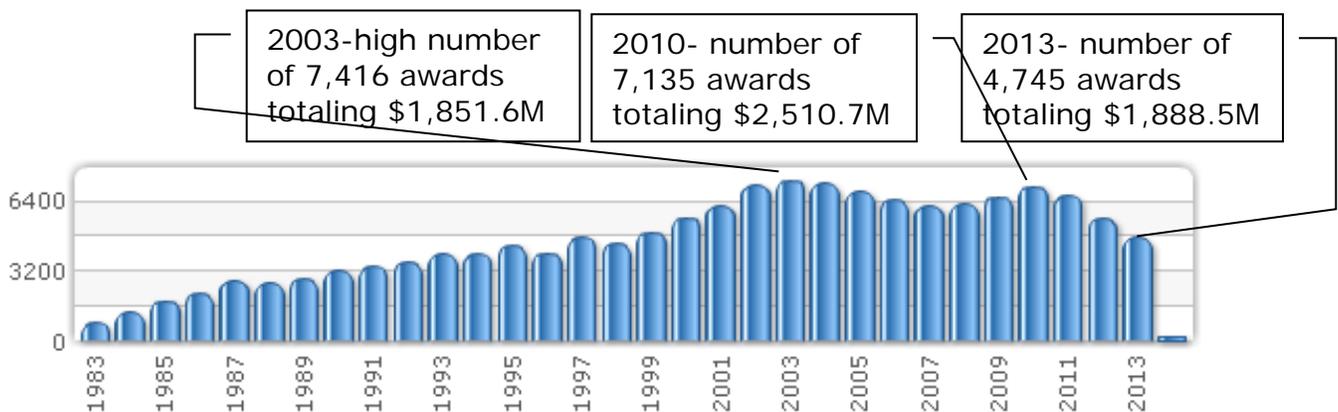


Figure 8: The number of SBIR Awards has dropped by 36 percent in the last decade; and the dollar amount awarded has dropped by 25% in the last three years.³¹

Commercialization successes

The National Academy of Science findings paint a remarkably positive portrait of the Program. The studies and even the summaries are extremely rich and detailed, and worth careful consideration. Commercial success includes sales, license revenues, R&D investment, research contracts and the sale of equity. The average sales per Phase II project were \$2.4 million and the average investment for Phase II was \$1.5 million. Given the inherent technical risks involved, "the fact that a high proportion of the projects reach the market place in some form is significant, even impressive."

"On average, SBIR projects received almost \$800,000 from non-SBIR sources, with over half of respondents (51.6 percent) reporting some additional funds for the project from a non-SBIR source."³²

SBIR has a stellar list of "graduates," including

- **Qualcomm**
- **Symantec**
- **Amgen**
- **Biogen**
- **Genzyme**
- **Chiron**
- **Titan**
- **Nanosys**
- **American Biophysics**
- **Luna Innovations**
- **JDS Uniphase**
- **iRobot, and**
- **Armorworks**

to name but a few.

Other Concerns

Patents and Wealth Creation

The America Invents Act of 2011 and its effect on Small Business Inventors

In October 2013, when the first reports of the effects of the America Invents Act (AIA) became available, Federal Circuit Chief Judge Rader described the AIA's Patent Trial and Appeal Board ("PTAB") as "*death squads killing property rights*". By March 2014, more numbers emerged showing the effectiveness of the PTAB post issuance procedures.³³ More than 80% of the patent claims challenged are instituted for trial. Once instituted for trial, the PTAB is canceling 95.2% of all claims.³⁴ This means the vast majority of asserted patents now face getting invalidated. In light of the March PTAB numbers, Rader noted that his "*death squad*" comments may be more accurate than originally thought.³⁵

So, for inventors, after having paid about \$75,000 for a patent, they now are in the position of a homeowner who finds that their house title is worthless. After spending years inventing, testing, and obtaining their patent, the inventor is now told all of their efforts were in vain.

Most significantly, these property rights are being extinguished by a non-Article III court. To invalidate a patent in a court requires a showing of clear and convincing evidence with the burden of proof on the challenger.^{36,37} The PTAB procedures require only the lowest evidentiary standards³⁸ to open the door to a PTAB procedure. Then the burden of proof is switched to the patent holder, and the procedure is structured to require validation of the patentability tests a second time, like re-applying as if the first grant was moot and in dramatic contrast to the settled judicial procedure previously required to invalidate the patent.

Some argue that in the end it is still fair because the patent holder can appeal to the Federal Circuit. However, the Federal Circuit is not a trial court and therefore does not control evidence, witnesses or other submissions, it is not the finder of fact, and the burden of proof again is on the patent holder. The cost of a PTAB review to the patent holder can exceed \$250,000 and burn a year and a half of the patents already limited term. In sum, the patent holder has little recourse as the fight is almost always over when the PTAB invalidates.

Statutory law applies the settled, 200 year old precedent demanding the presumption of validity which was defined by the Supreme Court to require clear and convincing evidence with the burden of proof on the challenger in a process structured to invalidate the patent. This result was blocked in the back rooms of the United States Patent and Trademark Office by implementing the new PTAB procedures.

The effects of the AIA are just now coming to light and those effects are proving themselves to be devastating to small patent-based businesses and independent inventors. **It is not surprising that during the first two months of 2014 the number of new patent cases dropped 25% over 2013.**³⁹ The number is likely to fall even further as more and more inventors realize the risk.

The consequences will spread across our economy causing grave damage to investment in patents. In 2010, America's most IP-intensive industries accounted for \$5.06 trillion in value, or 34.8 percent of U.S. gross domestic product and IP-intensive industries generated 27.7 percent of all jobs in the U.S. economy.⁴⁰

The AmiCOUR IP Group's brief of Amicus Curiae in the high profile case *Microsoft v i4i* heard by the United States Supreme Court analyzed similar effects of a proposed lowering of the bar to invalidate a patent. AmiCOUR wrote, "*Publicly held corporations will have to report any material devaluation to shareholders and the Securities and Exchange Commission (SEC), resulting in a devastating impact on patent centric companies. Hardest hit will be the high tech and biotech firms, which contribute significantly to U.S.*

economic growth, particularly through job creation and whose innovations are primarily responsible for the United States' edge over global competitors."

This drop in IP value is in large part due to the ease at which a patent can be invalidated, and in part due to current legislative efforts to further diminish the value of granted patents. As noted previously, 80% of patents are admitted into a PTAB procedure and 95% of those admitted are invalidated. Using simple math, a patent has a 76% chance of invalidation. This high likelihood of invalidation is substantially decreasing the values of patent assets across the board.

Aside from the chilling effects on innovation as there is no certainty that capital invested can ever be recovered, Sarbanes-Oxley require that this substantial change in patent asset values be written down on the books of thousands of companies. In the United States, patent assets are valued at \$5.06 trillion so this write down could conceivably be as large at \$3.84 trillion. Also under Sarbanes-Oxley, failure to do so is criminal and could land the CEO and CFO in jail. A write down this large would no doubt cascade negatively across our economy and will likely cause severe disruption in capital markets. The simple economics of lower business valuation in response to the measurably diminished ability to exclude competition would, in fact, be very real.

The patent system is dead for all except large corporations thanks to the AIA. While the write-down may be unavoidable at this point, if we pass the current patent reform legislation thus expanding PTAB procedures, we will bury the patent system altogether along with the economic future of our nation. Instead, we need to go the other direction and strengthen patent rights.

We can still save what is left of the patent system and avert economic disaster. To do this, we must first reject the current round of patent reform altogether and assess the full degree of damage caused by the AIA.

This is extremely important to SBIR firms as they have received about 100,000 patents. This devaluation of patents is hurting the small high-tech, job-creating SBIR businesses, and thus the economy.

The Innovation Act of 2013, HR 3309.

The recent "Patent Reform" bills have an insidious effect on small businesses. The proposed legislation ensures small inventors will never be able to get the best inventions to market by imposing: Fee Shifting "Joinder", Loser Pays, Pay to Play, Covered Business Methods (CBM), Elimination of Post Grant Review Estoppel, Disclosure of All Plaintiff Interested Parties, Enhanced Pleadings and Limiting Discovery, and Customer Stay provisions that are so onerous, only large corporations will be able to commercialize inventions. The provisions will make small inventing companies "Toxic Assets" to investors. Small inventors will likely need at least \$5 million in the

bank, not for their own use, but to cover the infringers' costs. The details of these legislative "potholes" were described in my five part series in IP WatchDog. (See References ^{41, 42, 43, 44, 45})

Regulations

In his testimony to the Senate Committee on Small Business & Entrepreneurship last year Dr. Irwin Jacobs, founder and CEO of Qualcomm stated that SBIR Program helped Qualcomm get started but cautiously noted:

"It sounds as if there has been some requirement creep over the years, because I remember it as being a very straight forward, a very simple process to get a proposal in and very quickly get an answer back, and it sounds like that has changed dramatically." Congress and the Administration need to eliminate much of the regulatory burden they have added to the SBIR program.

In an SBTC White Paper we delivered to DoD and SBA almost two years ago.⁴⁶ As you will note, 30 months after the law was passed, we still don't have a system in place to report on commercialization of SBIR technology, and no rules or regulations on goals or incentives have been promulgated. While DoD and SBA have been working on implementation of the law, key elements have not yet been implemented. We are pleased that progress is being made and the DOD in its FAR regulation instructions did recognize the need to set goals for transitioning SBIR/STTR technology. (The DFAR 5000.2 Instructions require all program managers to set goals for themselves.) Programs like the Rapid Innovation Program are working and we thank Congress for the Rapid Innovation Program. However, we are dismayed by the fact that, in our biased opinion, it appears that **regulations adding new burdens to small business are imposed quickly, while the regulations that help small business are very slow in coming. For an example, see reference ⁴⁷ on Q&A on Phase III Contracting. This was produced by SBTC due to the lack of promulgated regulations and procedures.**

Transfer Act

Others are proposing to take the limited funds provided for small business in the STTR law and divert them to their non-small business priority. First, the venture capitalists took 25% of the SBIR programs for majority owned by VC firms. Now universities and others want to take 22% of the STTR program. HR 2981, the proposed "TRANSFER Act", would transfer \$80 million per year from the STTR program into a new tech transfer program run exclusively for universities. The SBIR program, with only 3% of the extra-mural Federal R&D funding, creates 25% of all key innovations in America. Large firms account for fewer than **5%** of key awards, even though they receive **half** the extramural R&D funding. SBTC believes that much more can and should be

done to commercialize SBIR technology by the Government. Today SBIR companies file more patents than all universities combined. SBIR companies commercialize one half of Phase II awards while universities total licensing income is only \$2.6 Billion dollars while receiving over \$40 Billion Federal dollars. Despite SBIR firms' outstanding record of commercialization, the TRANSFER Act would take \$80 million dollars each year, or 22% of the STTR program, and transfer it to an untested, unproven program to have universities study how to commercialize technology. The STTR program has been doing what the Transfer Act can only hope to accomplish. More money should be added to the STTR program not taken from it. SBTC strongly opposes the Transfer Act.

Non-Government Sources of Funding

Traditional non-Government funding sources include Bank financing, Venture Capital, Angel financing, and Crowd Funding. Together, these sources are currently insufficient to provide enough capital to expand the American economy to provide the required job growth.

Additionally, regional variations make a huge difference in availability of funding, particularly for Venture Capital. We will look at each of these sources of capital so that we can further understand how critical SBIR funding expansion has become.

Improve the Banking Environment for Small Business.

SBTC's companies are experiencing a significant negative impact of the banking and the regulatory environment on funding, making it much more difficult to grow and create jobs. Some national examples are shown at ^{48, 49, 50, 51, 52, 53, 54, 55}.

A start-up company in Pittsburgh with rapid growth received seed money from Consol Energy's Foundation for more than 20% of its equity. It was successful; but due to SBA Loan Guarantee eligibility regulations, any party with more than 20% ownership must personally guarantee the loan. This is simply not reasonable for a company the size of Consol, funding through its foundation. The result – the start-up company cannot secure bank funding. Thus, becoming "bankable" or "credit worthy" is unattainable for this innovative company and funding therefore for growth, therefore, remains out of reach.

The new regulations make it very difficult for small companies to grow rapidly. A personal example is for one of my companies, which has been growing by 10-15% per month for the last three years. Because we decided to invest in ourselves and our growth, we had a loss for a year. This caused our bank line of credit to be cancelled, which is not only jeopardizing our growth, but the company as well. Thus, we see the fallout of Dodd-Frank and bank regulations hindering job growth for small businesses.

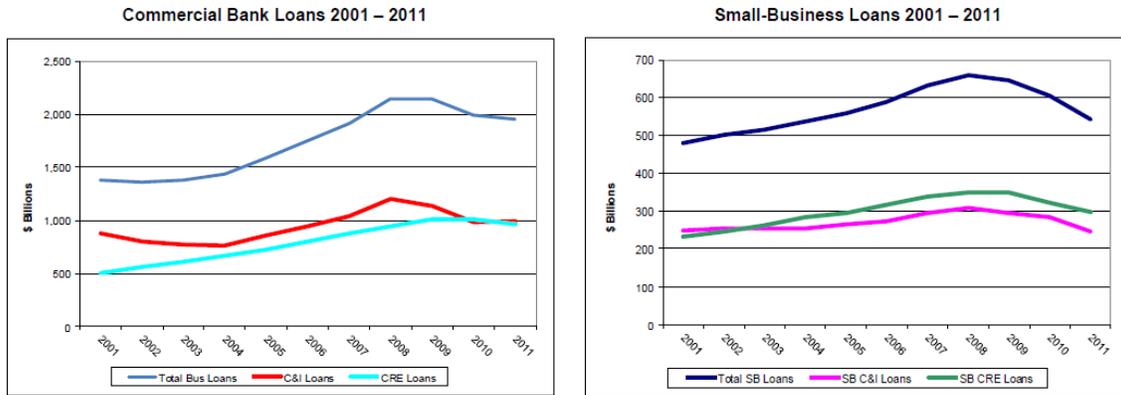
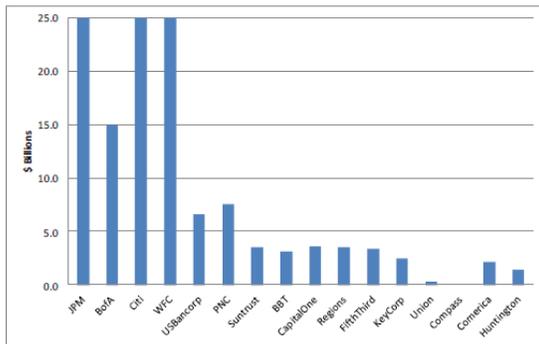


Figure 9: Commercial loans have recovered, however small business loans are still depressed which is suppressing job growth.

Small business lending is still down and hasn't bounced back. As shown in **Figure 9**, the data supports the anecdotal evidence provided above. A significant part of this problem is that the large banks who received billions of dollars of TARP money are the very banks that have decrease their lending to small businesses by 10% or more, in one case by more than 50%. See **Figure 10**.

**2008 TARP Capital Injections
Large U.S. Bank Holding Companies
with \$50+ Billion in Total Assets**



**Percentage Change in Dollar Amount of
Small-Business Lending, 2008 – 2011
Large U.S. Bank Holding Companies with
\$50+ Billion in Total Assets**

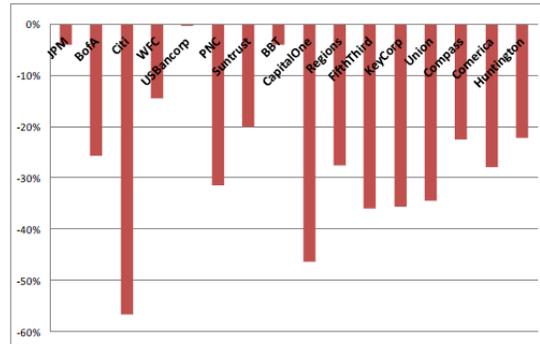


Figure 10: The very banks who received the most TARP money are the ones who are killing small businesses.

Although the community investment banks are much better than the large national and regional banks (as one would expect), the overall lending to small businesses is still down, by \$126.1 Billion, as is shown in **Figure 11**.

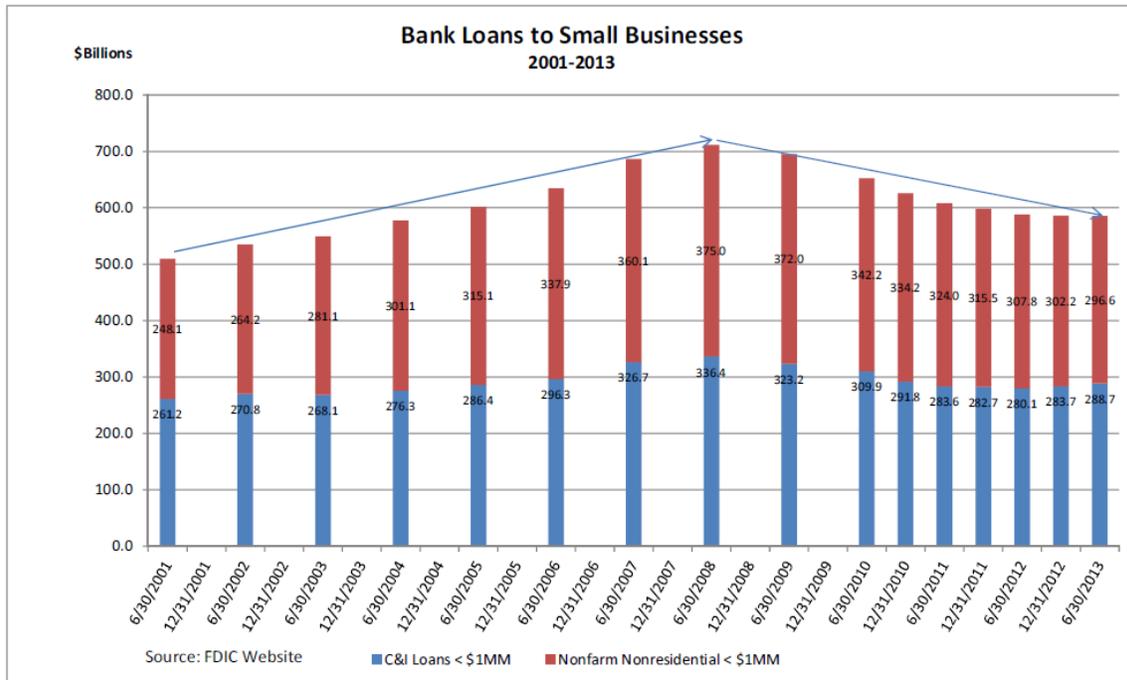


Figure 11. Small business loans have continued to decline since the recession.

Most recently, Thomson Reuters/PayNet Small Business Lending Index, which measures the volume of financing to small companies, fell to 110.5 in February from a reading of 116.5 in January, PayNet said on Tuesday. That was the lowest level since last September.⁵⁶ U.S. small businesses borrowing hit a five month low in February, in the latest indication of slower economic growth in the first quarter.

Venture Capital

Venture Capital (VC) funding has decreased from \$105.1B in 2000 to \$29.5B in 2013, or by about 72% over the last 13 years. This funded only 3,995 deals, about 16% fewer deals than the number of SBIR awards made last year. This reduction in dollars and deals has been very problematic for companies who are trying to raise money. It is even more of a problem for companies not located in Silicon Valley or Massachusetts.

American venture capital deals across the country are skewed, with Silicon Valley being the dominant location for investment.⁵⁷ (See **Figures 12 & 13.**) However, the "sheer degree of inequality of 2013's tech investments was nonetheless striking."⁵⁸ California receives over half the funding.

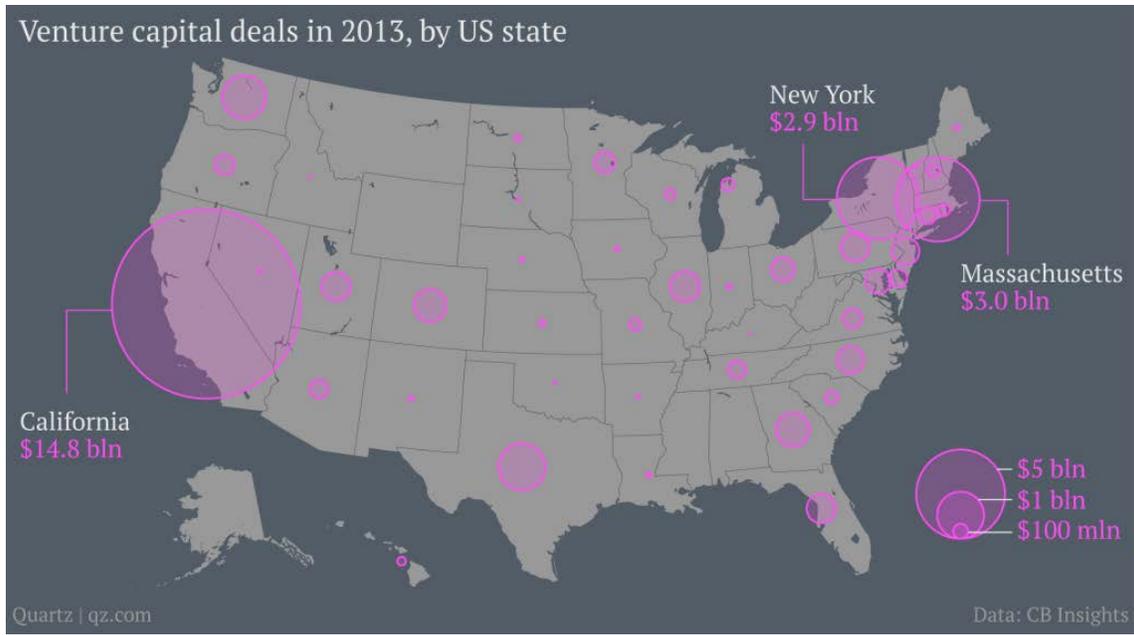


Figure 12: Just three states receive over 70% of all VC funding.

Venture capital deals in 2013, by US state



Quartz | qz.com

Data: CB Insights

Figure 13: Just five states receive over 76% of the funding, leaving the other 45 states competing over less than a quarter of all VC funding.

One of the former focus areas of VC investing has been the biosciences. However, US venture capital funding for the life sciences sector, which includes biotechnology and medical devices, declined by 1% in value and 3% in volume during 2013, according to the MoneyTree™ Report from PricewaterhouseCoopers (PwC) LLP and the National Venture Capital Association (NVCA).⁵⁹ Now, the majority of the funding is going into internet applications and IT software.

Venture capital has also continued to make few investments in seed and start up enterprises. The majority of these investments have been in software and IT industries with the vast majority of these seed and start up deals being made in the Silicon Valley. In the first quarter of 2014 there were only 41 of these startup/seed deals totaling \$125 million.⁶⁰ The most critical need for capital is at the early stage of technology development. The absence of such funding at the early stages makes the SBIR program even more critical.

Further, the gender and racial makeup of venture-backed companies is wildly inconsistent with the demographics of the country as a whole, in particular U.S. consumers. The U.S. population is 37%-minority today according but less than 1% of founders receiving VC funding were African-American.⁶¹ Women receiving VC funding were less than 2% of the total. This compares to about 9% for SBIR. The SBIR record for women and minorities can be seen in **Figure 14**.

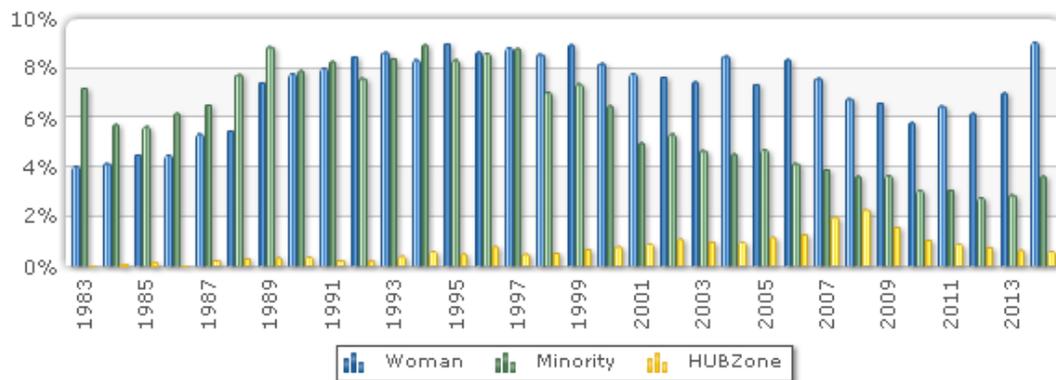


Figure 14 Percentage of SBIR Awards to Woman/Minority/HubZone-Owned SBC's⁶²

VC funding is even more difficult to obtain for early stage deals. Even though a record number of seed deals were funded in 2013, there were still only 843 Seed Deals funded by VCs.⁶³ This is less than 18% of the 4,745 SBIRs awarded in the same period.

Angel Funding and Crowd Funding

There are more than 225 angel investor groups throughout the United States and Canada.⁶⁴ The largest organization is the Angel Capital Association.⁶⁵ The ACA represents 170 member angel groups in 48 states, and 20 affiliated organizations, with over 8,000 accredited investors. These angel groups fund about 800 new companies a year, with over 5,000 companies in their portfolios. However, the demand for their services is over 75,000 companies per year, so 99% of the need is unfulfilled.⁶⁶ The 800 companies funded are about 1/6th the 4,745 SBIRs awarded in the same period. This is the reason the SBIR program is so critical.

Angel funding is increasing but certainly doesn't meet the demand for capital for developing new technology. Angel funding is focused on limited number of industries and is largest in California and New England (like the VCs). This leaves many companies outside of those areas without early stage funding.

Crowd funding may be helpful, but again the implementing regulations at over 500 pages seem to be insurmountable for small startup businesses. The crowd market is years from being able to solve the capital shortage problem for technology companies.

In a survey for [Palo Alto Software](#), 45 percent of startups said their struggle to find financing is hampering growth. According to the survey, securing investors is one of the top three goals of startups in 2014, and more than half are seeking at least \$100,000 in funding.⁶⁷

Conclusion

Universities receive well over 10 times more federal R&D dollars than the SBIR/STTR programs every year. SBIR/STTR companies receive 3% of Federal extramural R&D funding while universities receive between 32-36%. Simple stated, SBIR/STTR companies produce 58% more patents; three and a half time as many key innovations, and have a far better record of commercialization, on 10% of the federal funding that universities receive.

The normal business model for funding development is that the funding increases from basic research to applied research to advanced development. However, under the current Federal model, we see less funding when we move to applied research and advanced development. We are not arguing for less funding for universities; in fact, we argue the opposite as basic research is very important. However, due to the lack of alternative funding with angels, VCs, and banks, we believe that the Federal Government has an opportunity to expand the economy, and invest in our future where the product development curve starts to rise, the "sweet spot" for SBIR. Funding the testing and development of new products that lower health care costs, improve the performance of our military, produce low cost energy, and help the economy is one of the best investments that Congress can make in America's future.

If jobs are desired, SBIR is the best place to invest R&D dollars.

We recognize that the SBIR program alone cannot solve all of the country's problems. The nation will still face challenges with competition from China and the rest of the world. SBIR and technology growth will not solve the nation's unemployment problems alone. The SBIR program has helped create American jobs and even new industries. Compared to all other programs it is the best government program for turning inventions and research and development into innovations and jobs. I know of no other program that even comes close. Compared to other government programs, the SBIR program has an outstanding record of commercializing its technology. But it needs more help and support to create the new industries and new jobs to compete against China and the rest of the world.

SBA and DOD's delay in fully implementing critical portions of the law is slowing the economy and delaying job growth.

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