The Role of Philanthropic Capital in Entrepreneurship:
An empirical analysis of financial vehicles at the nonprofit/for-profit boundary of science and engineering

by

Sarah J. Wood
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Signature of Author:

Engineering Systems Division
August 10, 2012

Certified by:

Fiona Murray
David Sarnoff Professor of Management and Technology
Thesis Supervisor

Accepted by:

Joel P. Clark
Professor of Materials Systems
Acting Director, Technology and Policy Program
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ABSTRACT

Not-for-profit funding from wealthy individuals and their foundations is widely used to support science and engineering research within the university, but is not currently being used to fund the translation of those ideas towards greater impact. Entrepreneurship is a powerful engine for moving from idea to impact, but for-profit investments in early-stage companies fail to account for investors' charitable objectives and are not rewarded for social returns. Conversely, tax-shielded "charitable" funds are rarely used in for-profit technology companies regardless of their desirable social outcomes. As a result, there is often a limited amount of capital available to companies in areas such as energy, water and human disease because neither pure philanthropic nor pure profit motives sufficiently justify investment. Traditional explanations for funding gaps fail to recognize that the shortfall due to both the risk profile of potential investments, and the poor match between the social and private interests of "investors" and the types of vehicles that might allow a mix of philanthropic and financial motives to sit side-by-side.

To address this challenge, we asked a simple question: What financial approaches and organizational structures can be deployed at the intersection of the non-profit and for-profit boundary to address the funding gaps in science and engineering commercialization? To explore this issue, we conducted interviews, reviewed legal texts and relevant literature, and compiled data from online sources. Our findings reveal a sophisticated set of tools that are historically under-used, but which have the potential to advance many areas of science and engineering that hold solutions to global issues, such as health, environment, water, and energy.

Thesis Supervisor: Fiona Murray
Title: David Sarnoff Professor of Management and Technology
BIOGRAPHY OF THE CANDIDATE

Sarah Wood graduated from the University of Virginia in 2007 after cultivating a passion for doing well by doing good at the McIntire School of Commerce. She immediately started work as Trustee and Executive Director of the Chesonis Family Foundation, designing and implementing a strategy to use philanthropic resources to address pressing energy and environment challenges unaddressed by private enterprise or public capital.

Between 2007 and 2010, she oversaw the Chesonis family's $10 million gift to proof-of-concept academic energy research and helped facilitate several equity investments made by the family into energy technology startup companies.

Sarah enrolled at MIT full time to ask the question: why aren't more families aligning their philanthropic missions with their investment portfolios? What tools are available that might allow or encourage more families to complement private investors with strategic philanthropy, particularly in investment areas that are vital to civil society but not priced for embedded externalities? And, importantly, should this be the role of the family foundation?
ACKNOWLEDGEMENTS

This thesis is just a stack of paper, but hidden inside are two years of learning at MIT, preceded by 25 years of hard work and many supporters. First, I am grateful to Fiona Murray for challenging me professionally and inspiring me personally. You are my example of how it all can be done.

There are huge sets of customized data that do not appear in this thesis, but they inform my conceptualization of how research and development is funded in the U.S. I want to thank my research assistants, Caroline Lester, Kenny Ching, Brooke Johnson, Juan Valdez, and Christian Vilanilam, for their hard work gathering and refining data over the past two years.

I am grateful for contact with MIT Energy Initiative fellows, administrators, and staff during my time at MIT. Thank you, Professor Moniz and Melanie Kenderdine, for giving me a work space to explore my passion for energy technology innovation. Bumping into world experts from science and engineering disciplines every day informed my work in important ways.

Thank you to the MIT Energy Club leadership teams, 2006 through 2012, whose hard work gave me the platform to learn. This especially includes the 2011 MIT Energy Conference directors’ team. I can’t imagine surviving MIT without you.

I am particularly grateful for Arunas and Pam Chesonis, who provided the practical impetus for learning about the energy and philanthropy sectors and made my life rich with opportunities to succeed.

And to my family and Michael Kearney, you are my everything. Thank you.
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Twitter Feed
February 16, 2012
11:30am EST

Rob Day @cleantechvc
Just because the world needs something doesn’t mean it will generate VC-type returns to investors

Walt Frick @wfrick
@cleantechvc and just because a VC likes something doesn’t mean it will generate big returns for the world
CASE STUDY: Liquid Metal Battery Corporation

At first glance, the formation of the Liquid Metal Battery Corporation (LMBC) from the lab of Professor Donald Sadoway at MIT appears to be a typical story of university-led engineering innovation: brilliant professor shares eureka moment with capable student, student toils away in dark basement lab for half a decade, small-scale prototype eventually works, a business incorporates, and group moves off campus to try to save the world (and maybe make some money). But dig deeper and the LMBC story becomes one of a surprising but increasingly widespread combination of philanthropy, public and private capital. Rather than simply relying on investors driven by financial returns, the founders of LMBC were able to patch-together funding from wealthy individuals that chose to support the public-good creation efforts of the company in ways more akin to philanthropy and whose decisions mixed financial and social returns in complex and variable ways.

The story of LMBC is one example of a burgeoning trend among high-net worth individuals to engage not simply in scientific philanthropy by making gifts and grants to universities but also to engage in philanthropy targeted towards the commercialization of science and the translation from idea to impact via company formation. The financial mechanisms that supported the Liquid Metal Battery team from idea conception inside the university to incorporation and the translation of the idea beyond the university provide a window into emerging patterns of funding allocation that are particularly relevant to science, especially scientists and entrepreneurs in the life sciences and clean technology whose goals are not only to further knowledge but also to solve problems of significant social impact.

Below we follow the path of David Bradwell, Sadoway’s primary researcher on the liquid metal battery project, from 2006 through 2011 by examining invention disclosures, team developments, and the technological roadmap of an idea that has already garnered Bradwell a coveted spot on the 2010 TR35 (Technology Review’s Top 35 Innovators Under 35) and over $30M in committed capital, shared between the university lab at MIT and off campus with the Liquid Metal Battery Corporation. While formally using traditional financing vehicles – grants and equity financing, informally, the financing story is one of wealthy individuals making choices well beyond the traditional calculus of grant-making or investment-making.

The Sadoway Lab

For over thirty years, Don Sadoway has steered the research endeavors of his lab with a personal desire to reduce the carbon pollution output of various commercial industries, including production and usage of batteries, as well as extraction of metals from their
ores. When Sadoway joined the MIT faculty in 1977, the U.S. Bureau of Mines and the U.S. Department of Energy, which had an interest in stable anodes for aluminum, primarily funded his work. Unfortunately, during the Reagan Administration in the 1980s, funding for science waned - a decline that Sadoway attributes to low oil prices resulting from decreased Middle East oil imports to the U.S. from 1975 through 1982. In the meantime, Sadoway’s lab focused on metallurgy projects funded by the U.S. Navy, which had an interest in making ships out of titanium.

It was not until Japan-based Furukawa Electric approached Sadoway in 1994 with an offer of corporate sponsorship of university research that he pulled together a team of collaborators – MIT Professors Gerbrand Ceder, Anne Mayes, Yet-Ming Chang, and himself – to tackle new battery projects. As Sadoway himself shifted his focus to teaching Introductory Chemistry to MIT Freshman, new government and industrial partners started trickling in: NASA, American Iron & Steel Institute, and Brazil-based Vale all initiated new projects between 1996 and 2003.

Prior to 2005, Sadoway had never employed more than five researchers at one time in his lab nor collaborated with philanthropists or foundations for research funding. This is unusual for an MIT laboratory with 30% of overall funding at the Institute coming from philanthropic sources (directly or via the endowment) (Murray 2012).

When David Bradwell arrived at MIT in the fall of 2005, Sadoway had just begun “kicking around the idea to put an aluminum smelter in reverse.” Sadoway had come up with the idea together with one of his collaborators, Ceder, who was on sabbatical during Bradwell’s one-year terminal master’s degree program. Together Ceder and Sadoway had already filed an invention disclosure with the MIT Technology Licensing Office, but it wasn’t until Bradwell defined criteria for usable materials, made a second invention disclosure, and was added to the TLO case number that things really took off.

**Desh Deshpande: founding a center for seed money to university research**

In the summer of 2006, Bradwell decided to stay on to work for Sadoway as a visiting scientist and was granted the money to do so. He chose to apply for a grant that changed the funding trend for Group Sadoway – he selected to apply for funding from a new source on campus, the Deshpande Center for Technological Innovation. The Deshpande Center was established at the MIT School of Engineering in 2002 to increase the impact of MIT technologies in the commercial marketplace. One couple, Jairee and Desh Deshpande, ignited the program with a founding gift of $20 million.

After starting Cascade Communications with $1,000, selling it for $3.7 billion, and then founding Sycamore Networks, which at the time boasted the fourth-largest IPO of all
time, Deshpande fit the profile of the neo-philanthropist: young compared to his philanthropic predecessors (he was 51 when he founded the Deshpande Center), techie, and entrepreneurial.

The selection mechanism and criteria for Deeshpande grants were distinctive from traditional government grants. The project was awarded Deshpande money by the MIT employees that administer Deshpande Center programs; the Liquid Metal Battery project was allocated its first $250,000 to spend over the next two years. Bradwell started using his time to explore electrochemistry with help from a post-doctoral associate that had joined the group, Aislinn Sirk. Together they built the first working cell, one inch in diameter and fundamentally different in the way it functioned. A third invention disclosure was made.

After three application attempts during his time as visiting scientist, Bradwell was welcomed as a PhD candidate in the fall of 2007. He admits that he has sacrificed his grades to focus his attention on the Liquid Metal Battery project; he had become increasingly optimistic about the commercial viability of the technology during the course of the Deshpande Center grant, but there were still years worth of basic science to explore before he could consider forming a business to bring the battery to market.

**Arunas Chesonis: unrestricted but monitored gifts to university faculty**

As the Deshpande account dwindled, Bradwell sought other funding options that would give him the flexibility to start his own business in the event that the liquid metal battery proved to be a viable product. His search ended when he and met Sarah Wood, Executive Director for the Chesonis Family Foundation in November 2008.

Wood had just arrived on campus representing the Chesonis Family Foundation, a private family foundation dedicated to bridging funding gaps in the innovation value chain to develop economically viable technology as a driver of positive change. After taking personal meetings with over thirty MIT faculty, Arunas Chesonis made a $10M pledge to MIT over five years, 2008 through 2012. The money flowed as an unrestricted gift to the lab of Chemistry professor Dan Nocera, who set up sub accounts for faculty that Chesonis chose. It was through a sub account to Don Sadoway that the foundation offered to cover four years worth of Bradwell’s graduate student stipend and discretionary spending in the lab for materials and equipment. In this way, the dollars came directly from the foundation to Sadoway’s lab via an unrestricted gift. It was up to Bradwell and Sadoway to decide how to use the funds – no strings attached.

Like Deshpande before him, Chesonis fits the emerging profile of high net worth individuals interested in science but searching for structures that would have more
impact that simply adding to the university general fund. Chesonis had started PAETEC Corp, a telecommunications company based in Rochester, NY, in 1998 when he was only 35 years old. Today, at 48, he’s halfway through a four-year, $10 million pledge to MIT for unrestricted giving to faculty of his choosing in the School of Engineering and School of Science. His grants come directly from his own family foundation and he emphasizes personal interaction with the faculty and students that receive his dollars. He wants to know what’s going on in the lab and what keeps the researchers up at night, hoping for an insider’s glimpse of the next big thing in energy technology innovation.

Only a few days after Bradwell received the pledge from the Chesonis Foundation in December 2008, Sadoway was asked to stand in for Professor Ernie Moniz, Director of the MIT Energy Initiative, at a presentation to Total, an oil company based in Paris. During the talk, Sadoway mentioned the Liquid Metal Battery project that Bradwell had now been working on for a few years. A group of Total executives approached him after the talk, interested to fund any research in his lab that would enable storage for residential applications of solar photovoltaics. Sadoway explained that the intellectual property associated with grid scale application of the technology was off limits, but he was willing to discuss sponsored research for residential applications.

**Bill Gates: equity investments in capital-intensive startups**

While the conversation with Total gained momentum into January of 2009, Sadoway began receiving what seemed like junk email from Open Courseware, an MIT system that shares faculty lectures on the Internet. The notes expounded compliments of Sadoway’s publicly-available lectures, but offered lists of suggested improvements – all allegedly sent by Bill Gates. Sadoway ignored the spam until a past graduate student from Group Sadoway and current Microsoft employee called to tell him that Gates announced on a company retreat that he was addicted to Material Science lectures on MIT’s Open Courseware and was especially fond of Professor Donald Sadoway.

Shortly thereafter, Gates contacted Sadoway directly to arrange a clandestine visit to MIT, citing questions he had about materials science and engineering. Sadoway and Gates met for the first time for 90 minutes in September 2009, with Gates fully prepped with landmark texts that Sadoway had sent from his personal library to Gates’ hotel room the night before. It was during this initial meeting that Sadoway mentioned the Liquid Metal Battery project for the first time.

A few weeks later, in September 2009, Bradwell and Sadoway received two big breaks. The first, a $4 million deal with Total to fund research in the lab at MIT, the second, a $7 million grant from ARPA-E, a new federal agency formed by the Department of Energy.
to pump funding into transformational energy research and development projects at universities, national labs, and early-stage startups. Group Sadoway immediately expanded from one soldier to an army of Liquid Metal Battery warriors, and Sadoway called Gates to give him an update.

Gates encouraged Sadoway and one of his post-doctoral fellows, Luis Ortiz, to meet with him in Seattle in March 2010 and to give him the update about the project in person. Sadoway knew that the name, visibility, deep pockets, personal rapport, and entrepreneurial experience Gates could offer as an angel investor would be unparalleled to any other early-stage seed financier. Now was his chance to launch a business to promote the Liquid Metal Battery.

In June 2010, just a few months before Bradwell was due to defend up his doctoral thesis, Sadoway, Bradwell, and Ortiz founded the Liquid Metal Battery Corporation, underwritten by a standard term sheet from Gates Ventures. Gates declined taking a board seat or even an observer seat – the $2.25 million commitment was not a sufficient enough portion of his investment portfolio to demand such a time commitment. Or as he says “he doesn’t know the business as well as LMBC does.”

During the summer of 2011, when interviews for this case were conducted, the Liquid Metal Battery Corporation had three founders, Ortiz, Bradwell, Sadoway, one full-time employee, and a five-member board of directors with the Gates seat not filled. One year later, in July 2012, the LMBC had almost twenty employees working full time off campus and had closed a Series B fundraising round in June. LMBC has a worldwide exclusive license on all invention disclosures from Group Sadoway at MIT plus all improvements from on-campus research. Equity capital comes flows in via wire transfers from “William H Gates III” directly, but LMBC personnel rarely interact with anyone from the Gates family compound of offices – including the Bill & Melinda Gates Foundation, Gates Ventures, and Intellectual Ventures – based in Seattle, Washington. The LMBC team feels it has been made clear that Gates’ investment is “not a profit-seeking venture,” but rather one made to address the Gates family’s personal concerns about climate change and ramifications on global health.

More poignantly, the Gates equity investment, clearly driven by altruistic intentions, comes at the end of a string of like-minded investments made to push the Liquid Metal Battery concept forward: Desh Deshpande, Arunas Chesonis, and then Bill Gates. The similarities are striking: all three individuals bring to bear self-made wealth garnered through tech entrepreneurship, are under 60 years of age, and support the technology innovation pipeline in creative, philanthropic ways intended to create positive societal impact in commercial markets.
CHAPTER 1: Two Logics

The LMBC story is not unusual: Many science and engineering ideas developed inside universities have potential for useful impact both in economic and social terms. However, the funding sources that support those ideas do not reflect a mix of values, but rather entirely distinctive logics. This chapter examines these different logics as they shape the movement of technologies that are both potentially profitable and provide opportunities for social impact from bench to marketplace. More specifically it focuses on the funding gaps that arise between pure philanthropic capital in the earliest stages of development and pure for-profit capital in later stages.

A wide range of powerful ideas in science and engineering have been developed inside university laboratories; at MIT alone researchers contributed to such inventions as the world wide web, human genome, transistor radio, email, GPS, the spreadsheet, and treatments for hepatitis, multiple sclerosis, and cancer (Allis 2011). Projects like these have had tremendous impact not only in social terms, but also economic terms through opening up completely new markets or meeting existing needs for customers in new ways. As the notion of Pasteur’s Quadrant highlights, even ideas that make important contributions to fundamental knowledge can also have usefulness (Stokes 1997).

Stokes recasts the widely accepted view of the tension between understanding and use in scientific research, citing as a model case the fundamental yet use-inspired studies of Louis Pasteur as he laid the foundations of microbiology. Pasteur worked in the era of the "second industrial revolution," when the relationship between basic science and technological change assumed its modern form. Over subsequent decades, technology has been increasingly science-based. But science has been increasingly technology-based: the choice of problems and the conduct of research are now often inspired by societal needs (1997).

On this revised, interactive view of science and technology, Stokes builds a convincing case that by recognizing the importance of use-inspired basic research we can frame a new compact between science and the mission-based investors that fund research and development, such as the government and philanthropists (1997).

As illustrated in Figure 1, science and engineering ideas follow a trajectory with a variety of stages from idea conception to implementation.
At each stage, projects face a different set of stakeholders, challenges, and objectives. As they move from idea inception to impact, ideas typically face two entirely distinct funding logics.

### 1.1 Social Logic

At the earliest stages of university research, traditional funding comes from public sector grants or private philanthropy.

The rationale for this funding is clearly explicated by Arrow (1962), who argues that there will be chronic under investment in the earliest stages of scientific research because private investors will not be able to capture all the rents.

As a consequence, funding sources for science and engineering research where a path to market is high risk and long-term are typically government or foundations i.e. driven by a social logic. Broadly, the nonprofit logic’s reasons for investment are social goods such as clean air, clean water, and literacy.
Philanthropy plays a major role in university-based scientific, engineering and medical research in the United States, contributing over $4 billion annually to operations, endowment and buildings devoted to research. When combined with endowment income, university research funding from science philanthropy is $7 billion a year. This major contribution to U.S. scientific competitiveness comes from private foundations as well as gifts from wealthy individuals. According to ongoing research on the role of science philanthropy, it provides almost 30% of the annual research funds of those in leading universities (Murray 2012).

The powerful role of the social logic in driving scientific funding is evident in the earliest scientific research in the United States, which was supported exclusively by wealthy patrons (although the federal government also began to contribute during the course of the twentieth century). Today, modern day patrons and government agencies together continue to play important roles in supporting fundamental science and engineering research.

1800-1900: science as gentleman's culture to specialization

In the early 1800s, there was no well-defined occupational structure for a person who devoted his life to research. The word "scientist" was coined by an English philosopher in 18401, but was uncommon in the American vocabulary until the end of the nineteenth century. Figure 3 shows the usage of the written word "scientist" from 1780 through 2008 in the (American) English language.

Figure 3. Google books Ngram Viewer2 – "Scientist" used in American English

1 In 1834, Cambridge University historian and philosopher of science William Whewell coined the term "scientist" to replace such terms as "cultivators of science."

2 In 2010, Google made a database called "Ngram Viewer" from nearly 5.2 million digitized books available to the public for free downloads and online searches, opening a new landscape of possibilities for research and education in the humanities. The digital storehouse comprises words and short phrases as well as a year-by-year count of how often they appear and consists of the 500 billion words contained in books published between 1500 and 2008 in English, French, Spanish, German, Chinese and Russian.
In the early 1800s, Thomas Jefferson's cohort\(^3\) worked at science as they worked at politics, polite letters, and farming; science was considered, along with Latin, Greek, and moral philosophy, an important part of the gentleman’s culture. However, by the mid-1800s, science was becoming the property of specialists. By the 1840s, "men of science" and "men of letters" diverged into two cultures, causing problems for financial support of science. Scientists no longer had enough real world experience to stimulate public interest and few philanthropists knew enough about science to effectively subsidize its pursuit (Miller 1970).

Scientists were forced to act as their own entrepreneurs, taking every opportunity to secure patronage and recognition for basic scientific research. There were no general principles governing private philanthropy for scientific purposes. Family connections between men of science and men of wealth, a comet passing in the latitude of Boston to spark enthusiasm for astronomy, an industrialist’s realization that economic development created new career opportunities in science and technology, a patrician’s concern for the cultural status of his community, a robber baron’s bid for respectability, the winning personality of Louis Agassiz, the whims of an eccentric old lady who became the first patron of the American Association for the Advancement of Science: these were characteristic elements in the story of how science won its support (Miller 1970).

After 1880, institutions began to organize in more formal ways and introduced a greater degree of security and regularity into science, particularly at new research-oriented universities. Philanthropic "foundations" managed by professional staff freed the scientist of the responsibility to act as his own business manager and public relations expert. Professional foundation staff could also command the resources necessary to drive into the increasingly complicated and expensive search for knowledge (Nielson 1985).

In quantitative terms, public appropriations during the nineteenth century (as during the twentieth) outweighed private donations for scientific research. Federal and state agencies encouraged investigations that promised useful results, but politicians were unimaginative and frequently timid. Inertia, ignorance, partisan politics, and a fear that government support of science was somehow unconstitutional weakened public efforts at the advancement of knowledge. Although more intermittent in their support, private benefactors were free to innovate, to experiment, to venture capital on the unknown and helped make possible the first steps in the social organization of modern science in America (Miller 1970).

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\(^3\) Thomas Jefferson (April 13, 1743 – July 4, 1826) was the principal author of the United States Declaration of Independence (1776) and the Statute of Virginia for Religious Freedom (1777), the third President of the United States (1801–1809) and founder of the University of Virginia (1819). He was an influential Founding Father and an exponent of Jeffersonian democracy.
1900-1918: professionalization of philanthropy with little emphasis on science

Despite the professionalization of private foundations at the turn of the twentieth century, efforts to link private philanthropy and university science until 1920 continued to rely on individual research grants, which foundations found difficult to manage (Kohler 1985). The Carnegie Institution of Washington\(^4\) operated the only large grant program prior to 1920, and the experience permanently soured its president, Robert S. Woodward, on academic scientists.

1918-1939: post-WWI boom in giving to science

Fortunately, after WWI, science enjoyed unusual visibility and prestige; it was publicized as being paramount to post-war recovery and progress. Consequently, foundations invested $100 million in science between World Wars\(^5\) (1918-1939), primarily to universities. By 1925, at least a dozen large foundations began to sponsor research on a large scale, including the Rockefeller Foundation. These groups tended not to use individual research grants but rather relied on block grants to groups of scientists or to departments in a few leading research centers. Their overall objectives were to encourage more organized, cooperative research and to build regional centers of training for scientific manpower (Kohler 1985).

As an example, between 1918 and 1925, the General Education Board\(^6\) invested $20 million in astronomy, physics, chemistry, and biology. Similarly, the Carnegie Corporation

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\(^4\) Andrew Carnegie (Scottish-American industrialist, businessman, and entrepreneur who led the enormous expansion of the American steel industry in the late 19th century) founded the Carnegie Institution of Washington in 1902 as an organization for scientific discovery. His intention was for institution to be home to exceptional individuals—men and women with imagination and extraordinary dedication capable of working at the cutting edge of their fields. Today, Carnegie scientists work in six scientific departments on the West and East Coasts.

\(^5\) World War I began on July 28, 1914 and lasted until November 11, 1918. It involved all the world’s great powers, which were assembled in two opposing alliances: the Allies and the Central Powers. More than 70 million military personnel, including 60 million Europeans, were mobilized in one of the largest wars in history. World War II was a global conflict lasting from 1939 to 1945, involving most of the world’s nations and eventually forming two opposing military alliances: the Allies and the Axis. It was the most widespread war in history, with more than 100 million military personnel mobilized.

\(^6\) The General Education Board (GEB) was established in 1903 by John D. Rockefeller to aid education in the U.S. “without distinction of race, sex or creed.” The program included grants for endowment and general budgetary support of colleges and universities, support for special programs, fellowship and scholarship assistance to state school systems at all levels, and development of social and economic resources as a route to improved educational systems. Major colleges and universities across the U.S., as well as many small institutions in every state, received aid from the Board. The emphasis, however, was on the South and the education of Blacks. Offices were established in Richmond, Virginia and Baton Rouge, Louisiana to give GEB agents closer contact with southern communities. The Board was especially active in promoting the public school movement in the early part of the 20th century. After 1940, programs other than those for southern education were brought to a close; funds were nearly exhausted by the 1950s, and the last appropriation was made in 1964.
and Rockefeller Foundation each gave approximately $8 million to the National Research Council, which served as a trade association for science and developed markets for PhDs in industry, created communication networks, and encouraged cooperative research projects. These three examples played a major role in enabling American scientists to participate as equals with Europeans in all fields of science (Kohler 1985).

However, during the Great Depression, benefactors moved away from funding institutions and back to supporting individuals. Culturally, emphasis was on getting people back to work rather than visions of industrial research and development.

1939-1945: war-time science advances make strong case for post-war federal funding

In the years leading up the World War II, MIT's Vice President and Dean of Engineering, Vannevar Bush, became aware of the poor cooperation in the U.S. among civilian scientists and the military. In 1939, due to his concern about the lack of coordination in scientific research and the requirements of defense mobilization, Bush started to prepare a draft of a proposed National Defense Research Committee (NDRC) to be presented to Congress. But when the Germans invaded France, Bush decided speed was important and signaled President Roosevelt directly. He managed to get a meeting with the President on June 12, 1940 and took a single sheet of paper describing the proposed agency. Roosevelt approved Bush’s plan in ten minutes.

NDRC functioned with Bush as chairman and others as members, even before the agency was made official by order of the Council of National Defense on June 27, 1940. Bush quickly appointed four leading scientists to NRDC: NACA colleagues Conant, Compton, and Jewitt, and also Richard C. Tolman, dean of the graduate

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7 The National Research Council was organized in 1916 in response to the increased need for scientific and technical services caused by World War I. On June 1, 1917, the council convened a meeting of scientific representatives of the UK and France with interested parties from the US on the subject of submarine detection. The results obtained and the problems in the work were discussed. A further meeting with the British and French was held in Paris in October 1918 at which more details of the work was disclosed. As a result, the council recommended that US scientists be brought together to work on the problems. Due to the success of Council-directed research in producing a sound-based method of detecting submarines, as well as other military innovations, the NRC was retained at the end of the war, though it was gradually decoupled from the military. The Research Council is currently administered jointly by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, and its work is managed by a Governing Board and an Executive Committee.

8 The Great Depression was a severe worldwide economic depression in the decade preceding World War II. The timing of the Great Depression varied across nations, but in most countries it started in about 1929 and lasted until the late 1930s. It was the longest, most widespread, and deepest depression of the 20th century.

9 Vannevar Bush (March 11, 1890 – June 28, 1974) was an American engineer and science administrator known for his work on analog computing, his political role in the development of the atomic bomb as a primary organizer of the Manhattan Project, the founding of Raytheon, and the idea of the memex, an adjustable microfilm viewer which is somewhat analogous to the structure of the World Wide Web.
school at Caltech. Each was assigned an area of responsibility. Compton was in charge of radar, Conant of chemistry and explosives, Jewitt of armor and ordnance, and Tolman of patents and inventions.

The coordination of scientific effort was instrumental for the Allies winning the Second World War. Alfred Loomis said "...of the men whose death in the summer of 1940 would have been the greatest calamity for America, the President is first, and Dr. Bush would be second."

During 1941 the NDRC was subsumed into the Office of Scientific Research and Development (OSRD) with Bush as director, which controlled the Manhattan Project until 1943 and which also coordinated scientific research during World War II. In all, OSRD directed 30,000 men and oversaw development of some 200 weapons and instrumentalities of war, including nuclear weapons, sonar, radar, the proximity fuse, amphibious vehicles, and the Norden bomb sight, all considered critical in winning the war. At one time, two-thirds of all the nation's physicists were working under Bush's direction. In addition, OSRD contributed to many advances of the physical sciences and medicine, including the mass production of penicillin and sulfa drugs.

Of the war, Bush said, "...this has not been a scientist's war; it has been a war in which all have had a part. The scientists, burying their old professional competition in the demand of a common cause, have shared greatly and learned much" (Bush 1945).

Bush and many others had hoped that with the dissolution of OSRD, an equivalent peacetime government research and development agency would replace it. Bush felt that basic research was important national survival for both military and commercial reasons, requiring continued government support for science and technology. Technical superiority could be a deterrent to future enemy aggression.

During July 1945, in his report to the President Science, The Endless Frontier, Bush wrote that basic research was: "the pacemaker of technological progress" and that "new products and new processes do not appear full-grown. They are founded on new principles and new conceptions, which in turn are painstakingly developed by research in the purest realms of science!" (US Office of Scientific Research and Development 1945)
1945-1970: post-WWII boom in government support

Similarly, in an address on May 3, 1945 before the chapter of the Society of Sigma Xi\textsuperscript{10} at the University of Rochester, Dr. L.C. Dunn, Professor of Zoology at Columbia University and Chairman of the American-Soviet Science Society, agreed:

"The war and the sudden need to improve our means for supporting and directing war research have brought into high relief an important fact which has been dimly recognized for many years: there has been in the United States no orderly means for the continuous support of fundamental scientific research, and no policy or method for the deliberate utilization of science by our society. Science has been a hardy plant which grew where and how it could, thriving in the comfortable greenhouse of a research institute, or turning ample fertilizer into real fruit in an industrial laboratory, or in the more usual case struggling for sustenance in the thin soil of colleges and universities, occasionally enriched by temporary growth stimulants from a foundation or private donor. Except in the case of certain industrial developments and in a few government departments, the support of science in the United States has not been the result of decision but of chance, operating in a milieu [that] contained good scientists and good deal of fluid wealth" (Dunn 1945).

Consequently, the federal government did indeed become more active in funding science in the post-WWII epoch, most immediately with the National Science Foundation Act of 1950, whose stated mission is "to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense."

By 1950, in addition to the NSF, support for major areas of research were dominated by more specialized agencies such as the National Institutes of Health (medical research) and the U.S. Atomic Energy Commission (nuclear and particle physics). That pattern would continue after 1957, when U.S. anxiety over the launch of Sputnik led to the creation of the National Aeronautics and Space Administration (space science) and the Defense Advanced Research Projects Agency (defense-related research).

1945-2000: charitable giving swells with tax deductions and a growing economy

Congress first imposed personal income tax on Americans in 1913, and it allowed people to take an income-tax deduction for their gifts to charity starting in 1917.

\textsuperscript{10}Sigma Xi: The Scientific Research Society is a non-profit honor society that was founded in 1886 at Cornell University by a junior faculty member and a handful of graduate students. Members elect others on the basis of their research achievements or potential. Despite the name, Sigma Xi is neither a fraternity nor a sorority, and today is open to all qualified individuals who are interested in science and engineering.
However, the influence of the tax deduction before World War II was small because the income tax affected mainly the wealthy. But during and after World War II, the impact of the tax grew considerably; income tax rates rose and the pay of average Americans increased sharply due to a booming wartime economy (Billiterri 2000).

Suddenly, millions of Americans were paying income tax, and they had a motivation to shelter some of their wealth from the Internal Revenue Service by making donations to charity. By 1945, the last year of World War II, charitable contributions reported in income-tax returns were five times as large as they were in 1939. Giving continued to expand in the postwar era. In 1955, giving from individuals, foundations, and corporations totaled $7.7 billion. By 1978, that total had grown more than fivefold, to $39 billion. By 1998, total giving rose to $175 billion (Billiterri 2000).

Giving was fueled in the 1950s and 1960s by economic growth and the expansion of the American middle class, pent-up demand for capital projects at colleges and other institutions, and the increasing competitiveness of health charities like the American Heart Association and National Kidney Disease Foundation.

As private giving grew, so, too, did corporate giving. Court and legislative decisions in the 1950s and 1960s granted American companies wider leeway to support charitable causes, and a boom in postwar corporate public relations efforts also helped corporate philanthropy to grow. Corporate contributions reported on tax returns rose from $239 million in 1948 to $512 million in 1961. In 1998, giving by corporations totaled about $9 billion (Billiterri 2000).

Today: philanthropy continues to contribute importantly to university research

Over the period 2005-2010, the contribution of Federal funding to university research has grown less than 1%, and State funding has declined (NSF S&E Statistics Report 2010). Traditional analyses of non-Federal contributions tend to focus on the role of the private sector as the complement to public-sector government funding in academia even though industry contributes to less than 6% of university research funding. In striking contrast, philanthropic sources—particularly foundations and institutional sources (based on endowment contributions)—make up almost 30% of university research funding and have been growing at almost 5% annually (Murray 2012).

1.2 Economic Logic

Once ideas have reached the limits of their potential inside the university, there are generally two paths to impact—one is to large corporations through licensing. In 2009,
academic institutions generated 0.26 licenses for every invention disclosed - down from 0.34 in 2000 (Shane 2011).

The other path, well suited for ideas with high economic potential but significant risk, moves out of the university in the form of a start-up company. In 2009, U.S. academic institutions generated 0.11 start-ups per license, off from 0.14 in 2004 (Shane 2011). In both instances, the project confronts an entirely distinctive logic among financial supporters – economic in nature and focused on maximizing profits irrespective of associated social goods.

*Figure 4. Economic Logic Supports Startup Product Development*

Beginning in the post-WWII era in the United States, financial support for early-stage, high-potential, high risk, growth startup companies was called “venture capital.” Professional venture capital firms make money by raising “funds,” which own equity in the companies they support. The typical venture capital investment occurs after the seed funding round in the interest of generating a return through an eventual realization event, such as an IPO or trade sale of the company.

Venture capital is attractive for new companies that have limited operating history, are too small to raise capital in the public markets, or have not reached the point where they are able to secure a bank loan or complete a debt offering. In exchange for the high risk that venture capitalists assume by investing in smaller and less mature companies, venture capitalists usually receive significant control over company decisions, as well as a significant portion of the company’s ownership (PrivCo 2012).

Venture capital is also associated with job creation (accounting for 2% of US GDP), the knowledge economy, and used as a proxy measure of innovation within an economic sector or geography. Every year, there are nearly 2 million businesses created in the
USA, and 600-800 get venture capital funding. According to the National Venture Capital Association, 11% of private sector jobs come from venture-backed companies and venture backed revenue accounts for 21% of US GDP (NVCA 2102).

Carpenter and Peterson explain that, "because of asymmetric information problems and a lack of collateral, many high-tech firms, especially small firms, are likely to face financing constraints...venture capital is the form of equity financing that is currently best suited to address the capital market imperfections inherent in the financing of young high-tech companies." That is, capital market imperfections affect firms in high-tech industries in a disproportionate manner, underscoring the critical role of early-stage capital in bringing firms to the stage where they can conduct an IPO." While venture capital constitutes a relatively small proportion of all capital mobilized in the technology space, it plays a vital role in bridging gaps between the earliest stages of company formation - idea conception, intellectual property filing, prototyping, manufacturing protocol research - and running a business that operates sustainably at scale (Carpenter et al 2002).

In a working paper for the Harvard Business School written in August 2010, Gosh and Nanda explain that because venture capital firms plan to make money from only half of their investments, they need at least a small portion of their portfolio to perform very well and to own a reasonable share of those successful firms at exit in order for the venture capital firm to generate strong returns itself. Consequently, venture capitalists have a bias toward investing in projects where the commercial viability is established within a three to five year period. Similarly, to make many investments and realize even a few successes, venture capitalists typically invest under $15 million per portfolio company (Gosh et al. 2010).

1920-1958: origins of modern private equity

With few exceptions, private equity in the first half of the 20th century was the domain of wealthy individuals and families. The Vanderbilts, Whittneys, Rockefellers, and Warburgs were notable investors in private companies in the first half of the century. In 1938, Laurance S. Rockefeller helped finance the creation of both Eastern Air Lines and Douglas Aircraft, and the Rockefeller family had vast holdings in a variety of companies. Eric M. Warburg founded E.M. Warburg & Co. in 1938, which would ultimately become Warburg Pincus, with investments in both leveraged buyouts and venture capital.

Before World War II, money orders were primarily the domain of wealthy individuals and families (Wilson 1985). It was not until after World War II that what is considered today to be true private equity investments began to emerge marked by the founding of the first
two venture capital firms in 1946: American Research and Development Corporation (ARDC)\textsuperscript{11} and J.H. Whitney & Company\textsuperscript{12} (Ante 2008).

1958-1980: early venture capital and the growth of Silicon Valley

One of the first steps toward professionally-managed venture capital was the passage of the Small Business Investment Act of 1958. The 1958 Act officially allowed the U.S. Small Business Administration (SBA) to license private "Small Business Investment Companies" (SBICs) to help the financing and management of the small entrepreneurial businesses in the United States.

During the 1960s and 1970s, venture capital firms focused their investment activity primarily on starting and expanding companies. More often than not, these companies were exploiting breakthroughs in electronic, medical, or data processing technology. As a result, venture capital became synonymous with technology finance.

The growth of the venture capital industry was fueled by the emergence of the independent investment firms on Sand Hill Road, beginning with Kleiner, Perkins, Caufield & Byers and Sequoia Capital in 1972. Located in Menlo Park, CA, Kleiner Perkins, Sequoia and subsequent venture capital firms would have access to the many semiconductor companies based in the Santa Clara Valley as well as early computer firms using their devices and programming and service companies.

In 1973, with the number of new venture capital firms increasing, leading venture capitalists formed the National Venture Capital Association (NVCA). The NVCA was to serve as the industry trade group for the venture capital industry.

However, it was not until 1978 that venture capital experienced its first major fundraising year, as the industry raised approximately $750 million. With the passage of the Employee Retirement Income Security Act (ERISA) in 1974, corporate pension funds were prohibited from holding certain risky investments including many investments in

\textsuperscript{11} ARDC was founded by Georges Doriot, the "father of venture capitalism" (former dean of Harvard Business School and founder of INSEAD), with Ralph Flanders and Karl Compton (former president of MIT), to encourage private sector investments in businesses run by soldiers who were returning from World War II. ARDC's significance was primarily that it was the first institutional private equity investment firm that raised capital from sources other than wealthy families (The Economist 2004).

\textsuperscript{12} J.H. Whitney & Company was founded by John Hay Whitney and his partner Benno Schmidt. Whitney had been investing since the 1930s, founding Pioneer Pictures in 1933 and acquiring a 15% interest in Technicolor Corporation with his cousin Cornelius Vanderbilt Whitney. By far Whitney's most famous investment was in Florida Foods Corporation. The company developed an innovative method for delivering nutrition to American soldiers, which later came to be known as Minute Maid orange juice and was sold to The Coca-Cola Company in 1960. J.H. Whitney & Company continues to make investments in leveraged buyout transactions and raised $750 million for its sixth institutional private equity fund in 2005.
privately held companies. But in 1978, the U.S. Labor Department relaxed certain ERISA restrictions, and under the "prudent man rule\textsuperscript{13}," corporate pension funds were allowed to invest in the asset class, serving as a major source of funding to venture capitalists.

1980s: declining returns leads to retracting VC industry

The public successes of the venture capital industry in the 1970s and early 1980s (e.g., Digital Equipment Corporation, Apple Inc., Genentech) gave rise to a major proliferation of venture capital investment firms. From just a few dozen firms at the start of the decade managing $3 billion, by 1989, there were over 650 firms managing over $31 billion (Pollack 1989).

Subsequently, the growth of the industry was hampered by sharply declining returns, and certain venture firms began posting losses for the first time. In addition to the increased competition among firms, several other factors impacted returns. The market for initial public offerings cooled in the mid-1980s and collapsed after the stock market crash in 1987. Additionally, foreign corporations, particularly from Japan and Korea, flooded early stage companies with capital (Pollack 1989).

In response to the changing conditions, corporations that had sponsored in-house venture investment operations, such as General Electric and Paine Webber, sold or closed their venture capital units. Additionally, venture capital units within Chemical Bank and Continental Illinois National Bank, among others, began shifting their focus from funding early stage companies toward investments in more mature companies (Lueck 1987).

1995-2000: venture capital boom

By the end of the 1980s, venture capital returns were relatively low, particularly in comparison with leveraged buyouts, an emerging asset class. However, the late 1990s were a boom time for venture capital, as firms on Sand Hill Road in Menlo Park benefited from a surge of interest in Internet and computer technologies. Initial public offerings of stock for technology and other growth companies were in abundance, and venture firms reaped large returns (Metrick 2007).

\textsuperscript{13}The prudent man rule is a fiduciary responsibility of investment managers under ERISA. Under the original application, each investment was expected to adhere to risk standards on its own merits, limiting the ability of investment managers to make any investments deemed potentially risky. Under the revised 1978 interpretation, the concept of portfolio diversification of risk, measuring risk at the aggregate portfolio level rather than the investment level to satisfy fiduciary standards would also be accepted.
2000-2011: private equity crash

The technology-heavy NASDAQ Composite index peaked in March 2000, reflecting the high point of the dot-com bubble.

The NASDAQ crash and technology slump that started in March 2000 shook the entire venture capital industry as valuations for startup technology companies collapsed. Over the next two years, many venture firms were forced to write-off large proportions of their investments, and many funds were significantly “under water.”

By mid-2003, the venture capital industry had retracted half its 2001 capacity. Nevertheless, PricewaterhouseCoopers’s MoneyTree Survey shows that total venture capital investments held steady at 2003 levels through the second quarter of 2005 (PriceWaterhouseCoopers 2006).

Although the post-boom years represent just a small fraction of the peak levels of venture investment reached in 2000, they still represent an increase over the levels of investment from 1980 through 1995. As is shown in Figures 5 and 6, over recent years, the industry has consolidated into fewer funds raising less money overall (Greeley 2012; Kaplan et al 2010), but started to expand slightly last year.

Figure 5. Venture capital industry consolidated and retracted between 2008-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Funds</th>
<th>Fundraising (SM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>212</td>
<td>25,179</td>
</tr>
<tr>
<td>2009</td>
<td>163</td>
<td>16,336</td>
</tr>
<tr>
<td>2010</td>
<td>173</td>
<td>13,559</td>
</tr>
<tr>
<td>2011</td>
<td>182</td>
<td>18,575</td>
</tr>
</tbody>
</table>

14 value of the fund’s investments were below the amount of capital invested
In a time of scarce venture capital, entrepreneurs turn to angel investors, affluent individuals who provide capital for start-ups without the support of a professional venture firm. A small but increasing number of angel investors organize themselves into angel groups to share research and pool their investment capital.

The angel investment market in the United States invested $8.5 billion overall in the first quarter of 2010, down 6.5% over the first quarter of 2009. Similarly, the number of active investors in the first quarter of 2010 included 124,100 individuals, a drop of 11% from the first quarter of 2009. The decline in total dollars, coupled with the small increase in number of investments, resulted in smaller deal sizes on average during the first quarter of 2010 (Sohl 2010).

Data from the Center for Venture Research also indicate that angels have decreased their appetite for seed and start-up investing, with 26% of first quarter 2010 investments in seed and start-up stage and marking a steady decrease in the seed and start-up stage that began in 2008 (45%) and 2009 (35%). This decline was recouped in an increase in post-seed investing; 56% of total angel investments fell in this category in the first quarter of 2010. The declining interest in seed capital represents a significant change in the angel market. Sohl mentions that “without a reversal of this trend in the near future, the dearth of seed and start-up capital may approach critical stage, deepening the capital gap and impending both new venture formation and job creation.”

1.3 Summary

As outlined above, the social and economic logics are two separate domains with distinct institutions, affinity groups, best practices, personnel, governing bodies, and objectives. The social logic argues for investment in activities that promote social
goods, while the capitalism-based economic logic states that companies exist only to provide the maximum possible return to shareholders. Oftentimes, this conflicts with serving the common good in ways such as promoting clean air and water, as well as financial independence for all citizens. As corporations focus more on corporate sustainability efforts and social responsibility, their business models may expand to include more social goods in their day-to-day strategies and operations, but by and large, the two logics are distinct and frequently stand in opposition of one another.
CHAPTER 2: TWO LEGAL CONTEXTS

The distinctive funding logics are not simply the result of two distinctive sets of organizations and interests. They are strongly grounded in legal institutions that clearly demarcate the contribution of funds with either an economic or a social intent. Moreover, they demarcate the nature of the legal organizational forms to which these funds are traditionally provided.

Within the social logic, funds are typically given in the form of charitable gifts or grants, enabled by tax incentives for the benefactors. There are clear legal guidelines about what organizations can receive funds — typically "not for profits" or 501c3 — and why or why not investments made are allowable in terms of the implicit social contract. A supplier of capital must create a social good in order to deserve the tax exemption.

Within the economic logic, investments come from funds — angel, venture capital, and private equity — and are given to corporations with complex governance requirements and shareholder agreements.

2.1 Nonprofit Legal Context

U.S. tax implications for individuals making charitable donations

Since 1917, with the establishment of the individual income tax deduction for charitable donations, the U.S. federal government has encouraged taxpayers to make donations to charitable entities. In 1936, the federal government further incentivized charitable giving by permitting corporations to deduct charitable donations from income. The basic principle underlying the charitable income tax deduction for gifts is that taxpayers should not be taxed on income that does not benefit them directly — they give that money away to support the public good.

From 1982 through 1986, federal tax law permitted all taxpayers to deduct their charitable contributions, regardless of whether they used the standard deduction (non-itemizers) or itemized deductions separately. Under current law, donations to charitable organization are tax deductible only for taxpayers that itemize. For itemizers, such donations generally reduce taxable income and, consequently, federal income tax liability.

Since the enactment of the IRA Charitable Rollover as part of the Pension Protection Act of 2006, taxpayers aged 70 and older may donate up to $100,000 per year from their Individual Retirement Accounts (IRAs) to public charities, without having to include the distributions as taxable income. The IRA Charitable Rollover is an important recent addition to the federal income tax code that further incentivizes charitable giving.
In 2010, the United States boasted the most robust charitable sector in the world – according to the National Center for Charitable Statistics, it includes approximately 1.6 million tax-exempt organizations. This includes over 1 million public charities such as universities and colleges. According to the GivingUSA Foundation, charitable giving in the United States totaled $304 billion in 2009 (Association of American Universities 2010).

Charitable contribution deductions are generally limited to no more than 50 percent of a taxpayer’s adjusted gross income (AGI), depending on the type of property donated and the type of charitable organization. In general, individual taxpayers who donate to universities and itemize their deductions can deduct: 1) cash donations and other non-capital gains property in full up to 50 percent of their AGI, 2) capital gains property in full up to 30 percent of their AGI.

A private foundation is a legal entity set up by an individual, a family or a group of individuals for the purposes of philanthropy. In aggregate, private foundations in the U.S. control over $628 billion in assets and made more than $44 billion in charitable contributions in 2007. A private foundation does not generally solicit funds from the public.

A private foundation in the United States is a charitable organization described in the Internal Revenue Code by section 509. A private foundation is a 501(c)(3) tax-exempt organization.

Donor Advised Funds are held within and managed by another organization (usually a charity). Fifty percent of a donor’s adjusted gross income is tax deductible for cash donations to DAFs, while just thirty percent of donor’s adjusted gross income is tax deductible for cash donations to private non-operating foundations.

DAFs are limited to granting to certain types of 501(c)(3) public charities, while private foundations have greater flexibility in granting to individuals and for-profit entities for charitable purposes.

Regulating U.S.-based private foundations

Prior to 1969, private foundations did not use available tools of auditing and public reporting nor were they required to do so. Philanthropists assumed they were well regarded by the community at large and that they could dispense with the need to monitor themselves or to accumulate evidence about the nature or quality of their performance. However, the American public became increasingly suspicious of the private foundation as Americans began forming foundations at a rate of 2,000 per year in the late 1950s and early 1960s. It appeared to many that wealthy families were
forming charitable entities only to avoid paying taxes and to garner additional benefits. Philanthropists’ reluctance to discuss publicly their failures and successes made private foundations “symbols of secret wealth which mysteriously used the levers of power to promote obscure, devious, and even sinister purposes” (Commission on Foundations and Private Philanthropy 1970).

Recognizing the surge in public awareness of potential abuses by private foundations, U.S. Congressman John William “Wright” Patman stood on the floor of the House of Representatives in 1961, declared his concerns for the power of private foundations, and initiated an eight-year fight against private foundations. Examples of his accusations include: 1) overvaluing property contributed to foundations, 2) falsely claiming gifts never made to foundations, 3) no reporting of self-dealing, 4) speculative investments made by foundations without downside risk, 5) excessive expenses made by foundations administration, and 6) foundations influencing the outcomes of elections with tax-shielded dollars. Aggressive foundation lobbying defeated some of the most stringent of Patman’s proposals, but the resulting 1969 Tax Reform Act imposed regulatory excise taxes in Chapter 42 of the Internal Revenue Code and has proven far from toothless.

Specifically, the Tax Reform Act of 1969 imposed a series of limitations on foundation activities, including:

- No self-dealing
- No investment in speculative ventures that jeopardize its charitable purpose
- Minimum pay out to charitable purposes
- No expenditures to influence elections
- No payments to government officials
- No expenditures for non-charitable purposes

The Internal Revenue Service enforces these regulations by imposing excise taxes on private foundations that do not comply.

Initially, foundations were shocked and outraged by the Tax Reform Act, but over time as abuses were eliminated, the philanthropic community reached a consensus that the new limitations were “tolerable, though unwelcome.” Many acknowledged the benefits, especially the prohibition of self-dealing, but others focused on the “atrocious tax on investment income and limitation on excess business holdings.” This was particularly the case because in 1968, 40% of all contributions to foundations and 70% of all contributions to foundations worth over $100M consisted of stock in which the donor and his family owned at least a 20% interest. Contribution of control stock in a closely held business was an “extremely important source of foundation assets” before 1969 (Labovitz 1972).
Notably, foundations immediately began paying much higher legal fees and were forced to employ additional staff to comply with the new provisions of expenditure responsibility. Instead of instituting operational procedures that ensured compliance, many foundation administrators opted to avoid making grants to anyone other than public charities. As a result, as one foundation administrator explained in the Spring of 1972, “[foundations] are settling into a routine that is not at all healthy...the easiest grant to make is a general purpose grant to a public charity carrying out a traditional program.” In other words, foundations avoided innovative operational strategy, grant structures, and program proposals, maintaining the status quo to avoid incurring excess administrative burdens of complying with new regulations of expenditure responsibility (Labovitz 1972).

The authors of The Legal Answer Book for Private Foundations contend that “one of the most complex bodies of statutory law in the tax-exempt organizations setting is the set of regulations applicable to private foundations. Created 30 years ago, the private foundation rules are the subject of hundreds of private determinations by the IRS (and a few court opinions), and this process continues unabated” (Hopkins et al 2002).

2.2 For-profit Legal Context

A century ago, U.S. companies that combined commercial banking and investment banking dominated American corporate finance: J. P. Morgan and Company, Kuhn, Loeb, and Company, First National Bank, National City Bank, and a few others. Partners, directors, and officers in these banks held interlocking directorates in many of the largest companies in the U. S. and also held shares in those companies.

In the U. S., this era came to a close in 1933 with the Glass-Steagall Act. That act prohibited banks and their subsidiaries from owning shares in most kinds of non-financial companies and prohibited commercial banks from underwriting or selling securities (McDonnell 2002).

Today, banks use short-term debt and venture capital firms use equity investments, but both institutions negotiate detailed covenants affecting many areas of governance of the companies in which they invest. These covenants allow the investors to block many decisions they find unwise or against their interests.

Fiduciary responsibility of the venture capitalist

In the case of venture firms with equity interest, the firm is an outside shareholder without contractual claim to any specified stream of payments. Consequently, venture capitalists are particularly vulnerable to managerial misuse of funds. To combat this
threat, venture professionals frequently become actively involved in the day-to-day affairs of their portfolio companies and negotiate a number of contractual protections, including the right to appoint one of their principals as a representative to the board of directors of the portfolio companies (McDonnell 2002).

In such a situation, the director has fiduciary duties to both the general and limited partners of the VC firm that appointed him and to the shareholders of the company on whose board he serves.

Directors of corporations owe a fiduciary duty to act in the “best interests” of the shareholders of a corporation. Because most venture capital firms are established as general and limited partnerships, the Representative Director, as a principal of the VC firm, may also owe a fiduciary duty to the general and limited partners of the VC firm. "Absent a contrary provision in the partnership agreement, the general partner of a Delaware limited partnership owes the traditional fiduciary duties of loyalty and care to the Partnership and its partners."

In the case of a Representative Director, he owes duties to two different organizations whose interests may be in conflict. It is a "long-existing principle of [law]" that a person designated to sit on the board of another company for which the investor has a financial stake has "an uncompromising duty of loyalty" to the board on which he sits (Hamilton 2009). This means maximizing financial returns for company shareholders to the best of his ability.

2.3 Summary

In the nonprofit legal context, investors have a responsibility to prove to the IRS that they deserve a tax deduction for giving money away in support of the public good. In the for-profit legal context, investors have a fiduciary responsibility to make decisions that will maximize financial return for shareholders. In both cases, investors use contracts to ensure that they’re fulfilling their respective responsibilities in the context of their relationships with fund recipients. However, the intended outcomes of these agreements could not be more different, and oftentimes they stand in opposition to each other, undermining corporate progress on one hand or damaging social goods on the other.

This raises the central question of this thesis: Are there mechanisms to bridge the social and economic logics for ideas that have the potential for both forms of returns? More specifically, are there legal vehicles that can be applied and used for early-stage companies who aim to do just that? Would participation of blended instruments crowd out or undermine existing single-bottom-line investors already in the marketplace? To what extent are these tools applicable to the commercialization of economically and
socially powerful innovations in areas such as energy and life sciences? What is the extent of their application today? What are the limitations on future usage?
CHAPTER 3: DATA AND METHODS

The objective of this thesis is to analyze current financial activity at the nonprofit/for-profit boundary of technological innovation in areas of social impact and to illuminate barriers that prevent implementation of effective philanthropic strategies. In order to achieve this goal, we selected a mix of quantitative and qualitative methods. In the first stage of our investigation, we conducted an in-depth qualitative scan of the nonprofit and for-profit landscapes to search for appropriate financial vehicles that might blend the two logics in one instrument. Next, during phase two, we conducted a deep dive into two such vehicles – program-related investments (PRI) and mission-related investments (MRI).

3.1 Phase One: Are there blended vehicles philanthropy could use to support start-ups?

Literature Review

To begin our investigation of the nonprofit/for-profit boundary, we conducted a literature review on the history of philanthropy in the United States, including the history of charitable activity broadly, the history of giving to science during the twentieth and twenty-first centuries, and early-stage angel activity from the middle of the 1900s onward. In this way, we built our working knowledge of sociological trends as well as definitions for the plethora philanthropy-related vocabulary. Drawing from our literature review, we started visualizing the nonprofit/for-profit boundary in terms of a spectrum of investment motivation that runs from pure social logic to pure economic logic.

Legal Analysis

Once we built consensus around colloquial definitions for various philanthropic vocabulary, we set forth to confirm the legal definitions. We did this by examining federal tax law as well as soliciting input from legal experts, whose names appear in our list of interviewees (Appendix A). U.S. tax statutes were re-codified by an Act of Congress on February 10, 1939 as the “Internal Revenue Code.” Subsequent permanent tax laws enacted by the United States Congress updated and amended the 1939 Code. The Internal Revenue Service (IRS) is the revenue service of the United States federal government. The agency is a bureau of the Department of the Treasury, and is under the immediate direction of the Commissioner of Internal Revenue. The IRS is responsible for collecting taxes and the interpretation and enforcement of the Internal Revenue Code.

Our legal analysis including examining the Tax Code language itself, as well as literature published to clarify the rules, regulations, and prior rulings on relevant tax subjects.
Interviews

After we gleaned working definitions of philanthropy vocab and governing Tax Code, we conducted informal interviews with experts across the spectrum of social-economic motivation: nonprofit staff, private foundation staff, private foundation trustees, private foundation service providers, angel investors, corporate venture capital investors, university development staff, venture capitalists, and other experts that could confirm or debate our definitions. The list of interviewees can be found in Appendix A and their feedback infused deeply into our findings.

3.2 Phase Two: What are the barriers preventing the usage of these blended vehicles?

Based on our investigation during Phase One, we concluded that two types of blended vehicles hold promise for supporting science and engineering innovation at the nonprofit/for-profit boundary: 1) Program-related Investments (PRI) and 2) Mission-related Investments (MRI). I describe both in-depth in Chapter 4. During Phase Two of our investigation, we used privately-commissioned PRI data from the Foundation Center as well as interviews conducted before, during, and after a privately-organized event held at MIT, “The Foundation Energy Roundtable,” to assess the barriers currently preventing widespread use of both blended vehicles.

Data Analysis

In order to assess how PRIs had been used in the past, we purchased a data set in February 2012 from The Foundation Center, a nonprofit organization based in New York City. Established in 1956 and today supported by 550 foundations, the Foundation Center is a leading source of information about philanthropy worldwide. The Center maintains the most comprehensive database on U.S. and, increasingly, global grant-makers and their grants — a robust, accessible knowledge bank for the sector.

The information found in Foundation Center databases is compiled from IRS information returns (Forms 990 and 990-PF), grant-maker web sites, annual reports, printed application guidelines, the philanthropic press, and various other sources. In all, the Foundation Center’s editorial staff continually monitors more than 35 diverse information sources to verify the details in its databases. New and updated grant-maker, company, and grant data is updated weekly. New grant-maker-related news, job opportunities, RFPs, publications, and articles updates daily. New IRS Forms 990 and 990-PF are posted when they become available from the IRS.

For our study, The Foundation Center extracted an excel spreadsheet from its databases with a list of all Program-related investment (PRI) data from 1998-2010, and
including 23 available PRIs from years prior to 1998. Foundation data sources include IRS information returns (Form 990-PF), foundation reports, and information reported to the Foundation Center on annual surveys and through direct reporting.

Each line item of the data from the Foundation Center includes information about one Program-related Investment, including grantmaker, recipient, amount, date, duration, description of the grant, and other details about the purpose or intended use of the investment. We used the data to infer trends about historical usage of Program-related Investments in the field.

Roundtable Event

After defining philanthropic vocabulary, understanding federal tax language, and analyzing historical data from the field, it was clear to us that the barriers to proliferation of philanthropy at the boundary of nonprofit/for-profit endeavors in science and engineering also include complex, cultural norms within the two sectors that would have to work together: philanthropists and early-stage tech entrepreneurs. To explore these barriers further, we convened a gathering of representatives from these two sectors on June 28, 2012 to discuss a societal subject chronically under-funded by the social sector: energy technology innovation.

The “Foundation Energy Roundtable” convened fifty thought leaders from philanthropy, early-stage private investment, and energy technology and policy to discuss the potential of philanthropic resources to address unmet funding needs in the energy sector. The articulated purpose of the Roundtable was to:

- Convene leaders from two sectors that have not overlapped in the past: philanthropy and energy technology
- Identify existing barriers to collaboration
- Build relationships between the energy and philanthropy sectors

Attendees and speakers from the Roundtable can be found in Appendix B. Through rich dialogue, a cohesive set of cultural barriers to collaboration emerged, which I will discuss in Chapter 4.
CHAPTER 4: FINDINGS

My findings show that there are philanthropically-minded individuals and private foundations with interest in supporting innovative start-ups that impact social goods, but they do not have easy access to blended instruments to do so. This chapter outlines the taxonomy, legal definitions, and real world examples of the tools that are available, as well as enumerates the barriers – legal and cultural – that are preventing widespread use in areas of science and engineering.

This chapter will focus on two blended vehicles – Program-related Investments (PRIs) on the grant-making side of private foundations and Mission-related Investments (MRI) made with endowment dollars.

4.1 Taxonomy of Foundation Financial Vehicles

Private foundations in the United States are bifurcated into two sides: 1) the program side, which advances charitable mission by making grant expenditures and 2) the asset allocation side, which maintains the endowment over time. On the mission side, foundations are obligated to give away at least 5% of total assets every year. In 2010, the country’s 76,000 grant-making foundations made grants totaling $45.7 billion.

On the asset allocation side, $590 billion sit in U.S. foundations ready to invest. As Antony Bugg-Levine explains, “if U.S. Foundations committed as little as 5% of their endowments to impact investing (that is, money making entities that also do good), they would create a $30 billion investment pool that is as large as the entire U.S. venture capital industry” (2011).

The personnel responsible of each side at any given foundation have traditionally not interacted, and they view their fiduciary responsibilities as fundamentally in opposition to one another. One side is in charge of making money and the other on giving it away. Similarly, foundations have used only the 5% required grant expenditure on mission-related activities, but this is slowly changing; foundations are beginning to bring the full weight of their assets – including the endowment – to bear on the issues they care about.

As presented by Debra Schwartz from the MacArthur Foundation at Harvard University’s Kennedy School of Government, Figure 7 explicates the spectrum of tools available to private foundations, with the mission side in purple and the asset allocation side in green, and increasingly prevalent “blended vehicles” highlighted in the red box (2012). Below I briefly define each tool with an eye toward the legal rules that govern them.
Figure 7. Spectrum of Tools Available to U.S. Private Foundations

Motivated by social good

Grants

MRI

PRI

SRI

Traditional Investments

Motivated by profit

Traditional Investments

Since the inception of English Common Law in 1215, trustees and executors that manage money or property for the benefit of third persons have been subject to personal liability if they made irresponsible investments with those assets (Chernoff 2005).

In 1969, this concept found its way into the Internal Revenue Code’s new “private foundation rules” (Nielson 1985). Sections 4944(a) and (b) of these rules impose excise taxes on investments that jeopardize the carrying out of the exempt purposes of a private foundation. The Internal Revenue Service imposes these hefty taxes on the disobedient foundation, its managers, or both (Chernoff 2005).

In other words, all charitable organizations exempt from income tax are expected to permanently dedicate their assets to charitable purposes. Federal tax law parallels state law in requiring that officers and directors of private foundations exercise fiduciary responsibility to safeguard the foundation’s assets on behalf of its charitable constituents by following prudent investor standards, as mentioned in Chapter 2. The tax code says that a private foundation may not “invest any amount in such a manner

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15 The essence of English common law is that it is made by judges sitting in courts, applying their common sense and knowledge of legal precedent (stare decisis) to the facts before them. A decision of the highest appeal court in England and Wales, the Supreme Court of the United Kingdom, is binding on every other court in the hierarchy, and they will follow its directions. For example, there is no statute making murder illegal. It is a common law crime - so although there is no written Act of Parliament making murder illegal, it is illegal by virtue of the constitutional authority of the courts and their previous decisions. English Common Law has been used since the original signing of the Magna Carta in 1215.

16 Under the Uniform Prudent Management of Institutional Funds Act, the standard for prudent investment is as follows: “each person responsible for managing and investing an institutional fund shall manage and invest the fund in good faith and with the care an ordinarily prudent person in a like position would exercise under similar circumstances.” UPMIFA Section 3(b).
as to jeopardize the carrying out of any of its exempt purposes." To deter a private foundation from making investments that might imperil its assets, the excise tax is imposed on the foundation and any managers that approve the making of a jeopardizing investment — any investment that exposes the foundation assets to excessive risk of loss (Hopkins et al 2002).

It is important to note that the Tax Code and Treasury Regulations do not define "jeopardizing investment," and there exists no category of investment that is treated as a per se violation (Weiss 2003). However, in 1972, the Internal Revenue Service published a list of example investments that might be closely scrutinized as potentially jeopardizing, including: trading on margin, trading commodity futures, working interests in oil and gas, purchase of puts, calls and straddles, purchase of warrants, and selling short. And in 1998, the IRS added new potentially jeopardizing investments to this list: investments in junk bonds, risk arbitrage, hedge funds, derivatives, distressed real estate, and international equities in third world countries (Hopkins et al 2002). Despite publishing these lists as warning in the Regulations, the IRS appears to tolerate such investments if made with care and prudence (Weiss 2003).

In order to exercise "ordinary business care and prudence" when making investment decisions, foundation managers should consider:

- Expected return (income and appreciation of property)
- Risk of rising and falling prices
- Relative size of the investment within the portfolio
- Need for diversification within the investment portfolio

An investment will be deemed jeopardizing if it is determined that the foundation managers failed to provide for the long- and short-term financial needs of the private foundation to carry out its exempt purpose.

Similarly, the determination of whether the foundation manager acted with necessary prudence is made by assessing facts at the time the investment is made, not subsequently on the basis of poor performance in hindsight. General fiduciary principles require the foundation manager to monitor investments, reevaluate the portfolio, and sell any investments that become inappropriate.

Generally, an investment in a new corporation that is the sole producer of a promising new product that must compete with an established product that performs the same function will be a jeopardizing investment. However, if the corporation’s management
has a demonstrated ability to get new businesses started successfully and has received substantial orders for its new product, the investment will not be jeopardizing.\textsuperscript{17}

If the IRS concludes that a foundation has made a jeopardizing investment, an excise tax of 5\% of the amount invested will be imposed. If the foundation does not remove the jeopardizing investment during the taxable period in which it was made, an additional tax of 25\% of the jeopardizing investment will be imposed. Lastly, a tax equal to 5\% of the amount invested, capped at $5,000, will be imposed on any foundation manager who participated in making the investment knowing that it was jeopardizing.\textsuperscript{18}

**Socially Responsible Investments (SRI)**

SRI is any investment strategy employed on the asset allocation side of private foundations (among other types of investors and investment managers) that seeks to consider both financial return and social good; it is identified closely with shareholder advocacy for ethical business practices. SRI almost always refers to publicly-traded mutual funds that are either positively screened to include businesses with socially beneficial practices, or negatively screened to exclude businesses that are viewed as socially detrimental. Socially responsible investors encourage corporate practices that promote environmental stewardship, consumer protection, human rights, and diversity. Some avoid businesses involved in alcohol, tobacco, gambling, pornography, weapons, and/or the military. Shareholders use their power of proxy voting to make organizational impact based on mission (Sullivan 2010).

The origins of SRI in the United States date back to the Religious Society of Friends (Quakers). In 1758, the Quaker Philadelphia Yearly Meeting prohibited members from participating in the slave trade—buying or selling humans. Most applications at the outset of SRI were religiously motivated. Investors would avoid sinful companies, such as those associated with products such as guns, liquor, and tobacco. One of the most articulate early adopters of SRI was John Wesley (1703–1791), a founder of Methodism. Wesley's sermon "The Use of Money" outlined his basic tenets of social investing; do not do harm your neighbor through your business practices and avoid industries like tanning and chemical production, which can harm the health of workers.

The modern era of SRI evolved during the 1960s' climate of political activism. During this time, socially concerned investors increasingly sought to address equality for women, civil rights, and labor issues. Economic development projects started or managed by Dr. Martin Luther King, like the Montgomery Bus Boycott and the Operation Breadbasket Project in Chicago, established the model for SRI efforts. King combined ongoing dialog

\textsuperscript{17} IRC Section 53.4944-1(c)

\textsuperscript{18} IRC Section 53.4944 (b)(1)
with boycotts and direct action targeting specific corporations.

In the 1970s, concerns about the Vietnam War were incorporated into SRI. Many people living during the era remember a picture in June 1972 of a naked nine year-old girl, Phan Thị Kim Phúc, running towards a photographer screaming, her back burning from the napalm dropped on her village. That photograph channeled outrage against Dow Chemical, the manufacturer of napalm, and prompted protests across the country against Dow Chemical and other companies profiting from the Vietnam War (Lott et al 2001).

The Social Investment Forum, now known as the US SIF – The Forum for Sustainable and Responsible Investment, was founded in 1984 as one of the first organizations serving social investors. The mid and late 1990s saw the rise of SRI’s focus on a diverse range of issues and SRI is now a booming market in both the US and Europe. Assets in socially screened portfolios climbed to $3.07 trillion at the start of 2010, a 34% increase since 2005, according to the US SIF’s 2010 Report on Socially Responsible Investing Trends in the United States (Domini 2011).

Mission-related Investments (MRI)

Mission-related investing happens when private foundations make for-profit investments from their endowments that further organizational mission and program objectives, but also seek competitive returns for the corpus. MRI can include debt or equity vehicles, seek market rate or above market rate returns, and leads with the economic logic while seeking to incorporate the social logic as well. During the current recession, many mission investments have outperformed conventional investment portfolios by fully preserving capital and generating positive returns (Kramer et al 2010).

MRI products range from investing in community banks that serve low- to moderate-income areas, to public equity funds that set standards and advocate for change, to venture funds that support low-carbon technologies, to real estate funds that promote social equity and environmental sustainability. Examples of MRI products include Certificates of Deposit in CDFIs, Habitat for Humanity bonds, investments in the Calvert Social Investment Fund, and clean tech venture funds (Brozek 2009).

The global economic downturn since 2008 has retracted foundation giving and budgets of nonprofit organizations, only strengthening the call from grant-makers that all foundations should invest their assets in ways that are consistent with and support their charitable missions. U.S. foundations have steadily increased their use of MRI over the past decade. Recently, the growth rate has accelerated substantially, as new dollars annually committed to MRI have increased sixfold in the last three years. Unfortunately, in 2011, the Foundation Center estimated that only 3% of private
foundations make MRI as part of their asset allocation practice. Despite increasing interest and foundation participation, MRI remains a fundamental challenge to traditional foundation practice (Lawrence et al 2011). MRI today involves “relatively small amounts of capital, a limited number of investment opportunities, high transaction costs, and few qualified advisors or intermediaries” (Kramer et al 2010).

Trustees, who are responsible for approving the financial and operational direction of a foundation, are crucial to instituting a MRI program. Their position within the leadership structure of a foundation gives them a particularly strong ability to drive the adoption of the practice. Perception of fiduciary duties, lack of expertise, ambiguity surrounding the definition of MRI, and trustee-staff relationships complicate adoption of MRI strategies.

Although fiduciary duties of foundation trustees are predominantly a matter of state law, there are a series of uniform laws that define fiduciary duty that have been adopted by almost all fifty states. Of those, the Uniform Prudent Investment Act (UPIA) and Uniform Management of Institutional Funds Act (UPMIFA) are relevant to the practice of MRI for foundations. The UPIA, which regulates trusts and charitable trusts, applies the standard of due diligence to be made to any investment to the total portfolio instead of individual investments. Under UPMIFA, the language and stipulations of UPIA were expanded to nonprofits, including most private foundations. According to these laws, fiduciaries must act in accordance with the duty of loyalty; “solely in the interest of their beneficiaries,” and exercise prudence; “care, skill, and caution” in investment decision-making (Wood 2011).

For charitable trusts, social considerations can be taken into account to the extent that the investment decision can be justified, “on grounds of advancing, financially or operationally, a charitable activity conducted by the trust.” Fiduciaries can make MRI if the investment decisions are made with the intent of fulfilling the purpose of the institution and have undergone a prudent process of selection and judgment. Foundations created as perpetual institutions face specific fiduciary responsibilities related to that time horizon.

As Antony Bugg-Levine observes in his 2011 book, “if U.S. foundations committed as little as 5% of their endowments to impact investing, they would create a $30 billion investment pool that is as large as the entire U.S. venture capital industry” (Bugg-Levine et al 2011). A number of organizations have recently begun new efforts to promote MRI as an important vehicle for social change. Three major foundations have launched a “More for Mission” campaign and have established a research center at Harvard University to encourage MRI (Kramer et al 2010).
Grants

Grants are cash expenditures made from the private foundation for charitable purposes, none of which may be to the private benefit of any individual. From a conceptual perspective, grant-making is the reason private foundations receive tax exempt status, as their monies are shielded to benefit the social good. Grant recipients count as charitable if they serve the exempt purposes set forth in section 501(c)(3) of the Internal Revenue Code: “charitable, religious, educational, scientific, literary, testing for public safety, fostering national or international amateur sports competition, and preventing cruelty to children or animals. The term charitable is used in its generally accepted legal sense and includes relief of the poor, the distressed, or the underprivileged; advancement of religion; advancement of education or science; erecting or maintaining public buildings, monuments, or works; lessening the burdens of government; lessening neighborhood tensions; eliminating prejudice and discrimination; defending human and civil rights secured by law; and combating community deterioration and juvenile delinquency.”

Additionally, mandatory “expenditure responsibility” means that a private foundation must exert all reasonable efforts and establish adequate procedures:

- To see that the grant is spent only for the purpose for which it is made,
- To obtain full and complete reports from the grantee organization on how the funds are spent, and
- To make full and detailed reports on the expenditures to the IRS.

Before the American Civil War in 1861, charity in the United States was viewed as an individual’s obligation of personal involvement to his local community. This obligation manifested itself in personal time commitments aimed at improving the collective good in the volunteer’s immediate locality. However, during the period following the Civil War through the turn of the 20th century (1865-1911), philanthropy was monetized and bureaucratized. Individuals spent less personal time directly enacting charity and more time organizing and sponsoring events in the name of charity. In this way, individuals or groups of individuals could raise money to give to a cause by throwing fancy parties — charity balls.

At the turn of the 20th century, the practice of grant-making started to become professionalized, especially as those that garnered wealth from the Industrial Revolution began establishing private foundations as legal entities. Interestingly, tax and legal motivations were not relevant for foundations created before passage of the federal income tax before World War I. More often, donors endowed their foundations near the end of their lives because they felt they had no viable alternative to manage large
sums of money after their death, leaving us with only about half of the large foundations today created out of a sense of social responsibility (Nielsen 1985).

Today, the Giving USA Survey, an annual publication written at Indiana University, reveals that grant-making to charitable causes has almost tripled in terms of inflation-adjusted dollars since 1970, as shown in Figure 8 (2011). In 2010, grant-making from all sources equaled $290 billion.

*Figure 8. Total giving to charitable organizations: 1970-2010 (in billions)*

However, data shows us that foundations constitute only a portion of total grant-making in the United States over the same time period, as shown in Figure 9 (2011):

*Figure 9. Total giving by source: 1971-2010 (in billions of inflation-adjusted dollars)*
And although total grant-making in real terms has increased dramatically over time, as a percentage of total GDP, total giving from all sources remains unchanged within .6% of total GDP (Giving USA 2011).

Figure 10. Giving as a percentage of U.S. GDP, 1970-2010

Unfortunately, despite increased professionalization of the field of philanthropy during the course of the twentieth century, until the 1990s, many foundations did not aggressively seek improvement in operational strategies or incentive structure of their grants. Sarah di Troia, Managing Partner of New Profit Inc.\(^\text{19}\) explains, “Many foundations do not aggressively seek improvement in their operational strategies or incentive structure of their grants because: 1) foundation management has historically been viewed as a career for retirees, leaving the workforce aged and uninvective, 2) there are no market feedback loops to indicate good or bad grant-making to philanthropists, and 3) there are red herring feedback loops in the form of flattery from grantees, potential grantees, and other parties with vested interests in relationship management.”

As late at 1997, consensus emerged among philanthropic foundations that program officers were disappointed with level of impact from grant-making (Sievers 1997). Social problems were worsening despite the best intentions of foundations because government funding of social services had decreased over time and a disconnect

\(^{19}\) New Profit Inc. is a venture philanthropy fund based in Boston, Massachusetts. With the support of individual donors, and its partner, Monitor Group, New Profit provides multi-year financial and strategic support to a portfolio of social entrepreneurs working in education, youth development, public health, and workforce development.
existed in the relationship between foundations and the nonprofit groups to which they made grants. Grant-making processes left nonprofits spending time on selling innovative programs, not improving their own organizations (Letts et al 1997).

Grants with an emphasis on the economic logic – “venture philanthropy”

At the same time, the tech revolution of the 1990s gave venture capital tools fresh exposure and captured the imagination of philanthropy theorists. “Venture Philanthropy,” where foundations aspire to many of the strategies employed by venture capitalists, emerged as a popular concept. In a 1997 publication of the Harvard Business Review, Christine W. Letts, William Ryan, and Allen Grossman described the impetus of this concept: “Clearly, foundations and venture capitalists face similar challenges: selecting the most worthy recipients of funding, relying on young organizations to implement ideas, and being accountable to the third party whose funds they are investing.”

It seemed that the same reasons grant-makers were disappointed with impact enacted among grant recipients – operational inefficiencies and misplaced priority on fundraising rather than effective programming – could be addressed by adopting practices from the venture capital industry (Sievers 1997).

More specifically, a variety of key distinctions between venture capital firms and private foundations became concrete recommendations for ways to improve foundation operations, including: 1) risk management, 2) performance measures, 3) closeness of relationship with recipients of funding, 4) amount of funding, 5) length of relationship, and 6) the exit (Wallace 2005).

The differences in ways venture capital firms operate and ways private foundations had been operating during the course of the twentieth century gave rise to one key change in philanthropy during the 1990s: an industry-wide attempt to conceptualize the donor as partner, not patron. This included foundations and nonprofits agreeing in advance on organizational requirement in addition to desired program results, foundation managers reassessing their own capacity for hands-on approach, as well as the balance of their grant portfolios. Foundations began making longer-term grants, demanding radically lower case loads from each program officer and providing consulting services to grantees as a way to improve operational efficiency. Additionally, many foundations introduced the “organization grant” in addition to the “program grant” so that program innovation wouldn’t continue to happen at the expense of organization building (Frumkin 2003).
In this way, the language of philanthropy underwent major transition at the turn of the millennium. For example, “grant” became “investment,” “donor” became “investor,” “impact” became “social return,” “evaluation” became “performance measurement,” “standard setting” became “benchmarking,” “grant review process” became “due diligence,” and “grant list” became “investment portfolio” (Frumkin 2003).

More recently, Venture Philanthropy has received criticism as a change in rhetoric only, and not a transition toward innovative grant-making. Some industry experts believe that applying the concepts of venture capital to a sector that is inherently different has added administrative burdens on grant recipients that are more onerous than helpful (Wyof 2004).

4.2 Program-related Investments (PRIs)

Program-related Investments (PRIs) are a particularly vehicle that fulfills the criteria of being focused on charitable mission but also more aligned with the venture-oriented, economic logic. Since 1969, they have allowed the infusion of foundation capital into for-profit entities but count toward minimum grant distribution requirements. Defined in Section 4944(c) of the Internal Revenue Code enacted 40 years ago, “program-related investments” (PRIs) are an exception to the jeopardizing investment rule. Through program-related investments, a private foundation can invest money – equity, loan, loan guarantee, etc – in ventures that aim to achieve the foundation’s charitable purposes but do not otherwise meet the criteria to be a permissible business investment (Chernoff 2003).

Legal Analysis: PRIs in the Internal Revenue Code

To qualify as a program-related investment, an endeavor must meet three requirements:

(1) the primary purpose of the investment is to accomplish one or more of the charitable, religious, scientific, literary, educational and other exempt purposes described in section 170(c)(2)(B)20 of the Internal Revenue Code;

(2) No significant purpose of the investment is the production of income or the appreciation of property;

20 “For purposes of this section, the term “charitable contribution” means a contribution or gift to or for the use of a corporation, trust, or community chest, fund, or foundation organized and operated exclusively for religious, charitable, scientific, literary, or educational purposes, or to foster national or international amateur sports competition (but only if no part of its activities involve the provision of athletic facilities or equipment), or for the prevention of cruelty to children or animals.”

48
(3) No purpose of the investment is to lobby, support, or oppose candidates for public office or to accomplish any of the other political purposes forbidden to private foundations by section 170(c)(2)(D)\textsuperscript{21} of the Internal Revenue Code.\textsuperscript{22}

The first prong – primary exempt purpose – requires a determination specific to each foundation, its mission, and relation to the investment. There are two parts to the primary exempt purpose test: 1) investment must \textit{significantly further} the accomplishment of the foundation’s exempt activities and 2) it would not have been made \textbf{but for} the relationship between the investment and the accomplishment of exempt purposes.\textsuperscript{23} To meet the “significantly further" test, the foundation must determine that the PRI is consistent with one or more purposes described in section 501(c)(3) (Levitt 2011). The "but for" part of this test can be supported by foundation managers through contemporaneous documents proving the true motivation for investment. This documentation is useful if the investment, intending to serve a charitable purpose, becomes profitable (Weiss 2003).

Second, proving that a PRI has no significant income-producing purpose can be met by showing that the investment’s projected rate of return is insufficient by itself to compensate for the risk. It is immaterial if an investment produces significant income, as the circumstances at the time of the investment are what matter. However, the IRS does use profitability as evidence of purpose. It also considers whether a private, profit-seeking investor would have been likely to make the investment on the same terms.\textsuperscript{24}

Third, the last requirement mandates that an investment must not be made in an attempt to influence legislation or intervene in a political campaign. The focus of this requirement is on the actions of the recipient of the investment, rather than on the function of the foundation (Weiss 2003).

It does not matter whether the recipient of a program-related investment is tax exempt. For the transaction to be considered a program-related investment, the type of entity, tax status and domicile country of the recipient are irrelevant. The critical aspect of the investment is that a charitable purpose will be served.

To underline this point, Revenue Ruling 74-587, 1974-2 C.B.162 made in July 1974 explains “although some of the individuals receiving financial assistance in their business...
endeavors...may not themselves qualify for charitable assistance as such, that fact does not detract from the charitable character of the organization’s program. The recipient of loans and working capital in such cases are merely the instruments by which the charitable purposes are sought to be accomplished” (Chernoff 2003).

Historical analysis: PRIs in the literature

There are more than 75,000 grant-making private and community foundations in the United States, but unfortunately only 173 (.2%) made PRIs from 2006-2007, representing $734 million of $91.9 billion (.8%) in charitable distributions made during the same two-year timeframe (Lawrence 2005). Despite low usage in the past, application of PRIs and the breadth of areas to which they are being applied are expanding over time due to a number of inducements to foundation trustees and managers:

(1) PRIs count toward an organization’s grant distribution requirements in the year made; they are a “qualifying distribution” toward the mandatory 5% annual distribution.
(2) There is a secondary return because the amount of the PRI reduces the asset base on which the 5% requirement is calculated. This means that to the foundation, a 3% interest rate on a loan will effectively given an 8% rate of return.
(3) PRIs come from a foundation’s grant budget, not from its corpus, which sits in a diversified portfolio of non-jeopardizing investments. Dollars spent from the grant budget are usually not recovered, but PRIs will be repaid, earn interest, and can be re-used in the future.
(4) Over time, with consistent (although modest) returns, PRI programs can pay for themselves and perhaps provide increased funding for other charitable giving.

In the face of such strong incentives, Steven Lawrence, Director of Research at The Foundation Center, hypothesizes that the limited use of PRIs results from:

- Limited experience and low capacity to manage financial investments among potential PRI recipients
- Lack of predictable income stream needed for repayment
- Limited proficiency in the use of PRIs among foundation staff
- Reliance by foundations on traditional approaches

Lack of guidance of what is permissible as PRIs also contributes to the relatively small number of applications; there are three limited sources of data about the permissible use of Program-related Investments, including:
First, the Internal Revenue Code provides ten illustrative examples of tools that would constitute PRIs, including:

- A small business enterprise, X, is located in a deteriorated urban area and is owned by members of an economically disadvantaged minority group. Conventional sources of funds are unwilling or unable to provide funds to the enterprise. A foundation’s below-market interest rate loan to encourage economic development would be program-related.

- The private foundation described above allows an extension of X’s loan in order to permit X to achieve greater financial stability before it is required to repay the loan. Since the change is not motivated by attempts to enhance yield, but by an effort to encourage success of an exempt project, the altered loan is also considered to be program-related.

- Assume instead that a commercial bank will loan X money if it increases the amount of its equity capital. A private foundation’s purchase of X’s common stock to accomplish the same purposes as the loan described above is again considered to be program-related.

- Assume instead that substantial citizens own X, but continued operation of X is important for the economic well-being of the low-income persons in the area. To save X, a private foundation loans X money at a below-market rate to pay for specific projects benefiting the community. The loan is program-related.

- A private foundation wants to encourage the building of a plant to provide jobs in a low-income neighborhood. The foundation loans the building funds at a below-market rate to a successful commercial company that is unwilling to build the plant without such inducement. Again, the loan is program-related.

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25 Reg. 53.4944-3(b)
26 The Form 990, Return of Organization Exempt From Income Tax, is submitted by tax-exempt and non-profit organizations to provide the Internal Revenue Service with annual financial information. Form 990-PF is available for private foundations. A short version, Form 990-EZ, may be used by organizations with gross receipts of between $25,000 and $500,000 and total assets of less than $2.5 million.
27 Private letter rulings (PLRs), in the United States, are written decisions by the Internal Revenue Service (IRS) in response to taxpayer requests for guidance. A private letter ruling binds only the IRS and the requesting taxpayer. A private ruling may not be cited or relied upon as precedent. The IRS does have the option of redacting the text of a private ruling and issuing it as a revenue ruling, which becomes binding on all taxpayers and the IRS.
• A private foundation loans a socially and economically disadvantaged individual funds to attend college interest free. Once more, the grant is considered to be program-related.

• Land purchased for land conservation, wildlife preservation, and the protection of open and scenic spaces is program-related.

Unfortunately, these examples were crafted in 1969 based on how the Ford Foundation made PRIs in the 1950s and 60s; when the regulations were being drafted, President Lyndon Johnson’s anti-poverty programs were climaxing and the examples mostly pertain to urban renewal (Chernoff 2003).

Second, foundations report PRI usage in annual tax return documents. The Foundation Center, which aggregates data from surveying foundations directly contends that PRI-making "has diversified considerably in recent years." In the early 1990s, community development accounted for over half of all PRI activity. In 2007, education ranked at the top, with nine out of every ten PRI dollars targeting elementary and secondary schools (Lawrence 2010). I explore PRI usage in the field below by using data from the 990PF form, as aggregated by the Foundation Center.

Third, the Internal Revenue Service has issued 97 Private Letter Rulings at the direct request of foundations seeking guidance in PRI usage. The PLRs pertain to four distinct asset classes: loans, credit enhancement, equity investments, and real estate. It is important to note that any PLR is only applicable to the organization that requested it; the Internal Revenue Code provides that it may not serve as precedent for others.28

The judicial system has failed to provide a consistent answer as to how section 6110(k)(3) governs. While some judges flatly reject the use of written determinations in their opinions, others cite written determinations in contexts that are arguably precedential. Depending on one’s definition of “precedent,” judges are either interpreting section 6110(k)(3) narrowly or disregarding it altogether (Wood 2010). For example, in 1981, the U.S. Supreme Court cited PLRs in Rowan Cos Inc v. United States. More recently in 2010, however, the U.S. Court of Federal Claims denied AmerGen to right to enter PLRs from the IRS into evidence in AmerGen Energy Co LLC v. United States.

28 Internal Revenue Code section 6110(k)(3) states that, with certain minor exceptions, "a written determination may not be used or cited as precedent." This provision derives much of its visibility from ominous-sounding boilerplate usage by the Internal Revenue Service at the beginning or end of each Private Letter Ruling (PLR), Field Service Advisory (FSA), or item of Chief Counsel advice. The provision clearly provides an important caveat to taxpayers to whom written determinations have not been specifically issued.
Historical analysis: PRIs in the field

Based on historical data collected for an MIT working paper, we know that $42 billion of the $290 billion grants made in 2010 (14%) went to education. And according to our calculations, $28 billion of that $42 billion went to higher education (67%) and $3 billion of that $28 billion (11%) went to science, engineering, or medical research. As context, religion has been the largest recipient of philanthropic dollars for the past 56 years – in 2010, it received 35% of total grant-making from all sources, compared to education’s 14% (Giving USA 2011).

Importantly, support from philanthropic sources – individuals, private foundations, and corporate foundations – comprises almost one third of all dollars (27%) given to universities for science and engineering research in the United States (Murray 2012). As an example, Figure 11 shows the distribution of financial support for the top ten science and engineering research universities as identified by the 2012 NSF Science and Engineering Indicators.29

Figure 11. Funding supply for R&D at Top 10 Science & Engineering Universities

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29 The NSF Science and Engineering Indicators (SEI) is a record comprising the major quantitative data on the U.S. and international science and engineering enterprise. Indicators are quantitative representations that might reasonably be thought to provide summary information bearing on the scope, quality, and vitality of the science and engineering enterprise. The SEI is prepared by the National Science Foundation’s National Center for Science and Engineering Statistics (NCSES) under the guidance of the National Science Board (Board).
And while 27% constitutes a major portion of support for science and engineering innovation within the university, private foundations have not used PRIs to similarly translate innovation out of the university setting, across the nonprofit/for-profit boundary, and into the marketplace.

According to our data, foundations made less than 5,000 PRIs between 1998 and 2009. Figure 12 puts this into context among total grant-making from private foundations; PRIs constitute less than 2% of total grant-making for the years 1998 to 2009, and PRIs to science and engineering constitute less than fifty basis points of all grant-making to science and engineering over the same time period.

Figure 12. PRIs as a percentage of total grant-making: 1998-2009

<table>
<thead>
<tr>
<th>1998-2009</th>
<th>PRI</th>
<th>Grants</th>
<th>PRI as % of Grants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total amount given ($)</strong></td>
<td>3,841,475,781</td>
<td>203,394,651,000</td>
<td>1.89%</td>
</tr>
<tr>
<td><strong>Total amount give to science ($)</strong></td>
<td>16,108,997</td>
<td>6,011,531,000</td>
<td>0.27%</td>
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<tr>
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Similarly, among all PRIs made, those to science and technology comprised less than 1% of total PRI among other charitable causes. Figure 13 shows the distribution of PRI across sectors, including .55% to science and engineering projects.

Figure 13. Recipients by sector for all PRIs made: 1998-2009
To further contextualize the diminutive nature of PRIs made to science and engineering innovation, Figure 14 illustrates that PRIs to science and engineering projects comprise less than .01% of total grant-making from private foundations over the time period 1998 to 2009.

Figure 14. PRIs to science and engineering versus total grant-making: 1998-2009

Based on the data from the Foundation Center (2012), only 27 separate PRIs were made to science and technology projects from 1998 to 2009. These 27 PRIs are described in greater detail in Appendix C. Although few in number, most of the 27 PRIs were given to support technology as it moved from lab-scale to commercial development, demonstrating potential for this type of activity moving forward.

4.3 Summary

Private foundations in the U.S. have a wide spectrum of financial tools at their disposal to effect change. These vehicles range from being motivated purely by social logic on one hand and purely by economic logic on the other. For sociological and legal reasons, the tools that blend social and economic logic – PRI and MRI – have not been used widely in the past. However, for many of our complex, societal issues, foundations are uniquely positioned to fill gaps where private, single-bottom-line capital and government intervention fall short. They have the luxury of operating free of voting or
fundraising cycles, allowing investment strategy to stretch beyond 4-year or 10-year time lines.

**Barriers to creative investment and giving strategies at U.S. foundations**

Unfortunately, many aspects of foundation culture make innovative strategy difficult, including incorporating impact investment strategies that would proliferate PRI or MRI and bring the full weight of foundation assets to bear on the issues. To start, there is no forcing function of performance review for foundation program staff. At most foundations, quantitative performance metrics are self-imposed and efficacy is nearly impossible to measure in terms of social returns. To compound this issue, foundation staff are flattered by all stakeholders – grantees, service providers, colleagues, end-use beneficiaries, policymakers – that depend on the monies the foundation supplies or are not in a position to critique antiquated strategy. Grant recipients always want more money. Tax accountants and lawyers will always want to continue their contracts. Friends and strategic partners will not frequently feel comfortable critiquing a foundation strategy when it is trying to do good. End-use beneficiaries will not tell foundations to spend their money elsewhere. Policymakers are never in a position to critique, but rather align themselves with foundation work for branding and good rapport. So how could we expect foundations to implement innovative investment or grant-making strategies?

Additionally, at most large foundations, professional staff are forced to decipher ill-defined intentions of the earliest benefactor. And oftentimes, family ownership disputes underpinned the establishment of many of the largest foundations. These are the reasons the majority of private foundations in the U.S. pay out the minimum grant expenditure every year (5%) and grants only go to nonprofit entities – program staff and asset allocation staff have not yet been able to bridge the chasm of social and economic logic.

Entrepreneurship in general and commercialization in particular of US-developed engineering artifacts and processes are important ways to fulfill the promise of social goods. Unfortunately, private, public, and traditional philanthropic players are falling short in bringing new technologies to market, leaving room for impact investment funds to fill the gaps. Although not-for-profit funding from wealthy individuals, family foundations, and corporate foundations is widely used to fund science and engineering research within the university setting, it does not fund the translation of ideas towards greater impact. Grants typically vanish as soon as entrepreneurs incorporate and start to pursue go-to-market product research, even if the mission of the business is strategically aligned with the charitable mission of the grant-making organization.
Barriers to MRI and PRI usage at U.S. foundations

Within the context of blended instruments that hold promise for the future, MRI presents much more opportunity in terms of volume of money, but also complicated normative issues around appropriate use of funds. PRI represents less money but is clearly defined by regulation and past use.

However, there are a number of barriers preventing widespread use of PRIs to stimulate science and engineering innovation. First, foundation staff and their legal advisors feel the guidance provided in the Internal Revenue Code is insufficient for clarifying potential use of PRI. The ten examples provided in the tax language were written into the Tax Reform Act of 1969 and are arcane. The outdated and obtuse nature of these examples leads to foundations avoiding making PRIs, in order to avoid the excise tax penalties applied to improperly distributed funds. To combat this barrier, on April 18, 2012, the Internal Revenue Service released a Notice of Proposed Rulemaking that would add nine new examples of investments that qualify as “program-related investments” for private foundations. The proposed new examples illustrate different types of program-related investments that private foundations may make. The Notice was published in the Federal Register on April 19, 2012, at REG-144267-11.

The proposed new examples include the following investments:

- The purchase of stock in a business that will develop a vaccine to prevent a disease that predominantly affects poor individuals in developing countries.

- The purchase of stock, or the provision of a loan with below-market interest rates accompanied by the acceptance of stock, in a business in a developing country that collects recyclable solid waste and delivers such waste to recycling centers that would otherwise be inaccessible to a majority of the population.

- A loan with below-market interest rates to a business in a rural area that employs a large number of poor individuals, where the business has sustained damage from a natural disaster.

- A loan with below-market interest rates to individuals in a developing country that was damaged by natural disaster, for the purpose of starting small businesses.

- A loan with below-market interest rates to a company that purchases
coffee from farmers in a developing country, for the purpose of training poor farmers about water management, crop cultivation, pest management, and farm management.

- A loan with below-market interest rates to an organization described in Internal Revenue Code section 501(c)(4) that develops and encourages interest in painting, sculpture, and art by conducting weekly community art exhibits, for the purchase of a large exhibition space.

- A deposit as security, or a guarantee and reimbursement agreement, for a loan to a charitable organization described in Internal Revenue Code section 501(c)(3) that provides child care services in a low-income neighborhood, for the construction of a new child care facility.

The proposed examples demonstrate that a wide variety of charitable purposes may be served by program-related investments, including advancing science, combating environmental deterioration, and promoting the arts, in addition to the purposes demonstrated by the examples in the current Treasury Regulations, such as providing relief to economically-disadvantaged individuals or preventing deterioration of urban areas.

The proposed examples also clarify that program-related investments may include activities in other countries and may consist of credit enhancement activities and acceptance of equity positions in businesses in combination with loans. One example includes facts that indicate that a potentially high rate of return does not disqualify an investment from being program-related.

The Notice of Proposed Rulemaking states that taxpayers may begin to rely on the proposed examples now, even though they will not be effective until the Treasury publishes them as final regulations (McGuire Woods 2012).

In addition to abstruse tax language, a number of cultural barriers currently prevent widespread use of PRIs. First, service providers, such as lawyers, tax accountants, and money managers, are unfamiliar with PRIs. Few have learned about the potential of PRIs and fewer still have worked directly on a PRI in the field. This leaves service providers hesitant to approve, recommend, or advocate for using PRIs – most are rewarded for avoiding negative penalties rather than taking risks in the face of uncertainty.

Second, foundation staff themselves encounter sociological barriers, such as the personnel themselves. We found that the type of person – demographics, educational
background, and personal goals - that becomes a Program Officer at a private foundation is fundamentally different than a venture capitalist. This means staff at large foundations feel ill-equipped to make investments akin to the early-stage equity investments made by the venture community. At smaller foundations, we found that the family breadwinner continued to work full time on making more money, while his or her spouse managed their foundation. Families rarely approach charitable giving with the same rigor and creative strategy as money-making endeavors.

Third, the firewall between the mission side and asset allocation side of most private foundations blocks strategizing about overall impact investment tools. The two sides rarely communicate with one another and oftentimes see their fiduciary responsibilities as fundamentally opposed.

Fourth, there are very few sources of reliable data regarding historical usage of PRIs. Foundations can’t use private letter rulings as precedent, and past examples of permissible PRIs from the field are difficult to find aside from the 990PF forms aggregated at The Foundation Center. This leaves very little guidance for decision making at foundations and among professional service providers that advise them.

Fifth, entrepreneurs looking for financial support for their for-profit ventures are unfamiliar with the mandate for private foundations within the social logic, including the blended financial tools discussed earlier. Consequently, entrepreneurs do not know to communicate their business objectives as charitable, even while many of their business goals could be construed as such within the 501c3 language. In this way, the pitch for an entrepreneur seeking a PRI from a private foundation would be fundamentally different than the pitch to a venture capitalist. Currently, the educational rhetoric for science and engineering entrepreneurs - at universities and in the media - does not teach entrepreneurs to communicate in this way. It would be a paradigm shift for business pitching.

Last, for entrepreneurs seeking philanthropic capital, the fragmented foundation “market” is nearly impossible to penetrate. Although an entrepreneur might be building a business that could significantly advance the charitable mission for a foundation, there is a lack of affinity groups, centralized points of contact, or forums to meet foundation staff and deliver information that might pique their interest.

In sum, there are high cultural barriers that currently prevent ubiquitous implementation of PRI and MRI among U.S.-based foundations. However, our findings reveal that these tools do have the potential to advance many areas of science and engineering that hold solutions to global issues, such as health, environment, water, and energy.
CHAPTER 5: CONCLUSIONS

Our findings directly address the questions laid out at the outset of our investigation:

**Are there mechanisms to bridge the social and economic logics for ideas that have the potential for both forms of returns?**

Yes, private foundations have a spectrum of tools ranging from pure economic to pure social motivation available for use in the field. Mission-related investing (MRI) with the corpus and program-related investing (PRI) with annual grant dollars hold particular promise as blended vehicles.

**Are there legal vehicles that can be applied and used for early-stage companies?**

Yes, although infrequently, PRI have successfully been made to early-stage technology ventures in the past. Equity investments, loans, and loan guarantees are all permissible.

**To what extent are these tools applicable to the commercialization of economically and socially powerful innovations in areas such as energy and life sciences?**

These tools are applicable to tech innovation to the extent that companies’ objectives are “charitable,” as defined by the Internal Revenue Code. They may be applied in circumstances where mission is the primary purpose and single-bottom-line investors would not be likely to participate, complementing existing social and economic investors.

**What is the extent of their application today?**

Very few PRI have been made over the past forty years relative to overall grant-making, with even fewer being made to early-stage tech ventures. Most PRI are used to make loans that improve underserved, urban communities.

**What are the limitations on future usage?**

Barriers that prevent future use of PRIs for tech innovation are two-fold: 1) cultural mores that decelerate innovation of foundation strategy broadly and 2) sociological reasons that prevent ease of use for PRIs specifically. The legal rules are in place and already allow PRI-making to tech ventures, but the complex
sociological systems involved on both grantor and grantee sides prevent widespread, rapid proliferation.

Assuming that the use of blended vehicles is something desirable for the advancement of science and technology, below I briefly outline how policy makers, foundation staff, professional service providers, and those already active in tech venture creation could combat the high barriers to PRI usage in science and engineering. By taking proactive steps to knock down barriers, together we might begin to successfully bring the vast philanthropic resources in the U.S. to bear on gaps in the existing science and engineering innovation pipeline or to change the funding paradigm altogether.

**Figure 15. Foundations’ spectrum of tools, mapped onto S&E Idea to Impact Trajectory**

If we were to stimulate an active community of philanthropists making PRIs and MRIs to science and engineering projects, foundations that already make grants to universities as well as private equity firms that already make investments in corporations might all perform more optimally because they would be able to focus on projects within their ideal time and risk profile. They would avoid having to stretch outside their own narrow
investment focus areas to help bridge adjacent funding gaps. They also wouldn’t need to decline investments based on concerns about follow-on funding because there would be more players in the pipeline with ready capital.

5.1 Policy makers

The U.S. Treasury is already making strides toward lowering the barriers for private foundations to use PRIs. With the release of the Notice of Proposed Rulemaking in April 2012, it updated tax language that had not been modernized since 1969. There are now nineteen examples where there had been ten for forty years. The obtuse examples of the past have been criticized for preventing PRI usage in the field. Moving forward, policy makers would do well to collect information about how the new examples do or do not successfully effect change.

And while the additional examples in the Tax Code are a start, there are other actions the government could take to stimulate PRI-making. One would be to aggregate data regarding past use of PRIs, including private letter rulings, revenue rulings, and information found in 990PF forms. At present, it is prohibitively difficult for private foundations to decipher what is and is not permissible, both in the charitable purpose language in the first place and the PRI language in the second.

Lastly, policy makers or governmental agencies could host cross-cutting, interdisciplinary educational sessions about the potential of philanthropic capital, or PRIs more specifically. I’m confident many federal funding agencies that can only fund a small percentage of applications they receive would be thrilled to work together with foundations to fund a larger percentage of applicants, leveraging public monies with private foundation capital. At present, very few agencies have staff dedicated to working side-by-side with private foundations to complement one another, particularly in areas of science and engineering.

Lastly, it is important to note that many foundations’ goal is to fill gaps until more traditional, larger-scale funder can step in, such as for-profit investors or the public sector. Antony Bugg-Levine poignantly questions, “Are [the foundations using PRI and MRI] simply in the business of letting government get away with not fulfilling its responsibility to its people?” (2011). In my view, it would be prudent for the federal government to track investment trends among philanthropists that make use of the vehicles that blend social and economic logic, to make sure the public sector is not missing out on opportunities to do good and recoup tax payer dollars in the short term, leaving foundation capital to seek out longer-term needs.
Charitable individuals and foundations may be filling holes or compensating for market failures that should be encompassed by government intervention. By more actively following the philanthropic sector, our public sector could observe when it falls short on fulfilling its role to voters, misses opportunity to do good and receive upside profit, and when its presence could avail philanthropic dollars to other charitable purposes. The philanthropic sector can operate on longer time scales than our government and take more risk with its appropriations because it doesn’t answer to voters, but it should not simply be allowed to step in when government intervention falls short. Both sets of actors should play their part – government and philanthropy – by underlining their unique roles.

5.2 Foundation benefactors, trustees and program staff

In 2003, Michael Marsicano, CEO and president of the Foundation for the Carolinas said, “No country in the history of the world has so creatively and effectively combined philanthropy and government service. When we as individuals, however, volunteer our hard-earned dollars to advance society by freely giving from our own pockets, government taxes us less. The government gives us a tax deduction. As a matter of public policy, the law of the land rewards us for taking a personal role in the advancement of society. We are able to give less to Caesar when we give more to others. This is uniquely American and profoundly important. In America, government sees philanthropy as a partner. And you can even use your tax deduction to contradict government. If you believe the direction headed by Caesar is wrong, he will still give you a tax deduction when you freely finance the opposite direction. Philanthropists serve as an extended form of representative democracy. These individuals have been empowered to spend what otherwise would have been Caesar's to spend.”

The privileges described here are unique, and over the past century, there have been successes as well as abuses of the privilege. But never do we see foundation benefactors, staff, or trustees trying to do good with purposeful inefficiency or lack of efficacy. Unintentional sociological factors and complex societal systems prevent private foundations from consistently making asset allocations or grants that optimize impact.

There are a number of bold actions that foundation benefactors, program officers and trustees could take to enact this type of change in their own way.

Make purposeful hires on both sides of the foundation. Hire venture-minded employees on the program side. Choose mission-minded trustees and money managers on the asset allocation side. This way, program officers begin to feel better equipped to assertively tackle impact investing and incorporate it into existing grant-making or investment strategies.
Bring the full strength of the family's business acumen to the foundation's charitable work. Don't leave the grant-making up to someone in the family that is inexperienced just because he or she needs a project or because the business-minded family members are too busy. Philanthropic dollars are too important and too scarce to be spent more frivolously than they would be in the family's profit-seeking ventures.

Break down the firewall between the two sides of the foundation. Make sure program staff communicates frequently with trustees and wealth managers to approach social issues with all tools in the toolbox. By using the full spectrum of available tools, foundations will unlock full value of their assets.

Make it easier for social entrepreneurs to access the grant-making team. The fragmented foundation “market” is nearly impossible to penetrate for early-stage entrepreneurs, especially in light of the constraints on their time and resources. Work together with like-minded foundations to form affinity groups that can serve as sector-specific points of contact. Or identify a program officer that serves as centralized point of contact for the foundation. Or put together events to meet entrepreneurs and learn about their businesses’ value propositions.

Assess the merits of impact investing – SRI, MRI, or PRI – and explore its potential to benefit your areas of interest. Introduce trusted experts from mission-related work to experts that have successfully implemented impact investment strategy in analogous fields, such as community development and urban housing.

Think about the ways science and engineering could improve mission-based areas of interest. Science and engineering receives a very small fraction of total grant-making in the U.S. and an even smaller fraction of PRIs to translate inventions out of labs and into the commercial marketplace, where they can make a difference.

5.3 Philanthropy service providers – legal, tax, wealth management

Similarly, foundations rely on professional service providers – lawyers, accountants, advisors, consultants, and money managers – to help them fulfill their financial and legal obligations. These service providers should stop saying no to impact investment strategies without diving into the details. There have been a number of instances when our interviews led us to believe that professional opinions dissuaded foundation trustees or staff from taking risks when the advisor was not fully informed about the legal rules that govern PRIs.
Be aware when lawyers’, accountants’, or other advisors’ incentives do not line up with society’s needs. Professional service providers are usually rewarded for avoiding negative penalties rather than taking risks in the face of uncertainty, which might be exactly the role that philanthropy needs to play in any given circumstance.

Conversely, service providers could take the initiative to help philanthropic clients learn and/or access stakeholders to help consider and implement the blended vehicles discussed here. Events hosted by law firms for clients – foundations and startups. Affinity groups formed by money managers to introduce like-minded philanthropic clients and to educate them about successful PRI implementation in the field. The convening potential of service providers that serve multiple clients with similar questions is powerful for all stakeholders, including themselves.

5.4 Investors, entrepreneurs and educators

There are also actions those playing various parts of building new ventures can take – entrepreneurs, existing for-profit investors, and business school educators – to encourage more participation from the philanthropic sector in high tech entrepreneurship.

First and foremost, learn the legal details about blended vehicles to make it easier on foundations to give high-risk businesses money. That is, by better understanding the rules and tax burdens a foundation would take on by making a PRI, a new business would more likely be able to appeal to foundation program staff.

Similarly, make a separate and different pitch for value proposition to those interested in charitable mission. And for educators, offer business classes that teach entrepreneurs how to think about this; the interests of the private foundation are very different than the messages we currently teach business students to sell to venture capitalists.

Lastly, do not think of foundations as a “pile of easy money.” As discussed here, implementation of impact investment strategies is an uphill battle for private foundations in the face of cultural barriers. Some argue it is at least twice as hard as traditional venture capital, as impact investors try to build successful businesses that do social good at the same time. Approach MRI- and PRI-makers with the same type of diligence as a venture capital firm, learning about their investment theses and tailoring approaches in kind.
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Lawrence, Steven and Reina Mukai. "Key Facts on Mission Investing." Foundation Center, October 2011.


Wyhof, R. 2004. Venture Philanthropy: Value Added Investment or Administrative Annoyance?
## Appendix A. Interviews

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### Appendix B. Roundtable Guests

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<td>David Danielson</td>
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<tr>
<td>David Koerber</td>
<td>President, The Funding Farm LLC</td>
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<td>David Wood</td>
<td>Director, Initiative for Responsible Investment, Harvard University</td>
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<td>Dhira Jai Kolsrud</td>
<td>Partner, Rockport Capital</td>
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<td>Elisabeth Reynolds</td>
<td>Executive Director, MIT Industrial Performance Center</td>
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<tr>
<td>Gabriel Kra</td>
<td>Managing Director/Chief Investment Officer, Elon Management</td>
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<tr>
<td>Hugo Van Vuuren</td>
<td>Partner, The Experiment Fund</td>
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<td>Jeff McAulay</td>
<td>TechBridge Program Manager, Fraunhofer CSE</td>
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<td>Jim Blumberg</td>
<td>Trustee, Kresge Foundation</td>
<td>Speaker</td>
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<td>Joe Chaisson</td>
<td>Research Director, Clean Air Task Force</td>
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<td>Joshua Humphreys</td>
<td>Fellow, Tellus Institute</td>
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<td>Kacy Gers</td>
<td>Technology to Market Advisor, ARPA-E</td>
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<td>Laurie Burt</td>
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<td>Leslie Haroun</td>
<td>Senior Program Officer, Oak Foundation</td>
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<td>Lili Steifel</td>
<td>President, Steifel Family Foundation</td>
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<tr>
<td>Mariella Puerto</td>
<td>Senior Program Office, Barr Foundation</td>
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<td>Mark Goodman</td>
<td>General Partner, Terawatt Ventures</td>
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<td>Mark Johnson</td>
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<td>Mark K. Peters</td>
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<td>Mark Orlowski</td>
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<td>Matthew Nordan</td>
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<td>Michael Burychka</td>
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<td>Mike Telson</td>
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<td>Neil Rasmussen</td>
<td>SVP Innovation, Schneider Electric</td>
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<td>Pat Brades</td>
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<td>Patrick Clooney</td>
<td>CEO, Massachusetts Clean Energy Center</td>
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<td>Peter Weeks</td>
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<td>Phil Giudice</td>
<td>Farmer Board Chair, Center for Effective Philanthropy</td>
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<td>Ramsay Ravenel</td>
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<td>Richard K. Lester</td>
<td>Professor and Head, Department of Nuclear Science and Engineering, MIT</td>
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<td>Robert Day</td>
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<td>Ruth Madigal</td>
<td>Attorney-Advisor (Exempt Organizations), U.S. Department of the Treasury</td>
<td>Speaker</td>
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<td>Steve Brown</td>
<td>Managing Director, Merrill Lynch Wealth Management</td>
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<td>Trent Yang</td>
<td>Director, CU Cleantech</td>
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<tr>
<td>William Page</td>
<td>Senior Vice President, Essex Investment Management</td>
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(27 total, listed largest to smallest)

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<thead>
<tr>
<th>Foundation</th>
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<td>Seacoast Science Center</td>
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