UC Berkeley

Stimulating Entrepreneurship in the Bay Area and Nationwide

An Exploration of the Economic Contributions of UC Berkeley through Company Formations by Alumni, Faculty and Affiliates

2014

an analysis prepared by the

BAY AREA COUNCIL
ECONOMIC INSTITUTE
Connecting business, labor, government and education

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UNIVERSITY OF CALIFORNIA

Executive Summary

The University of California, Berkeley, widely considered the top public university and one of the leading research universities in the world, is located in the heart of the San Francisco Bay Area. The region leads the world in its ability to generate high-value businesses, venture investment, and transformative technologies. The region is also a leading center for entrepreneurial activity, generating home-grown start-ups, and attracting talented technologists and entrepreneurs from around the world.

UC Berkeley's entrepreneurial ecosystem consists of formal and informal elements that help drive innovation and entrepreneurship. These include talented students and faculty, the commercial licensing of technologies developed on campus, specialized programs for developing entrepreneurial skills, and university-sponsored incubators and accelerators designed to support incipient entrepreneurs and help them to launch companies.

This analysis estimates a minimum economic impact of entrepreneurial activity associated with UC Berkeley. The direct and ripple economic impact reported here likely underestimates the true impact.

Who are UC Berkeley's entrepreneurs?

- **Baby Boomers have been a driving force behind the growth of new businesses by identified Berkeley founders.** Graduates from the 1970s represent the most prolific cohort with a total of 809 founders. More recent cohorts have also generated substantial entrepreneurial activity.

- **More women graduates are founding companies.** Women represent 21 percent of all identified Berkeley founders. Women graduating in the 2000s, however, accounted for 31 percent of founders in that cohort.

- **Identified Berkeley founders have diverse academic backgrounds, drawing on 15 different colleges.** Nearly 70 percent of founders have earned graduate or professional degrees from UC Berkeley. Nearly a quarter of founders have more than one degree from Berkeley.

The firms founded by UC Berkeley alumni, faculty and other affiliates identified through this analysis generate significant jobs and revenues, span a diverse set of industries, and are located around the world.

- **With significant variations by industry, the 2,610 firms identified in this study account for 542,433 total jobs, and on average employ 208 workers each.**
- **Total global revenues of these identified firms are estimated at $317 billion.**
- **Fifty-two percent of all firms established by Berkeley founders are in the fields of Professional, Scientific & Technical Services.**
- **Manufacturing and Computer Systems Design top the list for Berkeley founders in the generation of jobs and revenues.**
  - Manufacturing reports the highest levels of both employment and revenue. With average employment of 1,592 workers, the aggregate $273 billion annual revenue of these companies leads all other sectors.
  - Computer Systems Design firms report average employment of 518 workers and aggregate annual revenues of $19 billion.
- **While Berkeley founders have started businesses around the world, their activities, and the employment they generate, are concentrated in the Bay Area.**
  - Fifty-five percent of companies established by Berkeley founders are located in the Bay Area. These companies account for 91 percent of total employment attributed to Berkeley founders globally.
  - Berkeley founders have particularly deep roots in Silicon Valley. Computer & Electronic Manufacturing firms in Santa Clara County make up 86 percent of total revenue in the Bay Area and 51 percent of total employment in the region associated with Berkeley founders.
  - Firms located across the rest of the US account for 19 percent of total companies founded and 6 percent of total jobs. Foreign-based firms represent less than 2 percent of total firms established by Berkeley founders and less than 1 percent of jobs.

This is only part of the story.

The direct impact of identified UC Berkeley company founders in terms of employment and revenue generation provides only part of the picture. The ripple effects of these successful ventures translate into broader new value creation across industries and across the United States.

- Looking at the broader ripple effects across the US economy, firms started by Berkeley founders are responsible for 1,247,490 jobs and $238 billion in total US economic output (i.e., the value of goods and services produced).
- Similarly, the business activities of Berkeley founders generate direct business revenues but also indirect and induced revenues in other businesses through business transactions. As a result, total business revenues account for $85.9 billion of the total value of goods and services produced in the US, and of this, $24.4 billion is personal (payroll) income.
- Federal, state and local tax revenues associated with firms started by Berkeley founders and the broader ripple effect through the economy totaled $27.3 billion in 2012. This includes employee compensation tax, direct corporate tax, and taxation revenues resulting from increases in household spending.

1. Introduction

The University of California, Berkeley, widely considered the top public university and one of the leading research universities in the world, hosts notable schools and departments in almost every major field of study. According to a National Research Council report, Berkeley has the highest number of leading graduate programs in the country, with 48 out of 52 Berkeley programs ranked among the top 10 in their fields.[1] The University is located at the heart of the San Francisco Bay Area, which leads the world in its ability to generate new high-value businesses, venture investment, and transformative technologies. The region is also a leading center for entrepreneurial activity, generating start-ups and attracting talented students, technologists and entrepreneurs from around the world. Many of these companies have become leaders in their fields.

With over 25,000 undergraduate and 10,000 graduate students, Berkeley plays a pivotal role in this ecosystem, generating value on a large scale not only for the region, but for California and the nation. Its ability to produce graduates and attract faculty who found companies and translate knowledge into products and services has made the University an invaluable economic asset and a large-scale platform for growth and innovation. This study sheds light on the economic contribution of Berkeley alumni, faculty and other affiliates who have founded companies contributing to the economic welfare of California and its citizens and commercializing technologies that continue to have profound national and global impacts.

This analysis is based on the results of a 2012 survey of alumni, faculty, and affiliates; information provided by specific university departments and affiliated organizations; and business data from Dun & Bradstreet. It sheds new light on the UC Berkeley entrepreneur. For the purposes of this study, a Berkeley entrepreneur or founder refers to any Berkeley alumnus, auditing student, visiting scholar or faculty member who has started a unique, currently operational and verifiable business of any size at any time. This sample of firms also includes companies founded primarily on technology licensed from Berkeley. The results presented here provide a partial picture of the full scope of entrepreneurial activity by Berkeley founders. Measured in terms of company formations, employment size and revenue value, the results provide an estimated minimum economic impact of Berkeley's

[1] National Research Council of the National Academies (2010) "A Data-Based Assessment of Research-Doctorate Programs in the United States" (Revised April 2011) http://www.nap.edu/rdp/.

company founders. Data from the survey is supplemented by case studies that identify a variety of companies, including some which were not represented in the survey. Since the survey was not comprehensive, the actual impact of Berkeley founders may be much larger. The methodology is detailed in Appendix A.

The study consists of five sections as described below. Section 2 explores the UC Berkeley ecosystem, what formal and informal institutions are in place, and how these lay the groundwork for the development of new industries. The Berkeley entrepreneur is profiled in Section 3, which examines patterns of entrepreneurial activity by gender, college, and graduation cohort. Section 4 details the direct economic impact of companies started by Berkeley founders, tracking employment and revenues as well as industry mix and geographic distribution. Section 5 provides estimates of the broader economic impact of companies established by Berkeley founders in California and nationally, including the multiplier effects of related business activity in the economy.

2.
Ecosystem for Entrepreneurship

Innovation and entrepreneurship at Berkeley occur through many channels: primarily through the talented students who receive their education there, but also through the faculty who teach them, through the commercial licensing of technologies developed on campus, through specialized programs designed to develop students' entrepreneurial skills, and through university-sponsored incubators and accelerators designed to support incipient entrepreneurs and help them create companies. Together these components form an entrepreneurial ecosystem.

This ecosystem benefits from being located in the San Francisco Bay Area, which claims one of the world's largest concentrations of research institutions, including corporate laboratories, independent laboratories, federal laboratories (such as Lawrence Berkeley National Laboratory), and other University of California campuses (UC San Francisco, UC Davis and UC Santa Cruz) with which UC Berkeley collaborates. The region also hosts the largest concentration of venture capital in the United States, with 40 to 45 percent of all venture investment in the country taking place within an hour's drive of the campus. This enables company founders to access capital and establish themselves more quickly. Angel investors, who invest in young companies in smaller amounts than venture capitalists, are another important component of this system. Entrepreneurs who have been successful provide numerous role models. A wealth of incubators and accelerators (60 at a minimum) and service providers offer specialized support as young companies grow. No less important is the spirit of entrepreneurship that pervades the region, where the acceptance of risk (as well as reward) and a vigorous start-up culture encourages creative people to found companies. UC Berkeley draws on this surrounding ecosystem and is also one of its anchors.

Laying the Groundwork for New Industries

The university's leadership in this extended environment has many dimensions. At one level, it can be seen not just in the formation of individual companies, but in transformative research that provides the basis for extended technology clusters—often concentrated in the Bay Area. Put differently, by developing innovative new technologies, Berkeley faculty and graduates have helped lay the groundwork for new industries.

Much of this happens through technology licensing, where Berkeley researchers are a major source of inventions. The university's research productivity is reflected in over 1,380 active inventions and 683 active patents. Over 145

companies have been founded under IP (intellectual property) licenses from Berkeley since 1990, attracting $67 million in federal SBIR (Small Business Innovation Research) and STTR (Small Business Technology Transfer) awards. Sixty-five have attracted venture or angel funding averaging $13.8 million.[2]

Dr. Martin Kenney at UC Davis has documented how these inventions can advance an entire industry. For example, the university's California Digital Computer Project, the first computer developed at a West Coast university (1954), engaged graduate students who went on to become industry leaders—designing the hard disc drive used in IBM's 305 RAMAC mainframe computer (Albert Hoagland, Roy Houng, Louis Stevens), and developing innovations such as the computer mouse, "windowed" user interfaces, and hypertext (Douglas Engelbart).

The Interactive Graphics and Retrieval System project (INGRES), an early project of Berkeley's Electrical Engineering and Computer Science (EECS) Department, provided training for business leaders who helped establish the Bay Area as the center of the relational database software industry. An INGRES participant, Robert Epstein left Berkeley to found Sybase, which remains an industry leader, and the origins of a host of other Silicon Valley companies including Oracle, PeopleSoft (since acquired by Oracle), Informix, Siebel Systems, Cadence Design Systems, Synopsis and Salesforce.com can be traced to INGRES and other EECS research.

The UNIX system was developed by Berkeley graduate student Kenneth Thompson while at Bell Labs; based on a UNIX programming course later taught by Thompson while on sabbatical at Berkeley, it was improved and released for popular use as BSD UNIX by a team of Berkeley graduate students that included Bill Joy. BSD 4.3 has been described by *Information Week* as "the single greatest piece of software ever, with the broadest impact on the world. BSD 4.3 represents the single biggest theoretical undergirder of the Internet."[3] Joy went on to co-found **Sun Microsystems**.

The contribution of Berkeley inventions to the development of new industries goes beyond engineering and technology. Working with the Navy, in the early 1950s Hugh Bradner, Berkeley engineer-physicist Dave Garbellano, and a team of Berkeley engineers developed for the Navy the unicellular foam plastic neoprene material used in exposure swimsuits worn by surfers and divers. While the technology was never patented, their research helped lay the groundwork for the commercial wetsuit industry, and for well-known companies like O'Neill.[4]

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[2] "IPIRA: Berkeley Office of Intellectual Property and Industry Research Alliances." UC Berkeley. (PDF brochure accessed July 2013) http://ipira.berkeley.edu/about-ipira.

[3] Babcock, C. (2006) "What's The Greatest Software Ever Written?" (Downloaded on 24 February, 2012) http://www.informationweek.com/news/191901844.

[4] Kenney, Martin, David Mowery, and Donald Patton. "Electrical Engineering and Computer Science at UC Berkeley and Silicon Valley: Modes of Regional Engagement." Publication forthcoming.

Biotechnology Pioneers

Biotechnology offers a good example of how UC Berkeley has contributed to the development of this important industry. Ed Penhoet, a Berkeley professor, co-founded **Chiron Corporation** (since acquired by Novartis) in 1981. Penhoet later returned to Berkeley as Dean of the School of Public Health in 1998 and is now a venture capitalist. Chiron's technology built on the work of Cetus Corporation, another Berkeley spin-off led by two Nobel Laureates, Donald Glaser and Ronald Cape. They invented the polymerase chain reaction (PCR), a major biotechnology tool.

Born in Hong Kong and a Berkeley graduate and biochemistry professor, Robert Tjian founded **Tularik** in 1991, and it was acquired by Amgen in 2004. The company was a leader in addressing human disease through techniques to regulate gene expression—transcription factors that turn genes on and off. Beginning with 60 employees and $3.9 million in capital, by the time of its IPO in 1999, Tularik had grown to 184 employees and a market value of $350 million.[5]

The university continues to generate biotechnology entrepreneurs. Corey Goodman founded **Exelixis** in 1994 and **Renovis** in 2001. Both licensed IP rights from his work (and that of Tito Serafini) as a faculty member at Berkeley. Later Goodman worked with Pfizer, founded venture capital firm venBio, and became CEO of one of venBio's portfolio companies. His experience, like that of Ed Penhoet and Robert Tjian, exemplifies how university-based talent can circulate between academia, industry and investment capital to support research, company formation and commercial product development.

Multidisciplinary Institutions Supporting Entrepreneurship Today

Today, it is understood that entrepreneurship can be supported by bringing together talented people who come from different backgrounds. Innovative institutions have been established at UC Berkeley that connect the business school with a diverse set of other disciplines.

The Lester Center for Entrepreneurship

The Haas School of Business' Lester Center for Entrepreneurship provides research, teaching and support for student entrepreneurs, linking Berkeley's business, engineering, computer science, law and biotechnology programs on an interdisciplinary basis. Since its founding in 1990 with support from Howard Lester, the Chairman of Williams-Sonoma, the Center has supported

[5] "CBRE-LBNL Economic Impact Study." (2010) http://www.lbl.gov/Community/pdf/CBRE-LBNL-Economic-Impact-Study-FINAL.pdf.

a wide range of MBA students who have successfully launched companies including the following:

- Tod Dykstra (MBA '91) founded **Dust Networks**, which received $7 million in Series A funding from Foundation Capital and Institutional venture Partners in 2004.
- Steve Markowitz (MBA '96), Noah Doyle (MBA '96), Mark Smith (MBA '96), Layton Han (MBA '96) and Dan Kihanya (MBA '96) founded **MyPoints.com**, which grew from no revenue in 1996 to $64 million in 2000, with over 16 million consumers (15 percent of all online customers). MyPoints.com acquired three competitors, spread to international markets and was acquired by United Airlines in 2001 for $112.5 million.
- Andre Marquis (MBA '96) founded **CyberGold**, which soon became one of the twenty fastest growing sites on the Internet; **Accept.com** which received funding from Kleiner Perkins and Benchmark Capital, and was subsequently acquired by Amazon.com; and **Bamboo.com**, which was later acquired by iPIX for $1.2 billion. iPIX is the largest manager of visual content on the Internet, with partners including Microsoft, Yahoo! and eBay.
- Kevin Brown (MBA '96) founded **Inktomi** with Eric Brewer and Paul Gauthier. Inktomi was acquired by Yahoo! in 2002.
- John Woolard (MBA '97) founded **Silicon Energy**, which was sold to Itron in 2003 for $71 million.
- Scott Kucirek (MBA '99) and Juan Mini (MBA '99) founded **ZipRealty**, which received $27 million in venture funding.

The Fung Institute

The Coleman Fung Institute for Engineering Leadership at UC Berkeley was established in 2010 with the goal of providing science and engineering students and professionals with the tools to become leaders in industry, government and the nonprofit sector. The Fung Institute offers two programs that focus on entrepreneurship: the Program for Innovation in Entrepreneurial and Social Finance and the Center for Entrepreneurship and Technology.[6]

The Program for Innovation in Entrepreneurial and Social Finance studies the changes in early stage funding models for entrepreneurial companies. The mission of this program is to collect and disseminate data on social finance methods to academics and policymakers. Its research on social finance, particularly crowd funded investing, involves several other disciplines. Aside from

[6] Coleman Fung Institute for Engineering Leadership. (2012) http://www.funginstitute.berkeley.edu.

informing academics and policy-makers, the program also organizes academic symposiums and collaborates with other researchers as a means to share research findings and coordinate research efforts.

The Fung Institute's Center for Entrepreneurship and Technology serves approximately 1,000 students and offers a multidisciplinary curriculum based on the Berkeley method of entrepreneurial education. This highly experiential curriculum allows students to apply their classroom learning to real life situations. This process is enhanced by the Fung Institute's esteemed faculty, and mentoring opportunities. The Fung Institute runs nearly 100 projects. Under the guidance of faculty and experts and collaborations with industry partners, these projects often turn into successful ventures in Silicon Valley. The success of these projects can be attributed to the Fung Institute's Global Venture Labs, which is "a set of programs that strive to develop an entrepreneurial ecosystem that supports venture creation and innovation at UC Berkeley". One of these programs is SkyDeck.

SkyDeck—Accelerating Entrepreneurs

Located in downtown Berkeley, SkyDeck Berkeley was established in 2011 as a business accelerator by the College of Engineering, the Haas School of Business and the office of the Vice Chancellor of Research, with the goal of providing entrepreneurs with the tools to start and grow their businesses and access the resources of the university. Though still a young organization, its ecosystem of startup teams, serial entrepreneurs, technology veterans, and early stage investors has already produced a first crop of successful companies. To qualify for the program, companies must have a scalable business plan, a technology or product and established customers or outside users. Once admitted, residents can stay six months with the option to re-apply in three-month intervals.

SkyDeck is currently home to 23 young companies, with teams ranging in size from two to seven. Examples include Ensighta Security and Kloudless. A cloud software start-up with a team of six, Kloudless recently received $1 million in funding. Ensighta, a cyber security enterprise founded by computer science Professor Dawn Song with technology licensed from Berkeley, was recently acquired by FireEye as part of a $50 million expansion into mobile platform security.

Partners Driving Innovation from Lab to Market

UC Berkeley's home-grown innovation ecosystem operates within the broader Bay Area ecosystem. The impact of UC Berkeley's direct efforts on campus is amplified through its collaborative relationships with the national labs and other research universities in the region. In addition to driving advances in basic science, UC Berkeley's research partners support the commercialization of new technology.[7]

[7] "Richmond Campus Scoping Paper." Bay Area Council Economic Institute. (May 2013) http://www.bayareaeconomy.org/media/files/pdf/Richmond_Campus-Scoping_Paper-May2013.pdf.

Lawrence Berkeley National Laboratory

Established in 1931 and managed by the University of California, Lawrence Berkeley National Laboratory was the first of the Bay Area's national laboratories and is the oldest in the US Department of Energy's national laboratory system. Conducting unclassified research in fundamental science and technology across disciplines such as astrophysics, biosciences, life sciences, information technology, energy and environmental science, the lab employs nearly 4,200 scientists, engineers, technicians, and operations, facilities and administrative staff. Almost 300 of the lab's scientists hold joint appointments at UC Berkeley and over 900 lab employees are undergraduate, graduate and postdoctoral students. The proximity of these two major research institutions produces synergies not easily replicated elsewhere.

Technologies originated at Lawrence Berkeley National Laboratory (Berkeley Lab) have served as the basis for over 30 start-ups since 1990. Approximately one third of these included Berkeley Lab entrepreneurs and a larger number engaged Berkeley Lab personnel on their scientific advisory boards or in other roles. These companies have directly created more than 2,000 jobs. Approximately two-thirds are in the Bay Area and 90 percent are in California. These companies have contributed $904 million to the Bay Area economy.[8]

Joint BioEnergy Institute

The Joint BioEnergy Institute (JBEI) was established in 2007 as a Department of Energy research center with the purpose of pursuing breakthroughs in the production of cellulosic biofuels or biofuels from nonfood plant fiber. JBEI is a research partnership led by Lawrence Berkeley National Laboratory and includes three other national labs and three research universities. The partnership includes:

- Lawrence Berkeley National Laboratory
- Lawrence Livermore National Laboratory
- Sandia National Laboratory
- Pacific Northwest National Laboratory
- UC Berkeley
- UC Davis
- Carnegie Institution for Science

[8] National Research Council of the National Academies. (2010) "A Data-Based Assessment of Research-Doctorate Programs in the United States." (Revised April 2011) http://www.nap.edu/rdp/.

Founded in 2011, the chemical manufacturing company **Lygos** was the first start-up to spin off from JBEI and is currently located at the QB3 East Bay Innovation Center. Three of the four Lygos founders—Leonard Katz, Eric Steen and Jeffrey Dietrich—started as UC Berkeley graduate students and postdoctoral fellows at JBEI. Katz is also Director of Research & Industry Relations at the Synthetic Biology Engineering Research Center (SynBERC), of which UC Berkeley is a leading partner. The fourth founder, Jay Keasling, is the current director of JBEI and also holds joint appointments with the Lawrence Berkeley National Laboratory and UC Berkeley.

Lygos' technology enables the production of petrochemicals—found in thousands of everyday products—without petroleum. The process uses sugar as a feedstock which is metabolized by special microorganisms to yield any of a number of molecules with different applications. Lygos technology is able to repurpose a class of proteins that have already been used in the production of antibiotics and other drugs for decades. In part because the Lygos process is carbon-neutral, the company received a $1.8 million Department of Energy grant and is actively fundraising.

Life Science Incubators

Berkeley also supports incubators that are specifically designed for emerging life sciences companies. **QB3**, the **California Institute for Quantitative Biosciences**, is a partnership of UC Berkeley, UC San Francisco and UC Santa Cruz that is at the cutting edge of the intersection of information technology and life sciences. In addition to supporting basic research, QB3 operates an innovative program—the Garage—which supports postdoctoral students and faculty who wish to take their research to commercial applications. Of the Garage's five locations, two are in the East Bay: the QB3 Garage@Berkeley, which is located on campus, and the QB3 East Bay Innovation Center (QB3-EBIC) in Emeryville. The QB3 Garage@Berkeley provides 800 square feet of wet laboratory space and eight stations for incubator use, as well as standard lab facilities and equipment. Its tenants have access to QB3's core laboratory facilities. The QB3-EBIC incubator provides 9,300 square feet of wet laboratory and support space and also provides tenants with access to QB3's core research facilities at Berkeley and UC San Francisco.

The Garage currently supports seven life sciences start-ups, while the East Bay Innovation Center supports thirteen. Notable Berkeley spin-offs that are in or have passed through Garage facilities include **Fluxion Biosciences, Omniox, Adheren, Caribou, Silicon Biodevices, Valitor, Lygos, Spiral Devices** and **Allopartis**. **Redwood Biosciences,** another notable Berkeley spin-off founded by David Rabuka, a Berkeley PhD in chemistry, is in the portfolio of emerging companies that QB3 supports, though not in QB3 space.

I-Corps: Bay Area Regional Node

Established by the National Science Foundation (NSF), the Bay Area Regional Innovation Corps (I-Corps) Node is one of three Nodes across the country set up in an effort to increase the impact of NSF-funded research.[9] The Nodes aim to develop innovation ecosystems within universities that will train the next generation of entrepreneurs, encourage partnerships between academia and industry, and commercialize science and technology.[10]

The Bay Area Node is an I-Corps Node coordinated by UC Berkeley in collaboration with UC San Francisco and Stanford University. The Node is headed by Richard Lyons, the dean of UC Berkeley's Haas School of Business, and Silicon Valley entrepreneur Steve Blank, an entrepreneurship lecturer at Berkeley and Stanford.

The Bay Area Node is producing an extensive entrepreneurship platform that is built on the three universities' expertise in science, technology and engineering; business thought leadership; and external ecosystems. It will teach the Lean Launchpad framework, developed by Steve Blank, which focuses entrepreneurs on developing business models instead of plans. By offering classes, focused training, and mentoring services outside of an MBA program, the Node is able to accelerate the creation of science-and-technology-based start-ups.

By providing much of the education, team tracking and mentoring online, the Bay Area Node is creating a start-up ecosystem that allows content and business processes to be readily updated. The data, resources and results are freely accessible on the Node's website, allowing those beyond the Bay Area to participate in the training. In addition, the Node conducts studies to facilitate the inclusion of a broad demographic, reflecting diversity by socioeconomic status, geographic location and ethnicity. It is also developing curriculum modules that address a broader array of subjects, including mentor training; healthcare and life sciences; and energy and clean technology, as well as legal and finance-related issues.

The Bay Area Node will train 96 student teams in 2014, working in fields as diverse as abdominal surgery, horse probiotics and nanophotonic transport. Of the teams that have already completed the program and have applied for federally-funded Small Business Innovation Research (SBIR) grants, 60 percent have been successful. For SBIR applicants who have not completed the I-Corps program, the success rate is 18 percent.

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[9] National Science Foundation website. Award Search. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1305078&HistoricalAwards=false.

[10] UC Berkeley Haas School of Business. News Release February 22, 2013. http://newsroom.haas.berkeley.edu/news-release/uc-berkeley-ucsf-and-stanford-join-forces-help-commercialize-university-innovations.

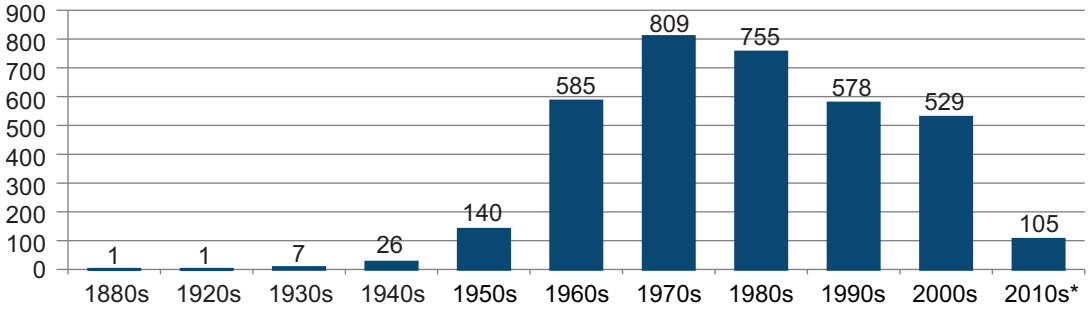
3.
The Berkeley Entrepreneur

Berkeley graduates, faculty and other affiliates have been founding companies since the university's beginning. The results of a 2012 survey of alumni, faculty and affiliates, together with supplemental information provided by UC Berkeley academic departments, identified 3,744 founders who have established companies that are still in operation as of 2013.

Because the survey did not capture all founders, the results presented here provide a partial picture of the full scope of entrepreneurial activity originating from UC Berkeley. The following section explores multiple characteristics of Berkeley founders, including graduation cohort, women founders, and variations by degree level and discipline.

Baby Boomers have been a driving force behind the growth of new businesses stemming from UC Berkeley. From the 1950s to the 1960s, the number of Berkeley founders increased 318 percent, from 140 to 585. Alumni, faculty and affiliates from the 1970s represent the most prolific cohort with a total of 809 founders. Cohorts since then have continued to generate large numbers of companies. The figure below illustrates the number of identified founders by graduation cohort. Earlier cohorts have had more time to start companies. According to the Kauffman Foundation, the average age of a first-time entrepreneur is 43,[11] so the number of company founders among more recent cohorts will likely continue to rise. The numbers reflect graduates but do not reveal the occurrence of multiple foundings by a single graduate.

Number of Founders by Graduation Decade



*Current as of December 2012

Data Source: Cal Advancement Data System

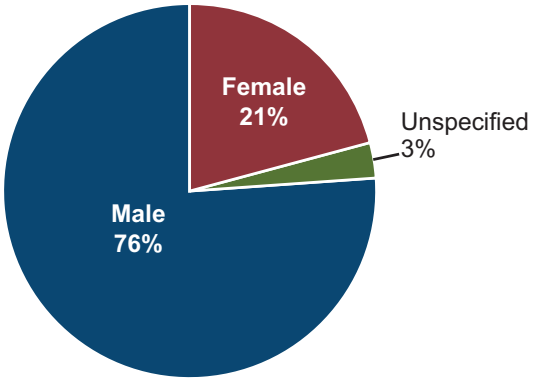
Note: Of all identified founders affiliated with UC Berkeley, 208 did not report graduation dates. In addition to graduates, identified founders include faculty, visiting scholars, and others affiliated with the University.

[11] Kauffman Firm Survey. "Education and Tech Entrepreneurship." (May 2008).

Women represent an increasing proportion of Berkeley founders. Of all identified founders, women represent 21 percent. Of founders graduating in the 1950s, women represent only 3 percent.[12] In contrast, of founders graduating in the 2000s, women account for 31 percent of the total. Most recently, of founders graduating since 2010, 25 women have already started firms, representing 24 percent of total formations.

Gender	Entrepreneurs
Male	2,833
Female	811
Unspecified	100
Total	3,744

Total UC Berkeley Founders by Gender



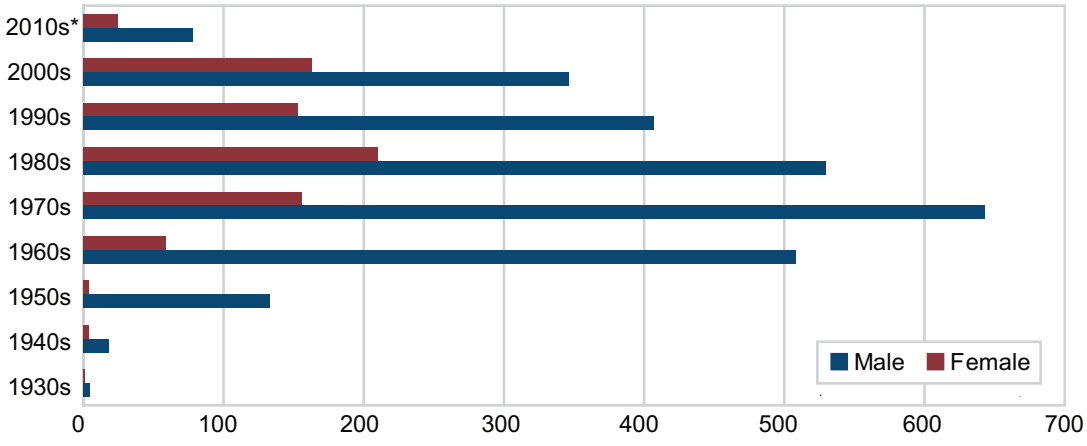
Data Source: Cal Advancement Data System

Graduation Decade	Female Founders	Women as % of Total
1930s	1	14%
1940s	4	15%
1950s	4	3%
1960s	59	10%
1970s	156	19%
1980s	210	28%
1990s	153	26%
2000s	163	31%
2010*	25	24%
Total	775	22%

*Current as of December 2012

Note: Data excludes records where graduation date was not reported.

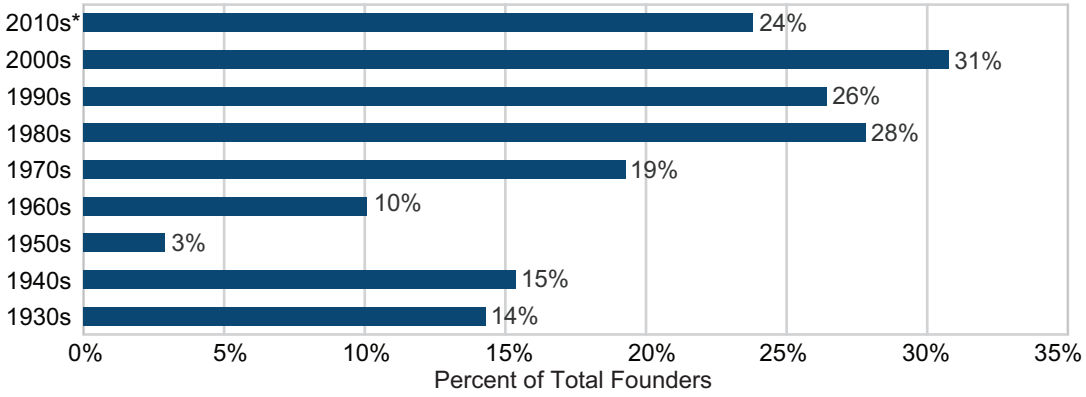
UC Berkeley Founders by Gender and Graduation Decade



*Current as of December 2012
Data Source: Cal Advancement Data System

[12] Five percent of records (for 36 female and 165 male founders) did not include a reported graduation year.

Women Berkeley Founders by Graduation Decade



*Current as of December 2012
Data Source: Cal Advancement Data System

Revolution Foods

As entrepreneurship at Berkeley grew in a culture that values social responsibility, a new kind of venture investment was conceived: impact investing, which is as concerned with social impact as it is with return on investment. This unique philosophy led to the creation of the Global Social Venture Competition (GSVC) at the Haas School of Business, a program created by MBA students to provide guidance and funding to social entrepreneurs. In 2006, the GSVC was won by two Berkeley MBA students, Kristin Tobey and Kristin Richmond. They presented a concept for a school cafeteria service provider called Revolution Foods.

The business concept was simple and depended heavily on affordability—to deliver high quality, pre-prepared meals to schools that would otherwise serve deep-fried or nutrition-depleted foods.

Drawing on the Hass School's impact venture network, Tobey and Richmond secured seed funding from "double bottom line" investors for a pilot program in Oakland. Revolution Foods quickly found itself needing to scale its business up in order to handle demand but had not yet turned a profit. At that point, Berkeley's relationship with social impact investors helped the company secure additional backing, this time from the Westley Group and Catamount Ventures. Today, after several further rounds of investment, Revolution Foods has served more than 50 million meals. Chefs around the country prepare more than 200,000 fresh meals daily, the company has grown to over 1,000 employees, and it has earned its founders the "Entrepreneurs of the Year" award from the Global Social Venture Competition where the company had its origins.

Entrepreneurial Activity by Academic Background

Berkeley's entrepreneurial graduates reflect diverse academic backgrounds, hailing from 15 of Berkeley's schools and colleges and numerous non-degree programs.

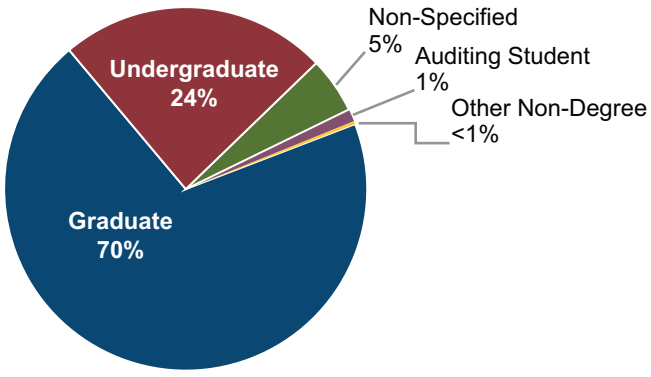
Degree Level	Founders
Graduate	2,618
Undergraduate	891
Non-specified	180
Auditing Student	49
Non Degree	6
Total	3,744

Nearly 70 percent of identified founders have earned graduate or professional degrees from Berkeley. Just less than a quarter of founders have bachelor's degrees, and a similar share has more than one degree from Berkeley.

Founders with other affiliations with Berkeley make up 8 percent. These include visiting scholars, auditors and participants in non-degree programs. Examples of non-degree programs at Berkeley include the Hass School of Business Center for Executive Education and the Young Entrepreneurs Academic Outreach Program. Both programs, among others, offer alternative students, such as pre-college youth and postgraduate professionals, the chance to revisit their education and gain valuable practical specialized skills. A range of summer session courses open to the public is also offered through all Berkeley colleges.

Because 24 percent of founders have more than one degree from Berkeley, when reporting on "founders" in this analysis, individuals are counted only a single time and are reported by their highest-level degree. Reporting "degrees" illustrates the fuller picture of the background of Berkeley's founders across multiple departments over time.

Degree Level of Berkeley Founders



Data Source: Cal Advancement Data System

Looking at the distribution of total degrees conferred to founders by school, the top five schools are the School of Law, the College of Letters & Science, the College of Engineering, the Haas School of Business and the College of Environmental Design. Together, these schools account for 88 percent of all degrees conferred to identified founders.

Greater detail on identified founders is presented below for the College of Letters and Science, the College of Engineering, and the Haas School of Business.

Total Degrees of Berkeley Founders

UC Berkeley College	Degrees	% of Total
School of Law	1,750	36%
College of Letters & Science*	1,254	26%
College of Engineering*	622	13%
Haas School of Business*	455	9%
College of Environmental Design	177	4%
College of Chemistry*	80	2%
College of Natural Resources	80	2%
School of Public Health	44	1%
School of Optometry	39	1%
School of Education	30	1%
Goldman School of Public Policy	28	1%
School of Information	25	1%
School of Social Welfare	13	<1%
School of Journalism	13	<1%
School of Criminology	12	<1%
Unaffiliated	7	<1%
No Current College	3	<1%
Not Specified	182	4%
Total	4,814	100%

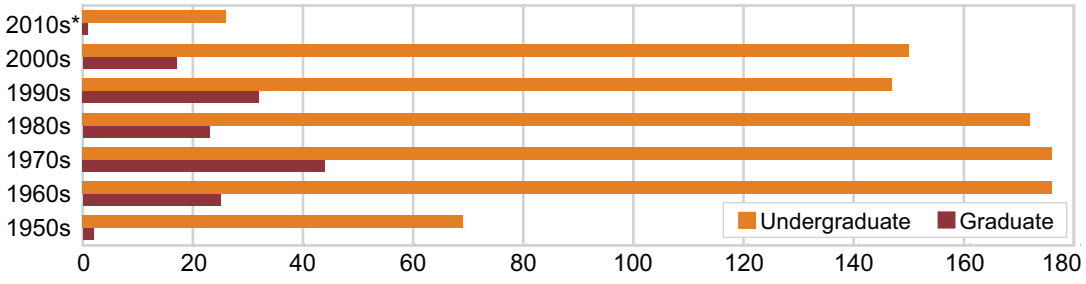
*Includes non-degree programs
Data Source: Cal Advancement Data System

The **College of Letters & Science** is the second most prolific department in producing company founders, where 87 percent received undergraduate degrees. College of Letters & Science departments include the humanities, the life sciences, and computer science. Among undergraduates, the departments of political science, economics, and history have produced the most founders. At the graduate level, the departments of physics and molecular and cell biology have produced the largest number of founders.

Start-up activity has been relatively constant across graduation cohorts since the 1970s with foundings picking up among those graduating in the 1990s and 2000s. In the College of Letters & Science, undergraduates have founded more companies than graduates with higher-level degrees. Of the total founders in this college, 87 percent (934) have undergraduate degrees and 13 percent (145) have a master's or PhD.

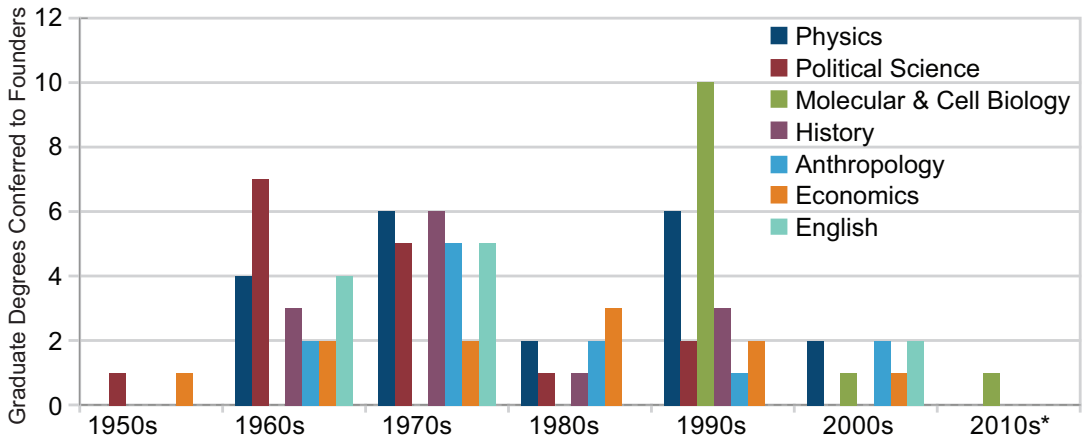
Of those completing graduate degrees in molecular and cell biology in the 1990s, ten founders have started companies. Twenty firms were started by founders graduating with upper-level degrees in physics. Among those with undergraduate degrees, company foundings have been most numerous by graduates in political science (181), economics (114), and history (75).

Number of College of Letters & Science Founders by Graduation Decade



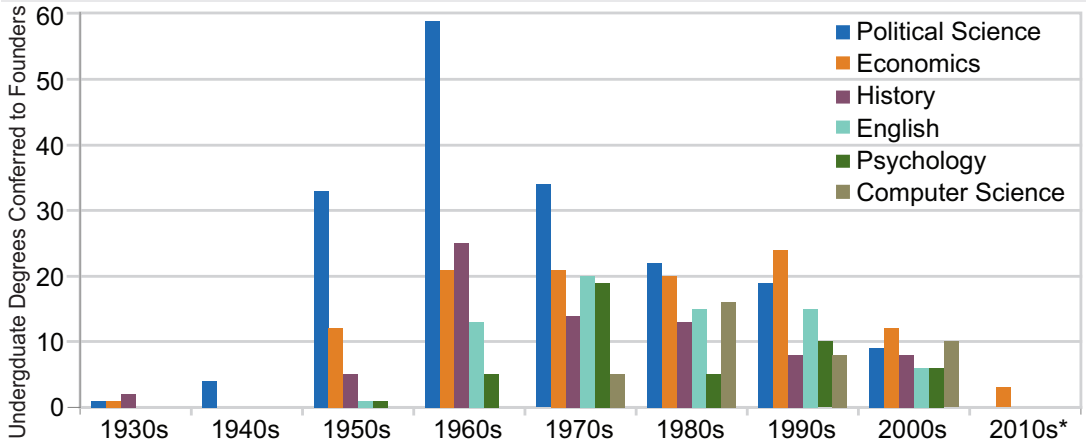
*Current as of December 2012
Data Source: Cal Advancement Data System

Top Graduate Majors—College of Letters and Science



*Current as of December 2012
Data Source: Cal Advancement Data System

Top Undergraduate Majors—College of Letters and Science



*Current as of December 2012
Data Source: Cal Advancement Data System

The **College of Engineering** has conferred a total of 622 degrees to identified founders, representing 13 percent of all degrees held by Berkeley founders. Over 60 percent of these degrees (374) are at the graduate level. The College of Engineering is a diverse school with renowned departments including electrical, mechanical and civil engineering.

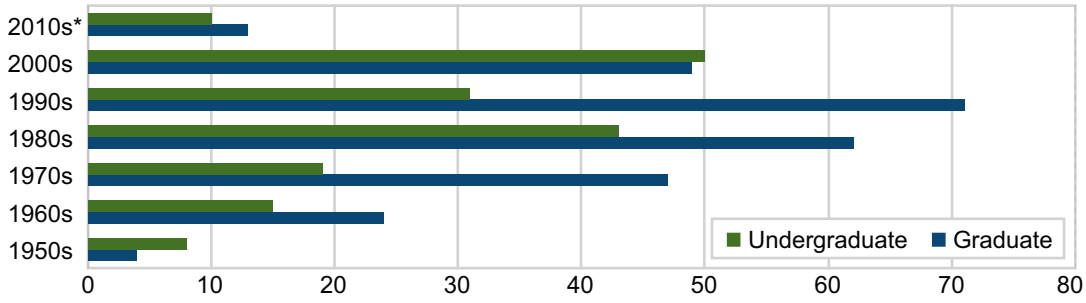
By decade, founders earning graduate degrees in the 1980s and 1990s account for the largest cohort. Among undergraduates, those graduating in the 1990s have founded the largest number of firms.

Half of the degrees conferred by the engineering school to founders were from the Electrical Engineering & Computer Science Department. Mechanical Engineering follows with 14 percent.

Engineering Degrees Conferred to Founders	
Department	**Number of Degrees**
Electrical Engineering & Computer Science	307
Mechanical Engineering	86
Civil Engineering	77
Industrial Engineering & Operations Research	41
Materials Science & Mineral Engineering	18
Nuclear Engineering	4
Naval Architecture & Offshore Engineering	3
Unspecified	86
Total	622

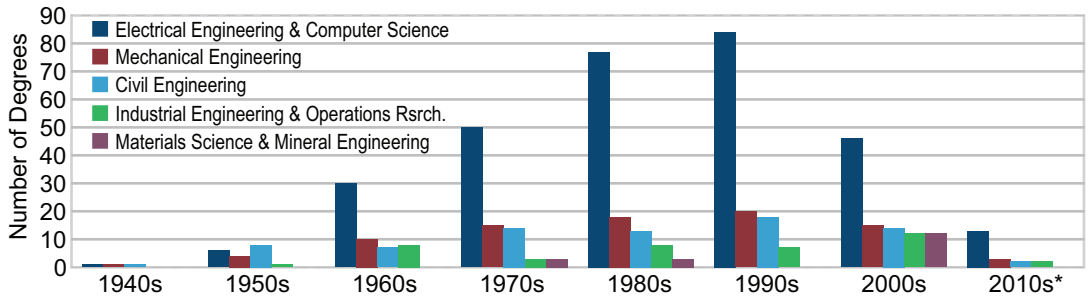
Data Source: Cal Advancement Data System

Number of College of Engineering Founders by Graduation Decade



*Current as of December 2012
Data Source: Cal Advancement Data System

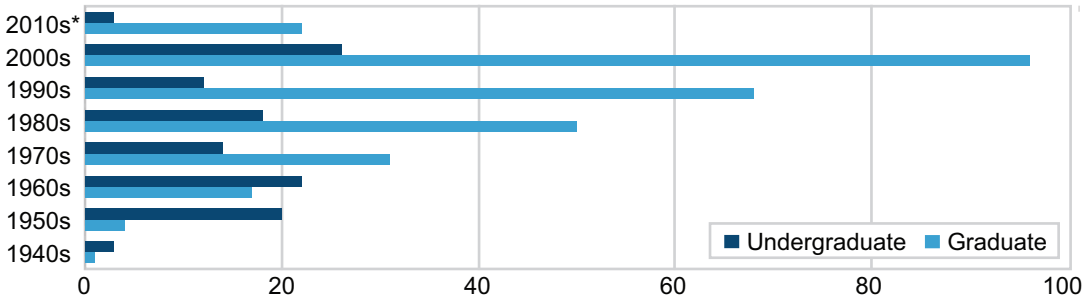
Degrees Conferred to Founders by College of Engineering Departments



*Current as of December 2012
Data Source: Cal Advancement Data System

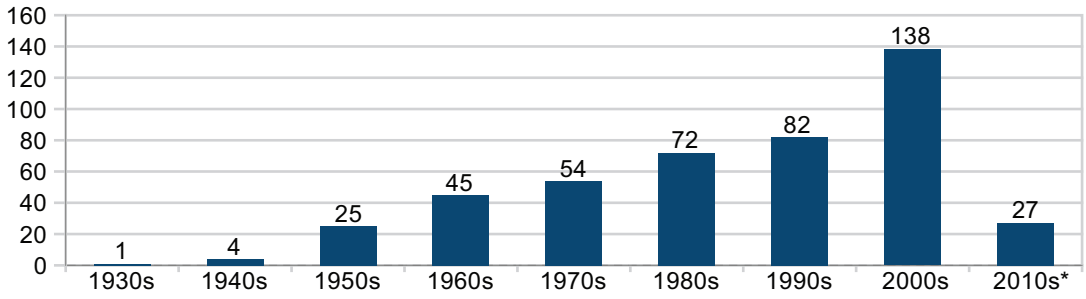
The **Haas School of Business** accounts for 10 percent of all degrees earned by founders. The number of degrees conferred in the 2000s to company founders is 68 percent higher than for graduates from the 1990s. Graduate degrees account for 78 percent of total business degrees conferred to founders.

Number of Haas School of Business Founders by Graduation Decade



*Current as of December 2012
Data Source: Cal Advancement Data System

Number of Degrees Conferred to Founders by Haas School of Business



*Current as of December 2012
Data Source: Cal Advancement Data System

Keyhole (Google Earth)

Founded in 2001 by John Hanke (MBA '96), Keyhole was a pioneering software development company specializing in geospatial data visualization applications. Earth Viewer, its marquee application, eventually became the successful Google Earth after Keyhole was acquired by Google in 2004. After the acquisition, Hanke spent several years as Vice President of Product Management for Google's "Geo" division (Google Earth, Google Maps, Local, StreetView, SketchUp, and Panoramio) and currently runs a Google start-up lab exploring experimental mobile/social/local applications.

Marvell Technology Group

Weili Dai, co-founder of Santa Clara-based Marvell Technology Group, exemplifies the contributions to the regional economy made by immigrants and the role played by Berkeley in attracting and developing top global talent. One of the world's most successful female entrepreneurs, Dai was born in Shanghai and came to the Bay Area in 1979. She and her future husband, Marvell co-founder Sehat Sutardja, met several years later while studying computer science at Berkeley. Both were attracted to the freedom of owning their own company, and Marvell was subsequently created around a kitchen table by Dai, Sutardja and his brother Pantas, who had also studied at Berkeley. Sehat and Pantas Sutardja were born in Indonesia.

Founded in 1995, the company went public in 2000, and today is the third largest fabless semiconductor company. Building on a business base of hard disc drives and networking hardware, the company is expanding its focus on mobile communications such as smartphones and tablets, and smart TVs. With 7,200 employees and worldwide operations, Marvell ships over one billion chips a year. Net revenue in 2012 totaled $3.4 billion, and the company's market capitalization was $5.9 billion.

Dai credits her Berkeley education and the quality of Marvell's workforce with her success. In 2009, she and Sehat Sutardja donated $20 million to the university's nano-fabrication laboratory. In recognition of that contribution, Sutardja Dai Hall now houses CITRIS—the Center for Information Technology Research in the Interest of Society—one of the University of California's four groundbreaking California Institutes for Science and Innovation.

4.
The Direct Economic Impacts of Firms Started by Berkeley Founders

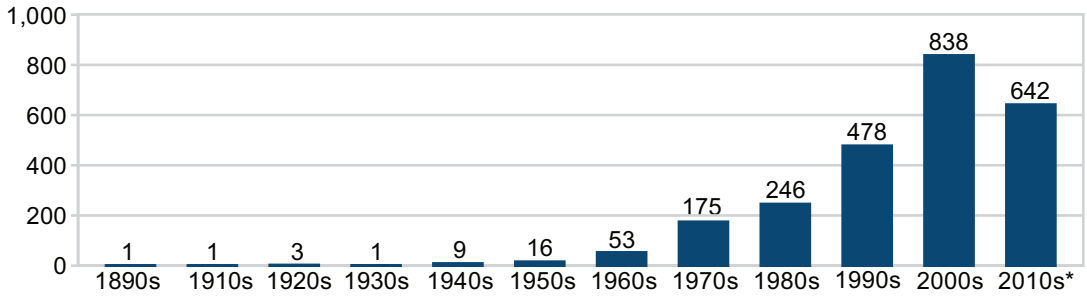
The data analysis for this report identified 2,610 companies currently in operation that have been established by Berkeley founders. These companies account for 542,433 employees and report $317 billion in annual revenues. These values represent a conservative estimate of the impact of the entrepreneurial activity of Berkeley founders.

This analysis is based on the results of a 2012 survey, information provided by specific university departments, and business data from Dun & Bradstreet. The business database developed through this process does not include the complete universe of companies with Berkeley founders. While not comprehensive, the results of this analysis reveal new insight into patterns of entrepreneurship over time, industry mix and geographic distribution.

Firms Started by Berkeley Founders In Summary	
Firms	**2,610**
Employment	**542,433**
Revenue	**$317 Billion**

From the 1990s to the 2000s, firm formation grew 75 percent. During the decade of the 2000s, at least 838 firms were founded that are still in business today. While the 2000s is the decade with the largest number of new firm starts, the robust activity in the first three years of the current decade suggests that the 2010s will edge ahead. Between 2010 and the end of 2012, Berkeley founders had already founded 642 new firms in three years. This equates to 77 percent of total new firm starts over the preceding decade.

Number of Firms with Berkeley Founders, by Founding Decade



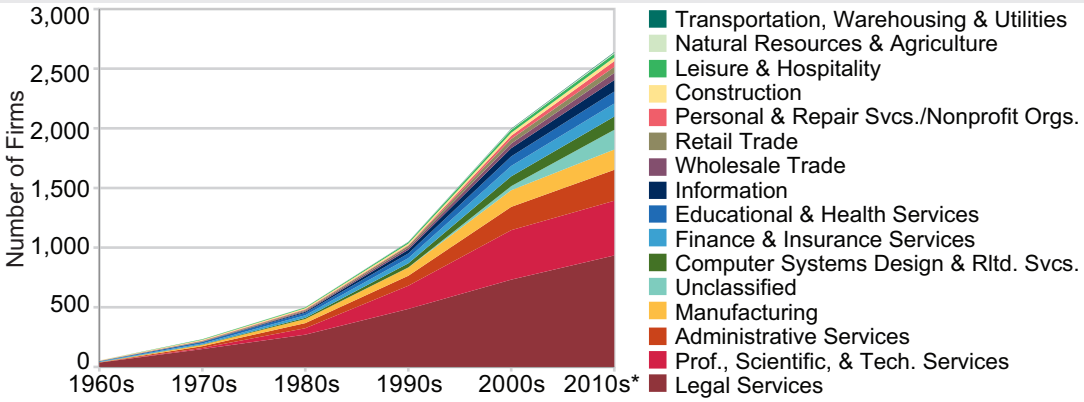
*Current as of December 2012

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Note: Of all identified firms with founders affiliated with UC Berkeley, records for 147 firms did not include start dates.

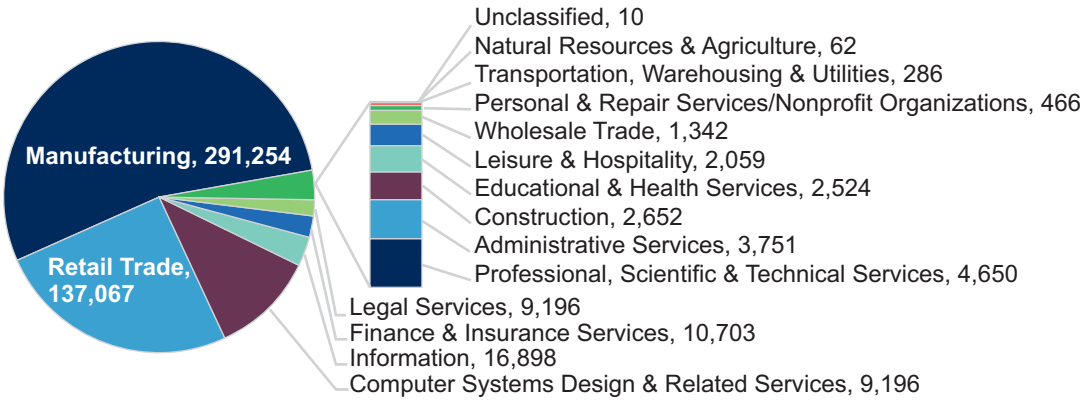
These identified firms span a range of industries and reflect a changing industry mix over time.[13] The largest percentage growth of firm starts was in the two sectors of Professional, Scientific & Technical Services and Administrative Services. With 70 starts in the 1990s, 40 new professional services firms were founded in the 2000s. Administrative Services, which includes temporary employment services, expanded from 41 company foundings to 111 new firm starts during the 2000s.

Industry Growth of Berkeley-Founder Firms



*Current as of December 2012
Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Share of Employment by Industry



Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

[13]Founding dates and industry classification were not provided for all firms identified through the survey and departmental data. Industry classification was not available for 165 firms and start dates were not available for 96 firms.

Looking at the full sample of 2,610 firms by industry, two-thirds of all firms of Berkeley founders are in Professional, Scientific & Technical Services. Within this sector, Legal Services accounts for 989 companies.14 The large number of law firms reflects in large part the higher rate of partnerships and sole proprietorships in this sector. The largest number of employees is in Manufacturing. Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

Berkeley-Founder Firms by Industry

		EMPLOYMENT			REVENUE		
INDUSTRY	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Legal Services	989	9,196	9.3	2	$1,281,000,000	$1,295,318	$180,000
Administrative Services	275	3,751	13.6	2	$410,400,000	$1,492,510	$140,000
Professional, Scientific, & Tech. Svcs.	262	4,650	17.7	3	$434,300,000	$1,657,634	$225,000
Unclassified	199	10	0.1	0	$517,530	$2,601	$-
Manufacturing	183	291,254	1,591.6	20	$273,000,000,000	$1,492,000,000	$1,200,000
Finance & Insurance Services	116	10,703	92.3	3	$2,038,000,000	$17,570,522	$224,196
Computer Sys. Design & Related Svcs.	115	59,513	517.5	15	$19,110,000,000	$166,200,000	$950,000
Educational & Health Services	108	2,524	23.4	4	$209,800,000	$1,942,404	$170,000
Information	104	16,898	162.5	10	$3,965,000,000	$38,123,736	$810,000
Wholesale Trade	67	1,342	20.0	4	$188,200,000	$2,808,455	$310,000
Retail Trade	57	137,067	2,404.7	3	$15,730,000,000	$276,000,000	$160,000
Personal & Repair Svcs./Nonprofit Orgs.	53	466	8.8	3	$56,818,709	$1,072,051	$140,000
Leisure & Hospitality	34	2,059	60.6	2	$100,600,000	$2,959,634	$100,000
Construction	33	2,652	80.4	8	$761,900,000	$23,088,608	$550,000
Natural Resources & Agriculture	10	62	6.2	4	$5,283,000	$528,300	$240,000
Transportation, Warehousing & Utilities	5	286	57.2	2	$44,812,000	$8,962,400	$160,000
Total	2,610	542,433	208	3	$317,336,631,239	$121,600,000	$170,000

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Note: The results for Legal Services and Computer Systems Design & Related Services are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

Identified Berkeley-founder firms vary by their employment and the revenues they generate. Most tend to be small companies. Manufacturing accounts for the largest employment and revenue generation. Computer Systems Design & Related Services reports the highest total revenue after Manufacturing. The largest sectors in terms of employment are highlighted below. Examples of some of the largest firms of Berkeley founders are included for each sector.

Manufacturing

Berkeley founders have started 183 manufacturing companies that are still in operation today. Manufacturing accounts for 4 percent of identified

[14]It is important to note that the number of Berkeley-founder legal firms described here does not correlate directly with the number of founders from the School of Law cited in the previous section. The analysis carried out in this section utilizes business data, and the analysis in the previous section utilizes data from the Cal Advancement Data System. In order to maintain the privacy of alumni, faculty and affiliates, the two data sources were not linked.

Berkeley-founder firms but 54 percent of employment. These companies include advanced manufacturing related to semiconductors, communications, surgical appliances, laboratory instruments, and measuring instruments. Manufacturing firms report average employment of 1,593 workers and a median size of 20 workers. Most of the 183 firms are small. Aggregate annual revenues are $273 billion.

One of the largest manufacturing employers, **Linear Technology Corporation**, is based in Milpitas. Founded in 1981 by George Erdi, the maker of high performance analog integrated circuits has 4,365 employees and $1.2 billion in annual revenues. Erdi received a master's degree from the College of Engineering.

With 945 employees, **Cepheid** is a molecular diagnostics company manufacturing products that automate and speed genetic testing. Based in Sunnyvale, the company employs 945 people and reports $331 million in annual revenues. The company was co-founded in 1996 by Gregory Kovacs, who received a master of science degree in bioengineering from Berkeley.

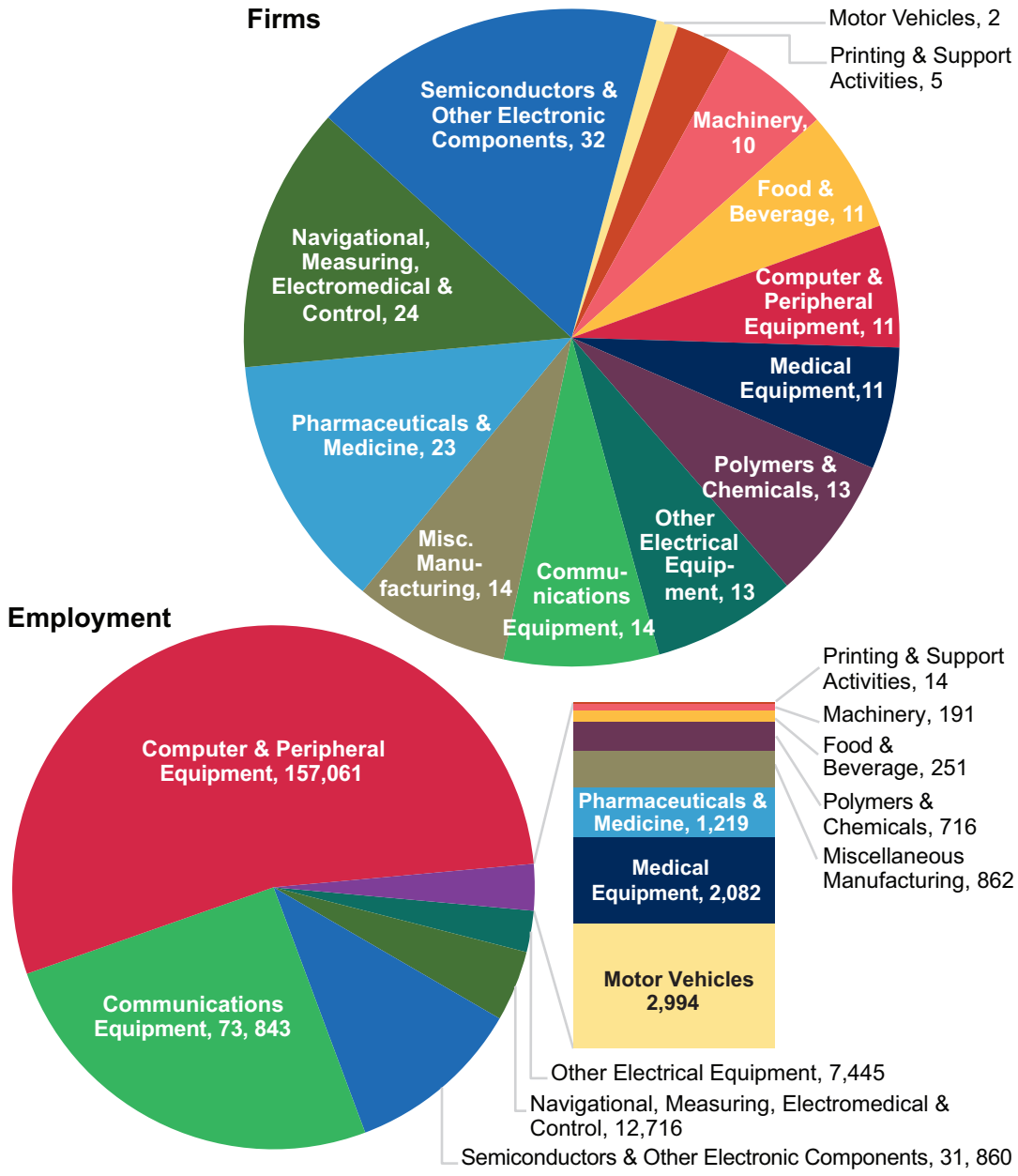
Enphase Energy, Inc. produces micro inverter systems for residential and commercial solar energy systems. Based in Petaluma, Enphase employs over 300 workers and reports annual revenues of $217 million. Co-founder Raghu Belur received his MBA from Haas School of Business.

Simpson Manufacturing Company designs, engineers, and manufactures structural connectors, anchors and other products used in housing and commercial construction around the world through its subsidiary **Simpson Strong-Tie Co., Inc.** Founded in 1956, this now publicly-traded company generated over $650 million in sales and employed 2,188 workers in 2012. Founder Barclay Simpson earned his B.S. degree from UC Berkeley in 1966.

The manufacturing sectors with the largest number of firms are Semiconductors (17 percent), Navigational, Measuring, Electromedical & Control Devices (13 percent), and Pharmaceuticals & Medicine (13 percent).

In terms of employment, 97 percent of manufacturing jobs are in computers and electronics. This category includes the production of semiconductors, semiconductor manufacturing equipment, electronic components, navigational and measuring devices, audio-visual equipment, communications equipment and computer equipment manufacturing. The largest sector, Computer & Peripheral Equipment accounts for 157,061 jobs and $105 billion in annual revenues. Communications Equipment employs 73,843, and Semiconductors, 31,860.

Berkeley-Founder Firms and Employment by Major Manufacturing Sector



Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Medical devices and biotech account for 19 percent of manufacturing workers in firms of Berkeley founders. This sector includes the production of pharmaceuticals, medicines, and medical supplies. Medical Equipment reports 2,082 jobs and Pharmaceuticals & Medicine accounts for 1,219 jobs.

Largest Manufacturing Employers with Berkeley Affiliated Founders

Business Name	Total Employment	Primary NAICS Industry
Intel Network Systems Inc.	82,500	Computer Terminal and Other Computer Peripheral Equipment Manufacturing
Apple Inc.	72,800	Radio & Television Broadcasting and Wireless Communications Equipment Mfg.
Applied Biosystems, LLC	10,000	Analytical Laboratory Instrument Manufacturing
Analog Devices, Inc.	9,200	Semiconductor and Related Device Manufacturing
Acuity Brands Lighting, Inc.	6,000	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing
National Semiconductor Corp.	5,800	Semiconductor and Related Device Manufacturing
Sandisk Corporation	4,636	Computer Storage Device Manufacturing
Linear Technology Corp.	4,365	Semiconductor and Related Device Manufacturing
Tesla Motors, Inc.	2,964	Automobile Manufacturing
Riverbed Technology, Inc.	2,566	Computer Terminal and Other Computer Peripheral Equipment Manufacturing
Marvell Semiconductor, Inc.	1,900	Semiconductor and Related Device Manufacturing
CPI International, Inc.	1,550	Other Electronic Component Manufacturing
Angiodynamics, Inc.	1,400	Surgical and Medical Instrument Manufacturing
Cymer, LLC	1,240	All Other Miscellaneous Electrical Equipment and Component Manufacturing

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Intel Corporation

Intel Corporation, the largest semiconductor chipmaker in the world, was founded by Robert Noyce and Gordon Moore. A chemistry major at Berkeley, Moore worked with Noyce at Fairchild Semiconductor, a forerunner Silicon Valley company in transistors and integrated circuits. Also a Berkeley alumnus, Andrew Grove was Intel's CEO from 1987 to 1998 and its third employee. Grove had also left Fairchild to join Intel.

Intel achieved its first major success two years after its founding, producing a low-cost memory chip. Its early business depended on the production of Static Random Access (SRAM) and Dynamic Random-Access Memory (DRAM) chips, which were used in virtually all consumer products with electronic components.

Intel dominated the RAM market from 1970 through 1985, when SRAM and DRAM chips came under intense competitive pressure from Japanese firms. At that point, Moore and Grove shifted Intel's focus onto another of their inventions, the microprocessor. Intel invested heavily in microprocessor design through the 1980s and 1990s, promoting the rapid growth of a booming personal computer industry.

One of Grove's key decisions was not to allow licensing of Intel's cutting-edge technology. Intel would be the sole manufacturer, which paid off, as its chips are now in four out of five personal computers. With "Intel Inside," Intel today is the world's largest semiconductor chipmaker, with a market value of $121 billion and 105,000 employees worldwide.

Retail Trade

Berkeley founders account for 137,067 jobs in retail. Of this, 136,000 are employees of one of the largest apparel companies in the world, Gap Inc. Of the other 56 identified firms, average employment is 19 workers per firm. These firms include electronics and appliance stores, grocery stores, automobile dealerships, office supply stores, and many other small retail companies.

Gap Inc. was founded in 1969 by Donald George Fisher, who graduated from Berkeley in 1950 with an undergraduate degree in business administration, and his wife, Doris Fisher. The company began as a solution to the disorganization and poor selection that was common in apparel stores of the time. From a single store near San Francisco State University, Gap Inc. has expanded to 3,263 locations worldwide with 136,000 employees (as of 2012). The success of Gap Inc. also saw Donald Fisher appointed to the Advisory Committee for Trade Policy and Negotiations under Ronald Reagan, George Bush, and Bill Clinton.

Computer Systems Design

Computer Systems Design & Related Services ranks third in employment and revenue generation. Average employment per company is 518 workers. Median employment among these firms is eight workers, which suggests that among the 115 companies, most are small. With a total of 59,513 jobs, aggregate annual revenues for these companies tops all other sectors at $19.1 billion.

NetApp is a $6.2 billion company based in Sunnyvale that produces data storage systems for business use as well as operating systems for data centers, storage security systems, NAS (Network-Attached Storage) and SAN (Storage Area Network) protocols, and a host of other storage optimizing software products. James Lau co-founded NetApp in 1992 and served as the President of Engineering until 1995, the chief technology officer from 1995 to 2000, and the chief strategy officer until 2010. He received his bachelor's degree in computer science and mathematics from UC Berkeley.

VMware, a $4.6 billion company based in Palo Alto, provides cloud-based data center services as well as a suite of virtual desktop products and mobile applications. Mendel Rosenblum, who holds a master's and a doctorate from Berkeley in computer science, is one of five co-founders and served as the company's chief scientist.

Information

Berkeley founders have started 104 firms in the Information sector that are still in operation today. These identified firms are primarily in Software (34 percent) and Telecommunications (29 percent). Motion Picture & Video make up 16 percent of these firms. While these firms employ 163 people on average, most are small, with median employment of ten workers. Aggregate annual revenue of these companies is $4 billion.

DigitalGlobe, Inc. provides commercial high-resolution earth imagery products and services. Based in Longmont, Colorado, the company employs over 1,300 people and reports annual revenues of $421 million. DigitalGlobe was founded in 1995 by Walter Scott, who received both a master of science degree and a doctorate in computer science from Berkeley and currently serves as an executive vice president and chief technical officer of the company.

Rhythm & Hues Studios produces visual effects and animation for film, commercials, games and other media. Headquartered in Los Angeles, the company has locations in Vancouver, British Columbia as well as India and Taiwan. Employing 300 in California, the company has annual sales of $21.5 million. Two of its three cofounders graduated from Berkeley—Pauline Ts'o, in computer programming, and Keith Goldfarb, in mathematics.

Saba Software, based in Redwood Shores, provides learning and talent management software. With 735 employees, the company reports annual revenues of $117 million. The company was founded in 1997 by Bobby Yazdani who holds a degree in applied mathematics from Berkeley. After taking the company public in 2000, Yazdani left Saba in 2013 and is now an active angel investor in web-based start-ups.

Finance and Insurance

Finance and Insurance Services companies of Berkeley founders account for 105 firms with a total of 10,703 jobs. These identified firms report annual revenues of $2 billion and are engaged in a range of financial transactions, insurance and employee benefit programs.

Founded by Gilbert Meyer in 1978, **Avalon Bay Communities** develops, acquires, and manages high-end apartment communities in high-demand markets. Currently their portfolio includes 272 properties with 81,279 apartment units in twelve states.

Legal Services

Legal Services represents 38 percent of firms, but less than 2 percent of total employment associated with Berkeley founders. With total employment of 9,196, law firms report aggregate revenues of $1.3 billion.

Based in Silicon Valley, **Wilson Sonsini Goodrich & Rosati** is a leading law firm that offers specialized services tailored to the unique needs of companies in technology, life sciences and other high-growth industries worldwide. Their clients range from small start-ups to multi-billion dollar corporations. Larry W. Sonsini, a founding partner, graduated from the UC Berkeley Boalt Hall School of Law in 1966. In addition to serving as a senior partner at Wilson Sonsini Goodrich & Rosati, Sonsini teaches securities law at UC Berkeley.

Founded in 1983, **Pircher Nichols & Meeks** specializes in real estate law, supporting clients in complex real estate transitions. Leo J. Pircher, a founding partner, received an undergraduate degree from UC Berkeley in 1954 and earned his law degree in 1957. Pircher is considered one of the pioneers of the legal framework used in large real estate transactions since the 1970s.

Professional, Scientific & Technical Services

The broad sector of Professional, Scientific & Technical Services encompasses activities in research, design, consulting, accounting, technical services, advertising and other services.[15] Berkeley founders have established at least 262 companies that are currently operational and account for 4,650 employees. With median employment of three, these are very small companies. Aggregate annual revenues are $434 million. Examples of Berkeley-founder firms from two of the largest subsectors of this industry are highlighted below.

Scientific & Technological Consulting accounts for 148 establishments and over 2,200 employees associated with Berkeley founders. This sector includes a variety of management, environmental and marketing consulting activities.

Design, Community & Environment, Inc. provides landscape planning and design services. With a workforce of 53, the company has annual sales of $5.8 million. Headquartered in Santa Ana, it has locations across the state. The company was founded by Berkeley graduate David Early in 1995.

Glowlink Communications Technology produces tools for improving the quality of satellite communications, including carrier and spectrum monitoring, interference detection and geolocation, satellite capacity planning, and VSAT network alignment and commissioning. Based in Los Altos, the company has a team of 25 and was co-founded in 2008 by Jeffery Chu, the company's Chairman and CEO. Chu received his master of science degree in electrical engineering and computer science from Berkeley.

[15]Formally this sector includes legal services and computer systems design, but for the purposes of this analysis, these two industries are handled separately.

Located in San Francisco, **M Squared Consulting** is a management consulting firm that specializes in program and project management, business process optimization, change management and communications. M Squared was founded by Marion McGovern, a 1985 graduate of the Haas School of Business who grew M squared to over $25 million in sales and twice earned it a spot on the Inc. 500 List of the Fastest Growing Companies in America.

Berkeley founders have established 98 Architectural & Engineering firms. Similar to law firms, these companies tend to be small, with median employment of four and annual sales of $330,000. This sector accounts for an aggregate $311 million in annual revenues.

Based in Long Beach, **Stearns, Conrad and Schmidt Consulting Engineers, Inc.** was founded in 1970. It provides solid waste management and environmental services for private and public sector clients in the United States and internationally. Founder Tom Conrad, a 1958 graduate, holds a B.S. in engineering from Berkeley.

Located in Emeryville, **Ratcliff Architects** is led by Christopher (Kit) Ratcliff, who graduated cum laude in 1968 from Berkeley with a bachelor's degree in architecture. The firm specializes in healthcare, academic and civic architecture, with a particular focus on sustainable practices and technologies.

Administrative Services

Berkeley founders have established at least 275 firms in Administrative Services, which employ a total of 3,751 people. Companies in this sector provide operations support to other organizations. These include general management and personnel management, as well as clerical and cleaning activities. These identified companies are very small, with median employment of two and aggregate annual income of $410 million.

Proactive Business Solutions Inc. was founded in 1998 by Deidre Towery, who graduated summa cum laude from UC Berkeley as a member of Phi Beta Kappa in 1995. Since starting out with two employees, the IT support company has grown to over 250 employees and was recently honored as one of the 100 Fastest Growing Private Companies in the Bay Area by the *San Francisco Business Times*. It is currently one of the 100 Largest Women-Owned Businesses in the Bay Area.

Duran Human Capital Partners (HCP)—originally ProQuest Inc when it was founded in 1994—is a certified minority business enterprise that uses technology to approach challenges in technical staffing. Founded by James Duran, who earned a bachelor of arts degree in political science from Berkeley's College of Letters & Science, the partnership

now offers contract recruiting and technical sourcing, permanent placement services, and recruiter training classes. Duran HCP employs 50 people and reported $3.5 million in revenue in 2012.

Educational & Health Services

Firm starts in Educational & Health Services more than doubled from the decade of the 1990s to the 2000s, with 22 new firms founded in the 2000s. These 108 companies employ 2,524 and report annual earnings of $210 million. Identified firms in this broad sector include private providers of technical and management training, inpatient and outpatient health services, and social services.

American University of Armenia (AUA), has 300 employees and is the largest organization in this category. Founded in Armenia in 1991, the university operates as an independent, nonprofit foundation with ties to UC Berkeley. The school was founded in the wake of the devastating Spitak earthquake in 1988 by a coalition of Armenian and American engineering specialists who recognized the critical need for improved education and training in Armenia. Dr. Armen Der Kiureghain was the vice chair of structural engineering, mechanics, and materials programs in the department of civil and environmental engineering at Berkeley, and since 1991 he has served as AUA's founding dean of engineering and the director of engineering research.

Headquartered in Oakland, the **Scientific Learning Corporation** has 240 employees and $28 million in annual revenues. Based on brain research by its founders, the company offers online and in-person programs for accelerating learning. Co-founder David Charron is a graduate of the Haas School of Business and serves as a senior fellow and a member of the professional faculty at Berkeley's Lester Center for Entrepreneurship.

Construction

Berkeley founders have formed 33 Construction firms. These firms employ 2,652 workers and post $762 million in annual revenues. With median employment of eight workers, they also tend to be small. These identified firms are engaged in the construction of buildings and in engineering projects as well as in the preparation and subdivision of land for construction.

Founded in 1975 by Berkeley graduate Daniel M. Gottlieb, **G&L Reality** has since grown into a major land subdivision and industrial development firm in California. G&L specializes in medical facilities, investing, developing, and managing properties across the United States. With a workforce exceeding 1,000 and annual revenue estimated at $40–50 million, G&L is the largest firm in Construction associated with Berkeley founders.

Stephen Gunther, a UC Berkeley School of Law graduate and former deputy attorney general of California, co-founded **New Urban West** in 1976 with Glenn Cardoso. New Urban West is a boutique real estate development firm in the Los Angeles area. Since its founding, the firm has been a force in the Southern California urban infill and housing development market.

Four years after completing his architectural degree in 1991 at UC Berkeley, John Curci founded **DBAC, Inc.** Under his leadership, the commercial construction and land development firm has grown to 25 employees with an estimated $40 million in annual revenue.

Point Source Power

Founded in 2008, Point Source Power (PSP) is a power generation company that focuses on small systems for underdeveloped parts of the world that might lack an electric grid but could still greatly benefit from consumer electronics such as LED lighting and cell phones. For the billions of people that still live beyond an electronic grid, PSP provides metal-supported solid oxide fuel cell technology, which can make use of all organic fuel types. In areas where wood, charcoal or even cow dung is regularly used for heating or cooking, this technology has large application opportunity. PSP has integrated their scientific breakthroughs into a device called VOTO, which captures energy from burning organic fuel types and can use that energy to charge phones or provide light from a built-in flashlight. Users will be able to charge their phones while cooking a meal, instead of traveling to charging stores and paying regularly for power.

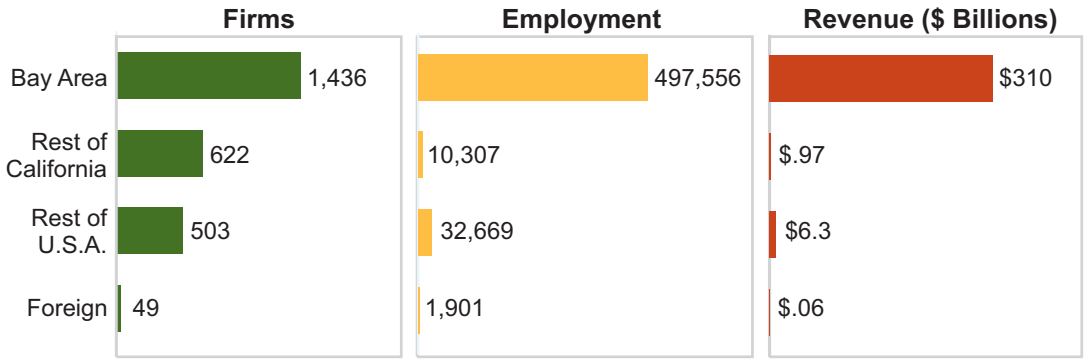
PSP raised seed funding from venture capital firm Khosla Ventures and is also looking for an additional two million dollars in funding. PSP wants to make its products affordable at a low cost to developing and underdeveloped customers, hoping to begin their marketing first in Kenya. Although in Kenya the device's handle will sell for about seventeen dollars and the replaceable fuel cell will sell for seven, customers in the developed world such as outdoor enthusiasts and backpackers might have to pay more for the VOTO. PSP plans on using proceeds from those sales to promote their product in poor regions of the globe.

Working with Steve Visco and Lutgard DeJonghe, Craig Jacobson co-invented PSP fuel cell technology over a thirteen-year period as a materials scientist at Berkeley Lab. Visco and DeJonghe are still affiliated with the Lab, and DeJonghe is a professor of materials science and engineering. PSP is currently licensing a portfolio containing more than 130 patents from Berkeley Lab, looking to expand their impact.

Geographic Distribution Of Berkeley-Founder Firms

While Berkeley founders have started businesses around the world, their activities, and the employment they generate, are highly concentrated in the Bay Area. Fifty-five percent of identified Berkeley-founder companies are located in the Bay Area. These companies account for 92 percent of total employment attributed to Berkeley companies. Firms located across the rest of the US account for 43 percent of the total and nearly 8 percent of jobs. Foreign-based firms represent approximately 2 percent of total firms and 1 percent of jobs.

Overall Geographic Distribution of Berkeley-Founder Firms



The Bay Area is defined as the counties of Marin, Sonoma, Solano, Napa, Contra Costa, Alameda, Santa Clara, San Mateo and San Francisco.
Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Riverbed Technology

Steve McCanne (who received a doctorate in computer science from UC Berkeley in 1996) and Jerry Kennelly co-founded Riverbed Technology in 2002. In 2004, Riverbed shipped its first Steelhead WAN optimization appliance, which was named an InfoWorld "WAN Accelerator—Technology of the Year" seven consecutive times.

Wide Area Networks play a critical role in any globally connected enterprise by connecting people, applications and data. Building on this success, Riverbed expanded to provide products and solutions including performance management, application delivery, and storage acceleration. Currently more than 20,000 companies including nine of the Fortune 10 and 80 percent of the Global 100 use Riverbed technologies. Company revenue totaled $837 million in 2012.

California and the Bay Area

In California, there are 2,058 firms identified with UC Berkeley founders across the state, employing 507,863 people. The Bay Area accounts for 70 percent of these firms and 98 percent of employment. Companies started by Berkeley founders in Southern California account for 19 percent of firms and 1.2 percent of jobs. Eleven percent of firms and 0.8 percent of employment are located across the rest of the state.

Outside the Bay Area, Legal Services accounts for more than half of all established firms and the largest shares of employment and revenues in the rest of the state. In terms of employment, Manufacturing accounts for the second largest single share of employment, with 2,623 workers across 23 firms. These manufacturing firms include high-tech product manufacturing such as medical devices and advanced electronic components as well as food and wine production.

Berkeley-Founder Firms in California by Region

State Region	Firms	Employment	Revenue ($ Billions)
Bay Area*	**1,436**	**497,556**	**$310**
Southern California**	**390**	**6,190**	**$0.6**
Rest of California	**232**	**4,117**	**$0.4**
Total	**2,058**	**507,863**	**$311**

*Includes the counties of Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo and San Francisco

**Includes the counties of Ventura, Los Angeles, Orange and San Diego

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Berkeley-Founder Firms in the Rest of California (Excluding the Bay Area)

		EMPLOYMENT			REVENUE		
Industry	Firms	Aggregate	Mean	Median	Aggregate	Mean	Media
Legal Services	353	2,698	8	2	$239,100,000	$677,292	$180,000
Administrative Services	54	1,025	19	2	$202,300,000	$3,746,349	$110,000
Professional, Scientific, & Technical Services	34	222	7	3.5	$25,186,166	$740,770	$317,500
Unclassified	34	0	0	0	$23,995	$706	$0
Finance & Insurance Services	29	719	25	3	$65,696,256	$2,265,388	$250,000
Educational & Health Services	26	209	8	5	$15,193,561	$584,368	$365,000
Manufacturing	23	2,623	114	15	$223,200,000	$9,702,793	$370,000
Information	13	700	54	2	$78,598,000	$6,046,000	$170,000
Retail Trade	11	338	31	10	$15,607,624	$1,418,875	$290,000
Wholesale Trade	11	87	8	5	$15,639,000	$1,421,727	$510,000
Computer Systems Design & Related Services	9	460	51	7	$40,043,827	$4,449,314	$999,410
Personal & Repair Services/Nonprofit Orgs.	8	62	8	2	$3,768,945	$471,118	$150,088
Construction	7	1,083	155	12	$39,092,019	$5,584,574	$1,972,019
Leisure & Hospitality	6	65	11	4	$4,851,726	$808,621	$126,067
Natural Resources & Agriculture	3	14	5	5	$1,820,000	$606,667	$340,000
Transportation, Warehousing & Utilities	1	2	2	2	$97,000	$97,000	$97,000
Total	622	10,307.00	17	2	$970,218,119	$1,559,758	$180,000

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

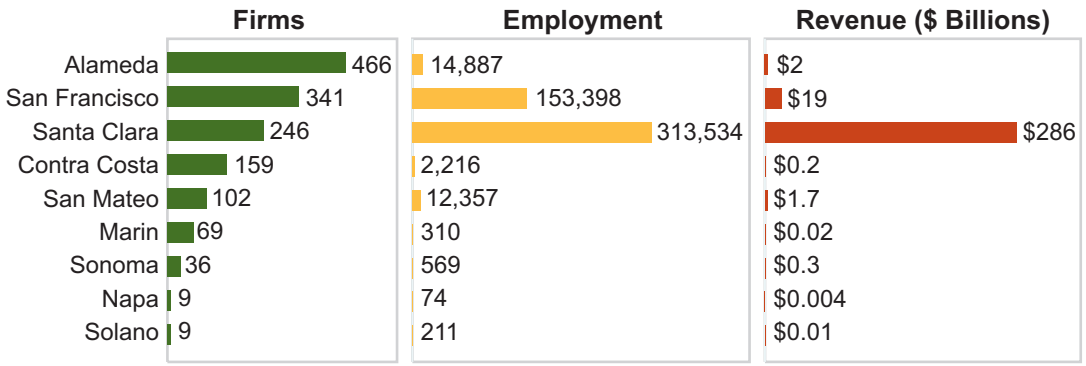
Largest Berkeley-Founder Manufacturing Firms in the Rest of California (Excluding the Bay Area)

Business Name	Employment	Revenues	Country	Yr. Founded	Industry
Cymer, LLC	1,240	$143,500,000	San Diego	*	All Othr. Misc. Electrical Equipment & Component Mfg.
Level One Communications, Inc.	821	*	Sacramento	1999	Semiconductor and Related Device Manufacturing
Materia, Inc.	120	$31,100,000	Los Angeles	*	Other Basic Inorganic Chemical Manufacturing
Tectrix Fitness Equipment Inc.	85	*	Orange	1998	Sporting and Athletic Goods Manufacturing
Navarro Winery	75	$7,400,000	Mendocino	1974	Wineries
Trisep Corporation	62	$10,600,000	Santa Barbara	1989	Other Commercial & Service Industry Machinery Mfg.
Ambrx, Inc.	56	$9,500,000	San Diego	*	Pharmaceutical Preparation Manufacturing
Fziomed, Inc.	40	$5,000,000	San Luis Obispo	1996	Surgical and Medical Instrument Manufacturing
Sonnet Technologies, Inc.	27	$5,000,000	Orange	1986	Computer Terminal & Othr. Peripheral Equipment Mfg.
Telegent Systems USA, Inc.	25	$3,500,000	San Diego	*	Semiconductor and Related Device Manufacturing

* Not Reported

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Geographic Distribution of Berkeley-Founder Firms in the Bay Area by County



The Bay Area is defined as the counties of Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo and San Francisco.

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

The majority of identified Berkeley-founder firms in the Bay Area are located in the counties of Alameda and San Francisco; however, the firms located in Santa Clara County account for the most employment and highest revenues. With just 160 companies, Santa Clara County accounts for 63 percent of employment and $286 billion of the $310 billion in revenues in the region. Computer Systems Design and Communications Equipment Manufacturing in Santa Clara County together make up 84 percent of total revenues for Berkeley firms in the nine-county region and 46 percent of employment.

Looking more closely at industry distribution in the Bay Area, Professional, Scientific & Technical Services, including Legal Services, make up the bulk of firms, but less than 2 percent of employment and less than half a percent of revenues. Variations appear by metro area.

In Alameda County, Computer Systems Design accounts for only 19 of the 466 Berkeley-founder firms but represents 27 percent of total employment and 26 percent of aggregate revenue. Software Publication is the next largest employer with 1,834 workers. Alameda's Semiconductor Manufacturing sector accounts for the second largest share of revenues with $284 million in annual aggregate sales.

In San Francisco, Legal Services accounts for the largest number of Berkeley-founder firms. Due to the presence of Gap Inc., Retail accounts for the largest number of jobs, 136,000. Following Retail, the Software (3,577) and Computer Systems Design (2,149) sectors report large numbers of jobs in the city. Financial & Insurance Services accounts for only 619 employees but represents the highest annual revenues at $375 million.

Of firms established by Berkeley founders in Santa Clara County, Manufacturing is the largest sector in terms of both employment and revenues. This is explained by the presence of tech giants like Apple Computer Inc., Intel, Cisco Systems, Marvell, and National Semiconductor. This single sector, with 50 firms in the county, employs 251,706 people and boasts revenues of at least $266 billion. Computer Systems Design, the second largest sector in the county, employs an additional 51,290 workers and contributes an additional $18 billion in sales. Legal Services accounts for 31 percent of Berkeley-founder firms in the county.

The Rest of the United States

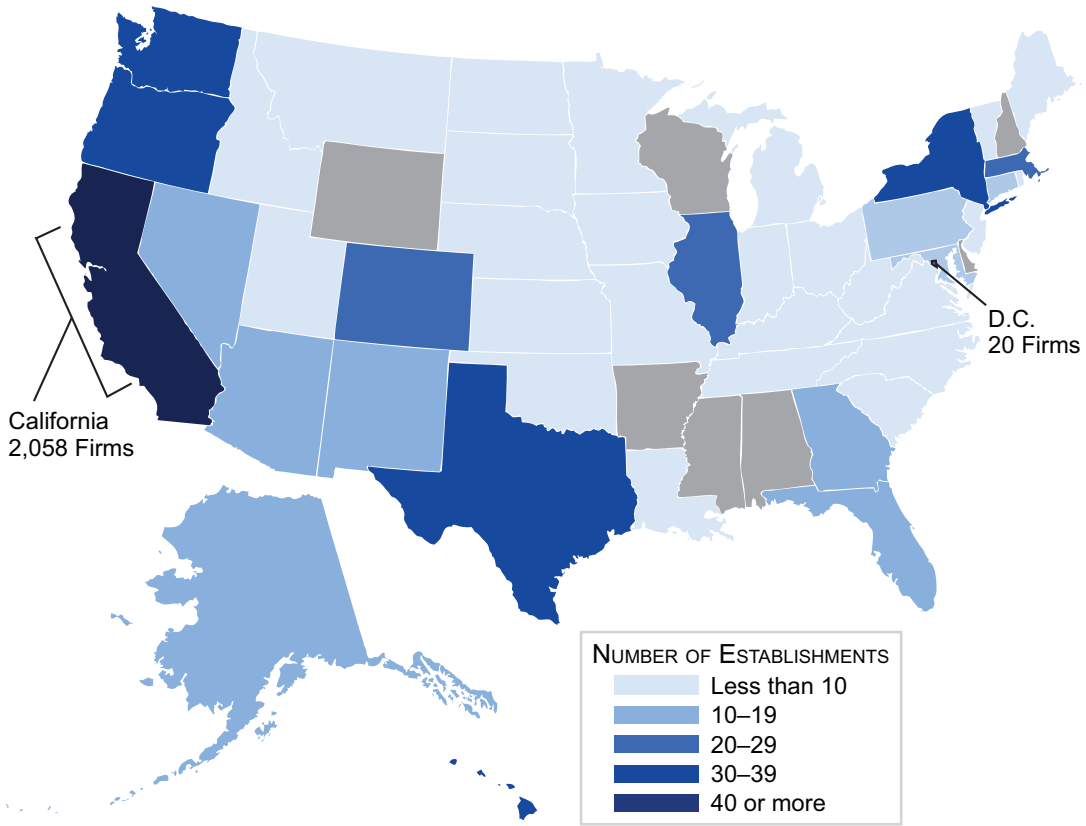
Outside of California, Berkeley founders have primarily set up businesses in states with technology and global economic hubs. The states with the largest number of identified companies established by Berkeley founders are Washington, Oregon, New York, Texas and Hawaii. Other states reporting high levels of employment include Colorado, the District of Columbia, Illinois, and Massachusetts.

Professional, Scientific and Technical Services make up 11 percent of total Berkeley-founder firms and 3 percent of jobs in the rest of the US These firms have average employment of 20 and average annual sales of $1.6 million, similar to Bay Area firms of Berkeley founders in this sector.

> Founded in 2003 by CEO Jonathan Brasade, an MBA graduate from the Hass School of Business, and by current vice president of systems integration Udi Latarre, **Exactor Inc.** offers cloud-based solutions for sales tax compliance primarily to commercial banks, gateway providers, and retailers. As a result of early success, the technology was integrated into My Clear Reports' Virtual Business Center, a large web-based reporting and sales system. The company is located in Wynneburg, Pennsylvania, with a staff of 17, and serves national and Canadian markets.

Spyglass Group, Inc. is a specialized accounting and consulting firm with a focus on telecommunications. Though relatively small, with 24 employees, Spyglass is a leader in the industry, with a client list of nearly 2,000 firms. An MBA graduate from the Hass School of Business, Peter Aronson co-founded Spyglass Group in 2001 in Westlake, Ohio.

Berkeley-Founder Firms by State



The sample excludes any firms established outside the United States.
Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Manufacturing represents 7 percent of identified Berkeley-founder firms outside California and 62 percent of employment. Average employment across these firms is 560, with average annual revenues of $113 million.

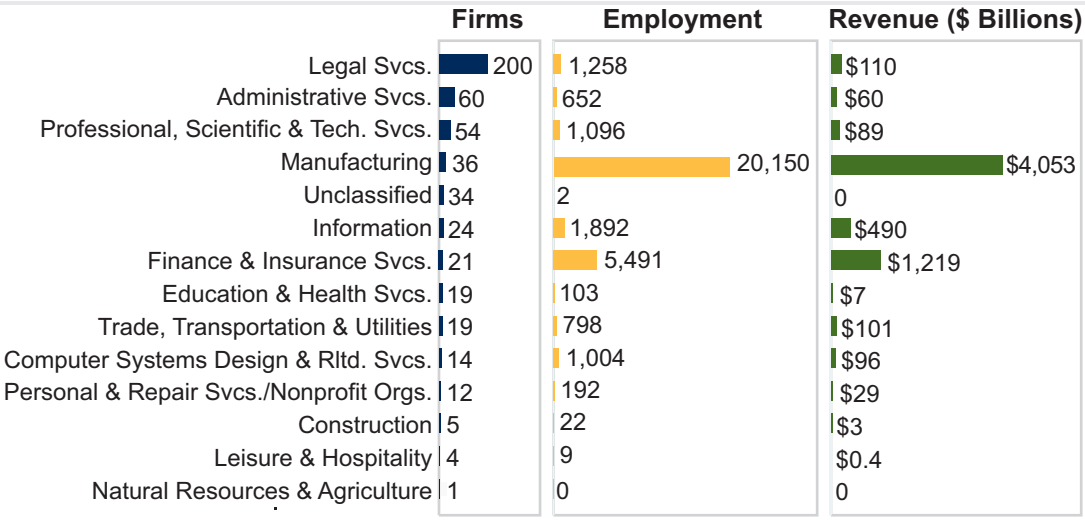
Founded in 1998 in Cambridge, Massachusetts, **Ironwood Pharmaceuticals, Inc.** has grown into one of the world's leading manufacturers of gastrointestinal medication. With more than 500 employees, the company reports $150 million in annual sales. Peter Hecht, the company's founder, earned his PhD in molecular biology from UC Berkeley.

Airspan Networks, Inc. was founded in 1998 by College of Engineering graduate, Eric Stonestrom. Since then, it has grown to become a world leader in the design and production of 4G Broadband wireless infrastructure. Located in Florida, the company has over 200 employees and reports nearly $50 million in annual revenue.

Information represents 5 percent of firms and 6 percent of employment outside California. These identified firms employ an average of 79 workers.

Internet Junction is the largest independent Internet services provider in Florida, specializing in firewall and network connections for small to medium-size businesses. Manoj Goel, a Haas School of Business graduate, co-founded the firm in 1993 and sold it to Cisco Systems in 1995. Internet Junction employs 25 and reports nearly $4 million in annual revenue.

Berkeley-Founder US Firms Outside of California by Industry

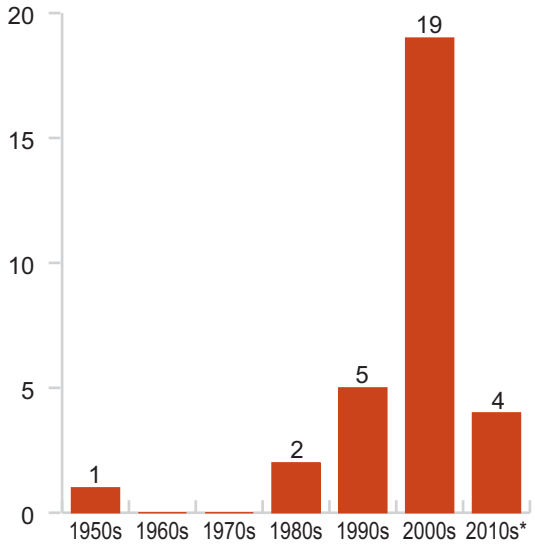


Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

Foreign-Based Companies

Firms based outside the US represent 2 percent of identified Berkeley-founder firms and 1 percent of jobs. These 49 firms employ 1,901 people and generate more than $63 million per year in revenues. During the decade of the 2000s, 19 firms were started abroad, and an additional three firms have been founded since 2010. Countries with the largest number of foreign-based firms include India, England and France. The countries with the largest number of jobs associated with companies of Berkeley founders are in Armenia, Spain, and Afghanistan.

Number of Berkeley-Founder Foreign-Based Firms by Start Decade



*Current as of December 2012

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

A total of 18 firms did not report a start date.

Berkeley-Founder Foreign-Based Firms Employment and Revenue

Firms Established in Foreign Countries and U.S. Territories

Country	Firms	Employment	Revenue
England	8	11	$412,317
India	8	28	*
France	4	108	$15,971,193
Italy	3	13	$4,164,803
Spain	3	566	$26,076,938
Switzerland	3	10	$1,907,803
Chile	2	-	*
Germany	2	25	$5,157,884
Japan	2	2	$169,400
Sweden	2	21	$3,395,090
Afghanistan	1	700	*
Armenia	1	300	*
Australia	1	-	*
Belgium	1	-	*
Canada	1	1	*
Czech Republic	1	1	$26,098
Ecuador	1	5	*
Guatemala	1	25	*
Ireland	1	5	*
Luxembourg	1	58	$5,677,698
Mexico	1	1	*
Northern Mariana Islands	1	21	*
Total	**49**	**1,901**	**$62,959,224**

*Unavailable

Data Source: 2012 UC Berkeley Survey; supplemental UC Berkeley departmental data; Dun & Bradstreet

The Chinese firm Baidu is not included in the data analysis because Dun & Bradstreet could not confirm the company information. See Appendix A: Methodology for more detail.

Baidu

Baidu, the China's leading search engine company, was cofounded by Eric Xu, a Berkeley graduate in biochemistry.[16] Through his strong connections in Berkeley and Silicon Valley, the company received its first round of venture capital investment in the US The start-up recruited top talent from China and the US, which laid a solid foundation for the company's future growth. After a decade of development, Baidu has grown from a team of seven into an Internet giant with 21,800 employees. In 2012, the company generated approximately $3.66 billion of revenue and accounted for a 73 percent market share in China.

[16] Baidu is not included in the data analysis because Dun & Bradstreet could not confirm the company information. See *Appendix A: Methodology* for more detail.

5.
The Broader Statewide and National Economic Impact

Berkeley founders have established companies across a wide range of industries, creating varying levels of employment and revenue generation. These direct economic impacts of identified Berkeley-founder companies are described in Section 4. In addition to these direct impacts, indirect effects are associated with suppliers of goods and services to these companies. Then there are induced multiplier impacts, which are generated by re-spending of additional worker income on consumer goods and services as well as public tax revenues. A consideration of the wider reach of these business activities helps give a broader picture of impacts across the entire economy.

This section provides a summary of the broader economic impact of Berkeley-founder company formations. The activities of a single business have the potential to generate significant related activities, further increasing economic output, local employment and government tax revenues. These effects are measured in three specific ways. First, there is a direct effect: the economic output, jobs and tax revenue directly linked to these expenditures. Second, there is an indirect effect: for example, when a restaurant sells 100 glasses of California Chardonnay, this stimulates activity directly at the restaurant, but also indirectly at the wineries that provide the wine. Finally, there is an induced effect that results from the employees of the restaurant and of the winery spending their increased income. A summary of the economic impacts on California and nationally is presented here.

Economic Impact of Berkeley-Founder Firms

Impact Type	California Output	National Output
Direct Impact	$82,734,479,998	$85,789,143,369
Indirect Impact	$43,141,623,305	$71,293,858,283
Induced Impact	$50,118,051,727	$80,703,284,837
Total Effect	$175,994,155,030	$237,786,286,489

Data Source: These figures were generated using the 2011 IMPLAN database.

This economic impact analysis was preformed using IMPLAN, a modeling system that combines the US Bureau of Economic Analysis' Input-Output Benchmarks and IMPLAN's proprietary trade flow data to construct quantitative models of trade flow relationships between firms, intermediaries, and consumers. Its models rely on data from all market transactions in a specific time period and region. For more information on the IMPLAN model, see Appendix B.

Counting direct, indirect and induced impacts, Berkeley-founder firms generate a minimum of 1,247,490 jobs and $238 billion in total economic output. Business revenues account for $85.9 billion of the total output, and of this, $24.4 billion is personal (payroll) income.

Tesla Motors

In 2003, UC Berkeley graduate in computer science Marc Tarpenning and Martin Eberhard set out to produce the first fully electric, high performance sports car. With Series A investment in 2004 provided by PayPal founder and current Tesla Motors CEO Elon Musk, the company was on its way toward an even more ambitious goal: creating affordable mass market electric vehicles and electric networks.

Tesla Motors produced its battery-run sports car, the Tesla Roadster, in 2008. It was released as the first production automobile to use lithium-ion battery cells and the first electric vehicle to go more than 200 miles on a single charge.

Tesla subsequently released the Model S midsized luxury sedan in 2009, and it has won numerous awards including Motor Trend magazine's Car of the Year in 2013.

In support of the company's long-term goal of speeding the transition from a fossil fuel economy to a solar electric economy, another component of Tesla's business is the sale of its batteries and power trains to other automotive companies.

In 2010, Tesla launched its IPO on NASDAQ, raising $226 million. As of October 2012, the company employed 850 people with plans to expand to 1,000 by the end of that year.

Income and sales produced by Berkeley-founder companies generate tax revenues at the local, state and federal levels. The state and local revenues associated with these firms totaled $10.2 billion in 2012, including employee compensation tax, direct corporate tax, and taxation revenues resulting from increases in household spending. These estimates are based on effective tax rates calculated by BEA and US Census data (as organized by IMPLAN).

Given that 79 percent of firms started by Berkeley founders are located in California, these impacts are concentrated in the state, but not limited to it. Nationally, total output associated with the business activity of companies established by Berkeley founders is estimated at $238 billion in 2012. This value includes direct, indirect and induced effects. In the state, total output is estimated at $176 billion, or 74 percent of the full national impact.

Values of total output do not include the estimates of government tax revenues. Total federal, state, and local tax revenues are estimated at $27.3 billion dollars in the year 2012. These totals reflect direct and indirect business taxes, as well as projected personal taxes (income tax, property tax, transit fees, and more), sales taxes, and severance taxes. Total federal, state and local tax revenues associated with activity within California are estimated at $22.1 billion dollars.

CellASIC

In 2003, two Berkeley graduates, Paul Hung and Phillip Lee, began work in the laboratory of Professor Luke Lee to utilize microfabrication to improve laboratory cell culture methods. Hung graduated with a PhD in computer science and Lee with a PhD in bioengineering.

What began as the pursuit of a "better Petri Dish" led to the formation of CellASIC. Previous research had identified specific genes, protein binding sites, and chemical/biological structures that could be used to develop improved therapeutics. There was, however, a major technical challenge in studying their complex interactions. Responding to that challenge, CellASIC has developed precise microfabricated environments that enhance the functionality of cell-based experimentation. In May 2012, CellASIC was acquired by the global pharmaceutical company Merck.

Summary of National Impacts of Berkeley-Founder Firms by Industry

	EMPLOYMENT		OUTPUT	
INDUSTRY	Direct	Total	Direct	Total
Manufacturing	182,253	272,321	$66,500,000,000	$105,900,000,000
Retail Trade	82,657	170,685	$4,812,000,000	$10,660,000,000
Computer Systems Design & Related Services	37,699	47,774	$4,309,000,000	$5,651,000,000
Information	12,558	39,472	$5,197,000,000	$14,970,000,000
Legal Services	8,676	22,327	$1,572,000,000	$4,047,000,000
Finance & Insurance Services	5,777	122,091	$1,263,000,000	$31,290,000,000
Professional, Scientific & Technical Services	4,599	50,094	$721,000,000	$7,542,000,000
Administrative Services	3,230	132,142	$376,100,000	$13,750,000,000
Construction	2,291	12,958	$336,000,000	$1,785,000,000
Educational & Health Services	2,177	113,741	$261,100,000	$11,150,000,000
Leisure & Hospitality	1,994	93,043	$119,800,000	$6,097,000,000
Wholesale Trade	1,334	43,675	$218,900,000	$7,167,000,000
Other Services	455	59,329	$54,332,532	$4,847,000,000
Transportation, Warehousing, & Utilities	305	42,322	$40,553,076	$7,434,000,000
Other	43	25,517	$7,983,000	$5,559,000,000
Total	346,048	1,247,490	$85,790,000,000	$237,800,000,000

Data Source: These figures were generated using the 2011 IMPLAN database.

Note: The employment associated with Berkeley-founder firms located outside the US was not included in this analysis. Furthermore, 40 percent of employment in firms with more than 1,000 employees was excluded to reflect international employees.

Industries vary by their primary activities and the degree to which those activities rely on the products and services provided by other businesses in the supply chain. The employment estimates presented in Section 4 provided the input for the impact model, so varying levels of employment by industry will also affect the total output. When estimating employment impacts, the reference to an additional job actually means the equivalent of a full-time position.

Examining economic impacts by industry, the largest relative employment impact is from Transportation, Warehousing & Utilities. Given the broader set of business activities surrounding this diverse sector, the direct employment of 305 yields an additional 42,017 (indirect and induced) jobs. The total employment impact is the sum of the two, yielding 42,322 jobs. With direct employment of 3,230, Administrative Services also yields a relatively high employment impact of 128,912 jobs (with a total employment impact of 132,142). The direct employment of 5,777 in Finance & Insurance Services represents 5 percent of the total impact in this sector. While the additional jobs generated in this industry by Berkeley-founder firms represent a smaller percentage than in the above examples, an estimated 116,314 jobs are added in the industry. The total employment impact is 122,091. Ahead of other industries, total economic output associated with Berkeley-founder manufacturing firms is over $106 billion. Of this, 37 percent is generated outside of those firms. The direct employment of 182,253 in these companies yields a total of 272,231 jobs, almost one third of which are generated outside of these companies.

In other words, the direct impact of Berkeley founders in terms of the employment and revenue they generate tells only part of the story. The ripple effects of these successful ventures translate into even larger-scale job and value creation, across industries and across the nation.

6.
Summary

UC Berkeley is home to a rich innovation ecosystem that contributes to and benefits from the vibrant regional innovation system of the San Francisco Bay Area. Through the University's formal and informal structures and dynamics, Berkeley company founders contribute significantly to the state and regional economies and beyond their borders.

Berkeley's innovation and entrepreneurship is driven by talented students and faculty, the commercial licensing of technologies developed on campus, specialized programs for developing entrepreneurial skills, and University-sponsored incubators designed to support incipient entrepreneurs and help them to launch companies.

Berkeley's entrepreneurs represent a diverse population. Baby Boomers have been a driving force behind the growth of new businesses. More women graduates are founding companies. Although five schools account for 88 percent of all founders, founders reflect diverse academic backgrounds stemming from 15 different colleges.

The firms started by Berkeley founders generate new jobs and revenues, span a diverse set of industries, and are located around the world. The direct impact of Berkeley founders in terms of employment and revenue generation tells only part of the story. The ripple effects of these successful ventures translate into new value creation across industries and across the nation.

Appendix A: Methodology

Survey

In an effort to estimate the economic impact of companies and organizations (for profit and nonprofit) founded by Berkeley entrepreneurs, UC Berkeley partnered with the Bay Area Council Economic Institute to carry out a survey of alumni, faculty and affiliates. The email survey was sent to all 611,295 living alumni, faculty and affiliates whose addresses were on file and active. A total of 2,498 responses were collected.

The information submitted in each completed survey was examined to verify the named founder and company. This yielded 1,731 verified survey responses. Where multiple founders were listed on a survey response for a single company, all founders were included in the database of founders. This extra step yielded an additional 85 records.

To supplement the survey results, information on formations and founders was provided by Berkeley's departments and other organizations that track entrepreneurial activity among their alumni and faculty. These sources included the International House, Intellectual Property and Industry Research Alliances, the School of Public Health, the Division of Biological Sciences, the College of Environmental Design, and the School of Law. This step resulted in an additional 2,337 records.

For further verification, survey responses were matched against data from the Cal Advancement Data System (CADS), a central campus database for UC Berkeley that houses information on alumni, faculty, affiliates, donors, and friends of the university. This step allowed for confirmation that responses were in fact from Berkeley alumni, faculty or affiliates. CADS also provided further information on the demographics of these entrepreneurs. The CADS data was returned as a series of anonymous records to protect the privacy of the individuals surveyed. The final population of verified founders was 3,744 with 4,814 degrees among them.

Finally, survey information such as company names and addresses was matched against an extensive company database provided by Dun & Bradstreet (D&B), which contains more than 225 million business records and provides data for analytical research. D&B provided a ranking system for the quality of each match between sets of data. For quality assurance, any record with a confidence rank below 5 was dropped. Any records with a confidence rank between 5 and 7 that did not match on company name and three other fields were dropped. All records with a confidence code between 8 and 10

were included in the database. The double counting of companies was prevented by utilizing the unique DUNS Number (the unique identifier supplied by Dun & Bradstreet) for each individual establishment.

This process delivered a final population of 2,610 records, which provides the base line for all analysis performed in Sections 4 and 5 of this report.

Analysis

The analysis presented in Section 3, The Berkeley Entrepreneur, is based on the Cal Advancement Data System (see description of CADS above). The sample population consisted of 3,744 founders and 4,814 degrees earned by founders. Records were largely complete but there were gaps. As a result, all demographic analysis of gender (100 unreported records), graduation year (208 unreported records), and college enrolment (182 unreported records) excludes records for which these values were missing.

The business analysis presented in Sections 4 and 5 is based on the sample of verified survey and departmental data records combined with the Dun & Bradstreet company information. For 147 business records, firm start date was not available.

The industry categories defined in both Section 4 and Section 5 are based on North American Industry Classification System (NAICS) codes. Based on the overall distribution of companies by industry, for the purpose of this analysis, industry groupings were defined that reveal details in the sectors of highest concentration. Specifically, Legal Services and Computer Systems Design were both extracted from Professional, Scientific & Technical Services because of the very high concentration of firms and/or employment in each. Likewise, industries will little representation were combined into larger groups. The industry categories operationalized for this report are as follows:

- Manufacturing (NAICS Codes 31, 32, and 33)
- Construction (NAICS Code 23)
- Administrative Services (NAICS Codes 5413, 5419, 55, and 56)
- Computer Systems Design and Other Services (NAICS Code 5415)
- Education and Health Services (NAICS Codes 61 and 62)
- Financial and Insurance Services (NAICS Codes 52 and 53)
- Information (NAICS Code 51)
- Legal Services (NAICS Code 5411)

- Leisure and Hospitality (NAICS Codes 71 and 72)
- Natural Resources and Agriculture (NAICS Codes 11, 21, and 22)
- Personal and Repair Services/Nonprofit Organizations (NAICS Code 81)
- Other (NAICS coded) (NAICS Code 92 and 99)
- Professional, Scientific and Technical Services (NAICS Codes 5412, 5414, 5416, 5417, and 5418)
- Trade, Transportation and Utilities (NAICS Codes 42, 44, 45, 48, and 49)

Section 4 includes the geographic distribution of results. The "Bay Area" refers to the nine counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma. The region of "Southern California" refers to the four counties of Ventura, Los Angeles, Orange, and San Diego. The term "Rest of California" denotes the entirety of the state of California excluding the aforementioned regions of the "Bay Area" and "Southern California". The term "Rest of USA" refers the entirety of the United States of America excluding California. The term "Foreign" refers to any firms founded outside the United States of America.

Impact Analysis

The impact analysis describes a "minimum impact." The final population of verified founders from the survey combined with departmental and other data records and the Dun & Bradstreet company information represents a partial sample of founders and companies associated with UC Berkeley. Therefore, the total employment, revenue and output values are based on this partial population of Berkeley entrepreneurs. Instead of a full economic impact, the analysis indicates the smallest impact that Berkeley-founder firms must have.

For example, the sample data may not include some notable businesses founded by UC Berkeley graduates because the founders did not respond to the survey and their departments do not track alumni entrepreneurs.

The broader impact analysis was generated by the IMPLAN economic impact modeling system. For more information on IMPLAN, see Appendix B. The impact analysis was performed using the employment attributed to the Berkeley-founder firms by industry as reported in Section 4. IMPLAN output is organized by industry designations that are unique to their modeling system; however, a crosswalk for these designations from two, three, four, five, and six-digit NAICS codes is provided by the proprietor of the system, MIG.

Employment was aggregated into the IMPLAN industry categories, and the IMPLAN software applied standardized labor output to each to determine a direct impact. Indirect, induced and tax impacts were then determined based on the two regional models applied to the analysis: California and the United States. All 36 firms designated with the region "Foreign" were excluded from the broader impact analysis. All 503 firms located in the "Rest of the United States" were excluded from the analysis for California. Sixty percent of employment in companies with 1,`000 employees or more was included in the impact analysis. This was reflected the average 40 percent foreign employment among these companies.

Appendix B: IMPLAN Model

The IMPLAN modeling system combines the US Bureau of Economic Analysis' Input-Output Benchmarks with other data to construct quantitative models of trade flow relationships between businesses, and between businesses and final consumers. From this data, we can examine the effects of a change in one or several economic activities to predict its effect on a specific state, regional, or local economy (impact analysis). The IMPLAN input-output accounts capture all monetary market transactions for consumption in a given time period. The IMPLAN input-output accounts are based on industry survey data collected periodically by the US Bureau of Economic Analysis and follow a balanced account format recommended by the United Nations.

IMPLAN's Regional Economic Accounts and the Social Accounting Matrices are used to construct region-level multipliers that describe the response of the relevant regional economy to a change in demand or production as a result of the activities and expenditures related to Berkeley-founder firms. Each industry that produces goods or services generates demand for other goods and services and this demand is multiplied through a particular economy until it dissipates through "leakage" to economies outside the specified area. IMPLAN models discern and calculate leakage from local, regional, and state economic areas based on workforce configuration, the inputs required by specific types of businesses, and the availability of both inputs in the economic area. Consequently, economic impacts that accrue to other regions or states as a consequence of a change in demand are not counted as impacts within the economic area.

The model accounts for substitution and displacement effects by deflating industry-specific multipliers to levels well below those recommended by the US Bureau of Economic Analysis. In addition, multipliers are applied only to personal disposable income to obtain a more realistic estimate of the multiplier effects from increased demand. Importantly, IMPLAN's Regional Economic Accounts exclude imports to an economic area so the calculation of economic impacts identifies only those impacts specific to the economic impact area. IMPLAN calculates this distinction by applying the area's economic characteristics described in terms of actual trade flows within the area.

Impact studies operate under the basic assumption that any increase in spending then has three effects. First, there is a direct effect on that industry itself. Second, there is a chain of indirect effects on all the industries whose outputs are used by the industry under observation. Third, there are induced effects that arise when employment increases and household spending patterns are expanded.

It is clear that there are several aspects to the overall economic impact. First, there is an effect on value-added—the take-home pay of all the people affected will be supplemented by that amount. The secondary and tertiary effects of the industry on the rest of the local economy are not very large. Second is the employment effect, with some jobs created in the industry itself, and the others spread throughout the California economy. Third is the output, where the difference between value-added and output is that the former concentrates on people's pay-checks, whereas the latter includes the costs of intermediate inputs. National income accounting avoids double counting by excluding the costs of intermediate inputs.

It is also important to note that different types of capital investment can lead to different multipliers. The reason for this is that a sector can have a large multiplier if it induces economic activity in industries whose employees have a high propensity to spend from take-home pay. Also, if the sector does not import many materials from abroad or from out of state, then its multiplier effect on the local economy will be high. In essence, some of the spending in the local economy may "leak out" into other states and countries. If raw materials are imported, then a shock to a local sector will result in decreased economic activity abroad. The same is true if a California business buys inputs from firms in different states.

In sum, our analysis using input-output accounts is based on three important assumptions. First, there are constant returns to scale. This means that a 10 percent cut in spending will be ten times as severe—across every sector in the economy—as a 1 percent cut. Second, there are no supply constraints. This means that any marginal increase in output can be produced without having to worry about bottlenecks in labor markets, commodity markets, or necessary imports. This assumption is quite realistic in a free-market economy like California's, where there is some unemployment. It is even more reasonable in times of high unemployment, such as the present economic environment, because there are many under- and un-utilized resources that can be activated without detracting from other industries. Third, the flow of commodities between industries is fixed.

Appendix C: Business Analysis

Full Summary

Firms by Industry

Berkeley Founders

INDUSTRY	Firms	EMPLOYMENT Aggregate	EMPLOYMENT Mean	EMPLOYMENT Median	REVENUE Aggregate	REVENUE Mean	REVENUE Median
Legal Services	989	9,196	9.3	2	$1,281,000,000	$1,295,318	$180,000
Administrative Services	275	3,751	13.6	2	$410,400,000	$1,492,510	$140,000
Professional, Scientific, & Technical Services	262	4,650	17.7	3	$434,300,000	$1,657,634	$225,000
Unclassified	199	10	0.1	0	$517,530	$2,601	$-
Manufacturing	183	291,254	1591.6	20	$273,000,000,000	$1,492,000,000	$1,200,000
Finance & Insurance Services	116	10,703	92.3	3	$2,038,000,000	$17,570,522	$224,196
Computer Systems Design & Related Services	115	59,513	517.5	15	$19,110,000,000	$166,200,000	$950,000
Educational & Health Services	108	2,524	23.4	4	$209,800,000	$1,942,404	$170,000
Information	104	16,898	162.5	10	$3,965,000,000	$38,123,736	$810,000
Wholesale Trade	67	1,342	20.0	4	$188,200,000	$2,808,455	$310,000
Retail Trade	57	137,067	2404.7	3	$15,730,000,000	$276,000,000	$160,000
Personal & Repair Services/Nonprofits Organizati	53	466	8.8	3	$56,818,709	$1,072,051	$140,000
Leisure & Hospitality	34	2,059	60.6	2	$100,600,000	$2,959,634	$100,000
Construction	33	2,652	80.4	8	$761,900,000	$23,088,608	$550,000
Natural Resources & Agriculture	10	62	6.2	4	$5,283,000	$528,300	$240,000
Transportation, Warehousing & Utilities	5	286	57.2	2	$44,812,000	$8,962,400	$160,000
Total	**2,610**	**542,433**	**208**	**3**	**$317,336,631,239**	**$121,600,000**	**$170,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

Regional Summaries

Average Employment & Revenues Geographic Comparison

Berkeley Founders

Industry	BAY AREA Employment	BAY AREA Revenue	REST OF CALIFORNIA Employment	REST OF CALIFORNIA Revenue	REST OF U.S.A. Employment	REST OF U.S.A. Revenue	FOREIGN Employment	FOREIGN Revenue
Administrative Services	10	$ 793,170	19	$ 3,746,349	11	$ 1,011,642	2	$ 122,500
Computer Systems Design & Relatec Services	673	$ 220,500,000	51	$ 4,449,314	72	$ 6,864,168	12	$ 1,380,000
Construction	74	$ 34,273,886	155	$ 5,584,574	4	$ 616,089	2	$ 593,444
Educational & Health Services	32	$ 3,176,291	8	$ 584,368	5	$ 378,150	3	$ 140,000
Finance & Insurance Services	70	$ 11,762,477	25	$ 2,265,388	261	$ 58,061,333	3	$ 200,000
Information	223	$ 53,021,647	54	$ 6,046,000	79	$ 20,411,167	5	$ 220,000
Legal Services	12	$ 2,141,890	8	$ 677,292	6	$ 551,318	2	$ 170,000
Leisure & Hospitality	83	$ 3,309,517	11	$ 808,621	2	$ 102,500	2	$ 55,000
Manufacturing	2,231	$ 2,240,000,000	114	$ 9,702,793	560	$ 112,600,000	29	$ 740,000
Natural Resources & Agriculture	10	$ 592,600	5	$ 606,667	0	$ -	-	$ -
Personal & Repair Services/Nonprofits Organizations	6	$ 734,224	8	$ 471,118	16	$ 2,455,054	3	$ 120,747
Professional, Scientific, & Technical Services	20	$ 1,367,537	7	$ 740,770	20	$ 1,648,327	3	$ 155,000
Retail Trade	3,695	$ 424,700,000	31	$ 1,418,875	3	$ 175,571	3	$ 150,000
Transportation, Warehousing & Utilities	2	$ 107,500	2	$ 97,000	141	$ 22,250,000	141	$ 22,250,000
Unclassified	0	$ 4,012	0	$ 706	0	$ -	-	$ -
Wholesale Trade	17	$ 2,566,079	8	$ 1,421,727	50	$ 5,522,000	6	$ 1,025,000
Total	**346**	**$ 215,900,000**	**17**	**$ 1,559,758**	**65**	**$ 12,444,619**	**2**	**$ 160,000**

Data Source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet

Median Employment & Revenues Geographic Comparison

U.C. Berkeley Alumni Founders

Industry	BAY AREA Employment	BAY AREA Revenue	REST OF CALIFORNIA Employment	REST OF CALIFORNIA Revenue	REST OF U.S.A. Employment	REST OF U.S.A. Revenue	FOREIGN Employment	FOREIGN Revenue
Administrative Services	2	$150,000	2	$110,000	2	$110,000	$ 2.0	$ 78,984.0
Computer Systems Design & Relatec Services	15	$975,000	7	$999,410	15	$2,000,000	$ 10.5	$ 72,474.5
Construction	10	$520,000	12	$1,972,019	2	$593,444	$ -	$ -
Educational & Health Services	4	$180,000	5	$365,000	3	$140,000	$ 23.0	$ -
Finance & Insurance Services	4	$240,000	3	$250,000	3	$200,000	$ 3.5	$ 198,896.0
Information	14	$1,000,000	2	$170,000	2	$125,000	$ 2.0	$ 48,010.0
Legal Services	2	$180,000	2	$180,000	2	$170,000	$ -	$ -
Leisure & Hospitality	2	$90,000	4	$126,067	0	$0	$ 65.0	$ 5,446,942.0
Manufacturing	20	$1,500,000	15	$370,000	16	$350,000	$ 13.0	$ 839,705.5
Natural Resources & Agriculture	6	$300,000	5	$340,000	1	$46,000	$ -	$ -
Personal & Repair Services/Nonprofits Organizations	3	$150,964	2	$150,088	3	$120,747	$ 5.5	$ 414,081.5
Professional, Scientific, & Technical Services	3	$245,000	4	$317,500	2.5	$135,000	$ 1.5	$ 78,852.5
Retail Trade	3	$160,000	10	$290,000	3	$500,000	$ 5.0	$ 183,744.0
Transportation, Warehousing & Utilities	2	$107,500	2	$97,000			$ -	$ -
Unclassified	0	$0	0	$0			$ -	$ -
Wholesale Trade	4	$215,000	5	$510,000	0	$0	$ 4.0	$ -
Total	**3**	**$180,000**	**2**	**$180,000**	**2**	**$150,000**	**$ 16.00**	**$ 767,586.00**

Data Source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet

Bay Area County Summaries

Marin County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Legal Services	30	118	4	2	$ 10,273,000	$ 342,433	$ 155,000
Natural Resources & Agriculture	14	74	5	3	$ 6,040,000	$ 431,429	$ 140,000
Professional, Scientific, & Technical Services	8	20	3	1	$ 1,431,000	$ 178,875	$ 103,500
Unclassified	6	0	0	0	$ -	$ -	$ -
Educational & Health Services	3	17	6	2	$ 1,349,000	$ 449,667	$ 91,000
Retail Trade	3	52	17	1	$ 3,912,000	$ 1,304,000	$ 78,000
Finance & Insurance Services	2	15	8	8	$ 1,420,000	$ 710,000	$ 710,000
Construction	1	1	1	1	$ 88,000	$ 88,000	$ 88,000
Personal & Repair Services/Nonprofits Organizations	1	3	3	3	$ 150,964	$ 150,964	$ 150,964
Wholesale Trade	1	10	10	10	$ -	$ -	$ -
Total	**69**	**310**	**4.49**	**2**	**$ 24,663,964**	**$ 357,449**	**$ 130,000**

Data source: 2012 Berkeley Survey; supplemental U.C. Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from

Sonoma County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Legal Services	14	44	3	2	$ 3,790,000	$ 270,714	$ 140,000
Administrative Services	3	6	2	2	$ 392,000	$ 130,667	$ 150,000
Manufacturing	3	405	135	72	$ 233,400,000	$ 77,800,000	$ 15,100,000
Professional, Scientific, & Technical Services	3	66	22	19	$ 2,990,167	$ 995,722	$ 980,167
Unclassified	3	0	0	0	$ -	$ -	$ -
Wholesale Trade	3	29	10	2	$ 5,230,000	$ 1,743,333	$ 130,000
Educational & Health Services	2	7	4	4	$ 440,000	$ 220,000	$ 220,000
Finance & Insurance Services	2	5	3	3	$ 290,000	$ 145,000	$ 145,000
Leisure & Hospitality	1	5	5	5	$ 300,000	$ 300,000	$ 300,000
Personal & Repair Services/Nonprofits Organizations	1	1	1	1	$ 350,025	$ 350,025	$ 350,025
Retail Trade	1	1	1	1	$ 85,000	$ 85,000	$ 85,000
Total	**35**	**569**	**16**	**2**	**$ 247,267,192**	**$ 6,868,533**	**$ 150,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

Napa County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Manufacturing	2	16	8	8	$ 1,300,000	$ 650,000	$ 650,000
Natural Resources & Agriculture	2	22	11	11	$ 1,067,000	$ 533,500	$ 533,500
Administrative Services	1	8	8	8	$ 590,000	$ 590,000	$ 590,000
Leisure & Hospitality	1	25	25	25	$ 660,000	$ 660,000	$ 660,000
Professional, Scientific, & Technical Services	1	1	1	1	$ 49,000	$ 49,000	$ 49,000
Unclassified	1	0	0	0	$ -	$ -	$ -
Wholesale Trade	1	2	2	2	$ 120,000	$ 120,000	$ 120,000
Total	**9**	**74**	**8**	**6**	**$ 3,786,000**	**$ 420,667**	**$ 430,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

Solano County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Legal Services	4	22	6	4	$ 2,120,000	$ 530,000	$ 320,000
Educational & Health Services	2	187	94	93.5	$ 11,100,000	$ 5,550,000	$ 5,550,000
Administrative Services	1	1	1	1	$ 66,000	$ 66,000	$ 66,000
Finance & Insurance Services	1	1	1	1	$ 90,000	$ 90,000	$ 90,000
Total	**8**	**211**	**26**	**4.0**	**$ 13,376,000**	**$ 1,672,000**	**$ 320,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

Contra Costa County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Legal Services	57	433	8	2	$ 44,426,000	$ 779,404	$ 190,000
Administrative Services	21	125	6	2	$ 12,201,000	$ 581,000	$ 130,000
Professional, Scientific, & Technical Services	17	80	5	3	$ 8,370,419	$ 492,378	$ 130,000
Unclassified	12	0	0	0	$ -	$ -	$ -
Educational & Health Services	9	537	60	3	$ 39,617,732	$ 4,401,970	$ 100,000
Finance & Insurance Services	9	77	9	3	$ 5,890,000	$ 654,444	$ 270,000
Manufacturing	6	379	63	35	$ 46,672,000	$ 7,778,667	$ 1,795,000
Personal & Repair Services/Nonprofits Organizations	6	13	2	2	$ 596,789	$ 99,465	$ 96,000
Retail Trade	6	7	1	1	$ 540,000	$ 90,000	$ 55,000
Wholesale Trade	5	64	13	1	$ 14,188,000	$ 2,837,600	$ 110,000
Computer Systems Design & Related Services	4	25	6	4	$ 2,690,000	$ 672,500	$ 285,000
Information	3	19	6	6	$ 1,610,000	$ 536,667	$ 580,000
Leisure & Hospitality	3	456	152	5	$ 13,792,000	$ 4,597,333	$ 340,000
Natural Resources & Agriculture	1	1	1	1	$ 96,000	$ 96,000	$ 96,000
Total	**159**	**2,216**	**13.94**	**2**	**$ 190,689,940**	**$ 1,199,308**	**$ 140,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

Alameda County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Legal Services	138	822	6	2	$ 80,862,257	$ 585,958	$ 190,000
Professional, Scientific, & Technical Services	69	978	14	4	$ 117,900,000	$ 1,708,588	$ 350,000
Administrative Services	59	612	10	3	$ 41,963,816	$ 711,251	$ 190,000
Manufacturing	37	2,339	63	6	$ 443,400,000	$ 11,984,535	$ 720,000
Educational & Health Services	30	1,041	35	4	$ 128,200,000	$ 4,273,934	$ 165,000
Unclassified	29	7	0	0	$ 13,147	$ 453	$ -
Computer Systems Design & Related Services	19	4,084	215	5	$ 528,700,000	$ 27,824,105	$ 390,000
Information	15	2,476	165	51	$ 252,600,000	$ 16,837,467	$ 2,000,000
Construction	13	916	70	5	$ 257,000,000	$ 20,538,738	$ 470,000
Personal & Repair Services/Nonprofits Organizations	13	101	8	6	$ 15,058,361	$ 1,158,336	$ 220,000
Wholesale Trade	12	159	13	3	$ 20,899,462	$ 1,741,622	$ 200,000
Finance & Insurance Services	11	226	21	5	$ 78,558,000	$ 7,141,636	$ 250,000
Retail Trade	11	80	7	4	$ 5,328,398	$ 484,400	$ 170,000
Leisure & Hospitality	6	1,018	170	9	$ 54,660,000	$ 9,110,000	$ 620,000
Natural Resources & Agriculture	2	25	13	13	$ 2,300,000	$ 1,150,000	$ 1,150,000
Transportation, Warehousing & Utilities	2	3	2	2	$ 215,000	$ 107,500	$ 107,500
Total	**466**	**14,887**	**31.95**	**3**	**$ 2,037,658,441**	**$ 4,372,576**	**$ 200,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

Santa Clara County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Manufacturing	50	251,706	5034	89	$ 265,800,000,000	$ 5,315,000,000	$ 9,850,000
Legal Services	49	1,535	31	2	$ 574,200,000	$ 11,718,592	$ 160,000
Computer Systems Design & Related Services	30	51,290	1710	28	$ 17,940,000,000	$ 597,900,000	$ 2,000,000
Administrative Services	23	354	15	2	$ 34,996,000	$ 1,521,565	$ 100,000
Unclassified	23	0	0	0	$ 20,226	$ 879	$ -
Professional, Scientific, & Technical Services	19	296	16	3	$ 46,262,000	$ 2,434,842	$ 360,000
Information	16	6,829	427	13.5	$ 1,647,000,000	$ 102,900,000	$ 1,200,000
Wholesale Trade	12	256	21	7.5	$ 40,300,000	$ 3,358,333	$ 1,550,000
Finance & Insurance Services	7	220	31	4	$ 23,330,000	$ 3,332,857	$ 170,000
Educational & Health Services	5	14	3	4	$ 4,034,138	$ 806,828	$ 210,000
Retail Trade	5	254	51	50	$ 18,756,000	$ 3,751,200	$ 1,500,000
Leisure & Hospitality	4	408	102	25.5	$ 20,243,106	$ 5,060,777	$ 4,581,933
Construction	3	372	124	20	$ 437,000,000	$ 145,700,000	$ 2,400,000
Total	**246**	**313,534**	**1275**	**4.5**	**$ 236,586,141,470**	**$ 1,165,000,000**	**$ 230,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

San Mateo County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Professional, Scientific, & Technical Services	21	220	10	2	$ 9,693,831	$ 461,611	$ 160,000
Legal Services	16	225	14	2	$ 28,666,768	$ 1,791,673	$ 155,000
Computer Systems Design & Related Services	12	352	29	5.5	$ 30,387,890	$ 2,532,324	$ 370,000
Manufacturing	12	10,290	858	7.5	$ 1,423,000,000	$ 118,600,000	$ 335,000
Unclassified	12	0	0	0	$ -	$ -	$ -
Information	9	962	107	11	$ 137,700,000	$ 15,297,333	$ 720,000
Finance & Insurance Services	6	111	19	2	$ 774,000	$ 129,000	$ 140,000
Administrative Services	3	87	29	1	$ 8,550,000	$ 2,850,000	$ 250,000
Wholesale Trade	3	58	19	5	$ 6,340,000	$ 2,113,333	$ 570,000
Educational & Health Services	2	23	12	11.5	$ 1,500,000	$ 750,000	$ 750,000
Personal & Repair Services/Nonprofits Organizations	2	10	5	5	$ 542,589	$ 271,295	$ 271,295
Retail Trade	2	4	2	2	$ 260,000	$ 130,000	$ 130,000
Construction	1	15	15	15	$ -	$ -	$ -
Leisure & Hospitality	1	0	0	0	$ -	$ -	$ -
Total	**102**	**12,357**	**121.15**	**3.0**	**$ 1,647,415,078**	**$ 16,148,756**	**$ 160,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

San Francisco County Summary

Berkely Founders

		EMPLOYMENT			REVENUE		
	Firms	Aggregate	Mean	Median	Aggregate	Mean	Median
Legal Services	127	2,041	16	3	$ 187,400,000	$ 1,475,378	$ 200,000
Unclassified	37	1	0	0	$ 460,162	$ 12,437	$ -
Administrative Services	31	286	9	3	$ 18,935,674	$ 610,828	$ 170,000
Professional, Scientific, & Technical Services	28	1,620	58	10	$ 123,300,000	$ 4,404,361	$ 645,000
Finance & Insurance Services	26	3,831	147	8.5	$ 642,400,000	$ 24,709,481	$ 550,000
Computer Systems Design & Related Services	21	2,149	102	10	$ 461,200,000	$ 21,961,571	$ 920,000
Information	21	4,016	191	10	$ 1,355,000,000	$ 64,500,971	$ 350,000
Manufacturing	10	2,618	262	3	$ 842,500,000	$ 84,247,700	$ 255,000
Retail Trade	9	136,300	15144	3	$ 15,690,000,000	$ 1,743,000,000	$ 200,000
Personal & Repair Services/Nonprofits Organizations	8	73	9	2.5	$ 6,062,225	$ 757,778	$ 266,937
Leisure & Hospitality	7	8	1	1	$ 263,780	$ 37,683	$ 29,780
Wholesale Trade	7	173	25	5	$ 30,230,000	$ 4,318,571	$ 300,000
Educational & Health Services	6	39	7	5	$ 1,142,312	$ 190,385	$ 210,000
Construction	3	243	81	20	$ 15,700,000	$ 5,233,333	$ 1,500,000
Total	**341**	**153,398**	**449.85**	**3**	**$ 19,374,594,153**	**$ 56,801,787**	**$ 190,000**

Data source: 2012 Berkeley Survey; supplemental Berkeley departmental data; Dun & Bradstreet.
Given the large number of firms in Legal Services and Computer Systems Design & Related Services, results for these two categories are reported separately from Professional, Scientific & Technical Services for the purposes of this analysis.

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