Entrepreneurial Impact: The Role of MIT

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Entrepreneurial Impact: The Role of MIT

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Abstract

The ultimate value of this study is to help us understand the economic impact of the entrepreneurial ventures of university graduates. We know that some universities play an important role in many economies through their core education, research and development, and other spillovers. However, in order to support economic growth through entrepreneurship, universities must create a culture and programs that make entrepreneurship widely accessible to students. While MIT's leadership in developing successful entrepreneurs has been evident anecdotally, this study — one of the largest surveys of entrepreneur alumni ever conducted — quantifies the significant impact of MIT's entrepreneurial ecosystem that supports firm start-ups. Furthermore, while MIT is more unique and unusual in the programs it offers and in its historical culture of entrepreneurship, MIT provides a benchmark

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by which other institutions can gauge the economic impact of their alumni entrepreneurs. The report also provides numerous examples of programs and practices that might be adopted, intact or modified as needed, by other universities that seek enhanced entrepreneurial development. The Appendix identifies several universities that have carried out surveys of alumni entrepreneurs.

Contents

1

Executive Summary

1.1 Economic Impact of MIT Alumni Entrepreneurs

Research and technology intensive universities, especially via their entrepreneurial spin-offs, have a dramatic impact on the economies of the United States and its 50 states. This report is an in-depth case study, carried out during the past few years, of a single research/technology university, the Massachusetts Institute of Technology (MIT), and of the significant consequences it has helped to produce for the nation and the world via its broad-based entrepreneurial ecosystem. From our extensive data collection and analyses, we conclude that, if the active companies founded by living MIT alumni[1] formed an independent nation, conservative estimates indicate that their revenues would make that nation at least the 17th largest economy in the world. Indeed, a less-conservative direct extrapolation of the underlying survey data boosts the numbers to 25,800 active companies

[1] Throughout the report we use the term "alumni" to include both male alumni and female alumnae. Furthermore, "alumni" are defined by the MIT Alumni/ae Association to include all persons who received an "earned" degree from MIT, as well as those who were registered in a degree-granting program for at least one full undergraduate term or two full graduate terms.

(as of the end of 2006) founded by living MIT alumni that employ 3.3 million people and generate annual world revenues of nearly $2 trillion, producing the equivalent of the 11th-largest economy in the world.

A deeper examination determines that those firms that were founded based upon technology drawn from MIT and other universities generate 1.7 million of those jobs and $1.0 trillion of global revenues. Together with the companies based upon non-university technology, the technology-based new firms founded account for 85% of the estimated employment and 92% of the overall global sales impact. Non-technology-based companies founded by MIT alumni create slightly under a half million jobs, important but only 15% of the overall economic consequences arising from MIT alumni entrepreneurs.

The ultimate value of this study is to help us understand the economic impact of the entrepreneurial ventures of university graduates. We know that some universities play an important role in many economies through their core education, research and development, and other spillovers. However, in order to support economic growth through entrepreneurship, universities must create a culture and programs that make entrepreneurship widely accessible to students. While MIT's leadership in developing successful entrepreneurs has been evident anecdotally, this study — one of the largest surveys of entrepreneur alumni ever conducted — quantifies the significant impact of MIT's entrepreneurial ecosystem that supports firm start-ups. Furthermore, while MIT is more unique and unusual in the programs it offers and in its historical culture of entrepreneurship, MIT provides a benchmark by which other institutions can gauge the economic impact of their alumni entrepreneurs. The report also provides numerous examples of programs and practices that might be adopted, intact, or modified as needed, by other universities that seek enhanced entrepreneurial development. The Appendix identifies several universities that have carried out surveys of alumni entrepreneurs.

Our database is from a 2003 survey of all living MIT alumni with additional detailed analyses, including more recent verification and updating of revenue and employment figures from the 2006 records of Compustat (public companies) and Dun & Bradstreet (private

companies). For conservatism of our projections, we have deliberately excluded from our database all companies in which the MIT alumnus founder had died by 2003, even if the company still survives, such as Hewlett-Packard or Intel. Even if the founder is still alive, we have generally excluded from our numbers those MIT alumni-founded companies that had merged with or been sold to other firms, such as Digital Equipment Corporation (DEC), which had peak employment of 140,000 people prior to its merger with Compaq in 1998 (and their later merger with Hewlett-Packard). Nor do the database numbers include MIT alumni-founded firms that had closed prior to our 2003 survey. These estimates similarly ignore all companies founded by non-alumni MIT faculty or staff. Thus, we feel that our overall portrayal of MIT's entrepreneurial impact is quite conservative. Nor do we examine in addition to these entrepreneurial spin-offs the impact of MIT-generated science and technology upon the overall innovation and competitiveness of government and industries that benefit from direct and indirect transfer of scientific know-how and discoveries emerging from MIT, its faculty, staff, and graduates.

While the economic estimates we present contain some degrees of uncertainty, the trends in the numbers are clear. More entrepreneurs emerge out of each successive MIT graduating class, and they are starting their first companies sooner and at earlier ages. Over time, the number of multiple companies founded per MIT entrepreneurial alumnus has also been increasing, thereby generating dramatically increased economic impact per graduate. MIT acts as a magnet for foreign students who wish to study advanced engineering, science and management, and a large fraction of those students remains in the United States. Well over half of the firms created by foreign students who graduate from MIT are located in the United States, generating most of their economic impact in this country.

Thirty percent[2] of the jobs in the MIT alumni firms are in manufacturing (far greater than the 11% of overall United States jobs that are in manufacturing) and a high percentage of their products are exported. In determining the location of a new business, entrepreneurs said that

[2] We round off most numbers in this report to the nearest percent.

the quality of life in their community, proximity to key markets, and access to skilled professionals were critical considerations, but almost all located where they had been working or attending university, including near graduate schools other than MIT.

The study reveals that the states benefiting most from jobs created by MIT alumni are Massachusetts (for which we estimate about one million jobs worldwide for the entire population of over 6900 active MIT alumni-founded Massachusetts-headquartered companies), California (estimated at 526,000 jobs from its current approximately 4100 MIT alumni-founded firms), New York (estimated at 231,000 jobs), Texas (estimated at 184,000), and Virginia (estimated at 136,000). A total of 15 other states are likely to have more than 10,000 jobs each and only 11 states seem to have fewer than 1000 jobs from MIT alumni companies.

As a result of MIT, Massachusetts has for many years been dramatically "importing" company founders. The estimated 6900 MIT alumni firms headquartered in Massachusetts generate worldwide sales of about $164 billion. More than 38% of the software, biotech, and electronics companies founded by MIT graduates are located in Massachusetts, whereas much less than 10% of arriving MIT freshmen are from the state. Not only do MIT alumni, drawn from all over the world, remain heavily in Massachusetts but their entrepreneurial offshoots benefit the state and country significantly. Greater Boston, in particular, as well as northern California and the Northeast, broadly, is home to the largest number of MIT alumni companies; however, a significant number of companies are also in the South, the Midwest, the Pacific Northwest, and Europe. About 30% of MIT's foreign students form companies (in contrast with somewhat more than 20% of MIT's US-born students), of which at least half are located in the United States. Those estimated 2340 firms located in the US but formed by MIT foreign-student alumni employ about 101,500 people.

1.2 The Types of Companies MIT Graduates Create

MIT alumni companies are primarily knowledge-based companies in software, biotech, manufacturing (electronics, instruments, machinery),

or consulting (architects, business consultants, engineers). These companies have a disproportionate importance to their local economies because they typically represent advanced technologies and usually sell to out-of-state and world markets. That causes their local employment to be considerably higher per dollar of revenues than for companies whose sales are largely to local markets. The global revenues per employee of MIT alumni-founded firms are far greater than those produced by the average American company. Furthermore, they employ higher skilled as well as higher paid employees. They also tend incidentally to have far lower pollution impact on their local environments.

An important subset of the MIT alumni companies is in software, electronics (including instruments, semi conductors, and computers), and biotech. These firms are at the cutting edge of what we think of as high technology and, correspondingly, are more likely to be planning future expansion than companies in other industries. They export a higher percentage of their products, hold one or more patents, and spend more of their revenues on research and development. (Machinery and advanced material firms share many of these same characteristics but are not nearly as numerous as the electronics, software, and biotech companies.)

More than 900 new MIT alumni companies were founded each year during the decade of the 1990s. However, the bulk of total MIT-generated employment results from the estimated 541 companies of 1000 or more employees who have created about 83% of the jobs. Not surprisingly, most of the larger companies have been in existence for some time; however, many younger entrepreneurs have built sizable companies in a short period of time. One in six of the companies founded by a graduate out of school 15 years or less already has 100 or more employees.

1.3 The MIT Entrepreneurial Ecosystem

Rather than any single or narrow set of influences, what we call the overall MIT "entrepreneurial ecosystem," consisting of multiple education, research, and social network institutions and phenomena,

contributes vitally to this outstanding and growing entrepreneurial output. The ecosystem rests upon a long MIT history since its 1861 founding and its evolved culture (and logo) of "Mens et Manus," Latin for "mind and hand." The founding tradition at MIT of valuing useful work resulted in the development of strong ties with industry, including encouraging faculty consulting and even (rather uniquely) faculty entrepreneurship since before the beginning of the 20th century. Over the years, the increasingly evident MIT entrepreneurial environment has attracted entrepreneurship-inclined students, staff, and faculty, leading to a strong positive feedback loop of ever-increasing entrepreneurial efforts.

Alumni initiatives in 1969 and the early 1970s appear to be the first direct institutional moves to encourage entrepreneurship, leading to the establishment of the now worldwide MIT Enterprise Forum. Since its beginning, the Cambridge, Massachusetts chapter alone has helped nurture more than 700 young companies, with equivalent numbers across the rest of the country. Beginning in 1990, the MIT Entrepreneurship Center crystallized these efforts over the past 20 years by launching more than 30 new entrepreneurship courses at MIT and by assisting in the formation and growth of a large number of related student clubs. The resulting dramatic increase in networking among students across all MIT departments and schools, and between the students and the surrounding entrepreneurship and venture capital community, appears in survey results to be the primary MIT-related factor influencing the growth of new company formation.

The MIT Entrepreneurship Program since its founding in 1990 has created classes taught by discipline-based academics and experienced, successful entrepreneurs, and venture capitalists, which have generated an effective blend for learning both theory and practice. Mixed-team project classes, consisting of both management students and engineers and scientists, have had great impact on MIT students in their understanding of the entrepreneurial process, have initiated their exposure to and engagement with new real-world enterprises, and have influenced the subsequent founding of many new companies. Cross-campus student-run activities such as the MIT $100 K Business Plan Competition have moved numerous students, often with faculty

as team members, to develop their ideas to the point of public scrutiny. Participant teams in these student-run competitions have started more than 150 companies, many of them very successful.

The MIT Technology Licensing Office (TLO) has consistently been among the country's leading universities in licensing technology to start-up firms, licensing 210 new companies in the past 10 years, and many more start-ups before then. The TLO has also brought its experience and knowledge into active engagement with MIT students, faculty, and alumni.

The creation of formal MIT institutions focused upon encouraging entrepreneurship has accelerated significantly during the past decade. In 2000, the Venture Mentoring Service was begun to help any MIT-related individual — student, staff, faculty, alumnus/a — who was contemplating a start-up. It has already seen over 152 companies formed by those it has counseled.

The Deshpande Center for Technological Innovation was initiated in 2002 to provide small research grants to faculty whose ideas seemed especially likely to be able to be commercialized. In its first eight years, the Deshpande Center has funded more than 80 faculty research projects. A total number of 23 spinout companies have already been formed from these projects, most of those aided by student teams from the related Innovation Teams course, carried out jointly by Deshpande and the MIT Entrepreneurship Center.

In 2006, the MIT Sloan School of Management created a new Entrepreneurship & Innovation (E&I) "Track" within its MBA Program to provide intensive opportunities for those students who seem dedicated to an entrepreneurial life. It is too soon to know what eventual outcomes this focused approach will produce, but more than 40% of incoming MBA candidates are now enrolling in this concentration. Initial students have already engaged in numerous company-building activities and have won important university business plan competitions. The E&I track seems to have mobilized entrepreneurial efforts even by students not enrolled in the track, with 40 MBA graduates (12% of the class) founding new firms in 2010 rather than accepting employment in existing companies. This escalating focus on

entrepreneurship has become evident even among the mid-career MIT Sloan Fellows and in the recently launched Executive MBA Program.

The 2007 founding of the Legatum Center for Development & Innovation has brought increased emphasis and resources for encouraging MIT students to found companies in low-income countries that would provide a bottoms-up approach to alleviating poverty and accelerating economic development. Legatum's fellowship program has led more students into participation in the $100 K Competition's Development Track and into formation of related club activities.

Beyond these MIT influences upon firm formation, 85% of the alumni entrepreneurs reported in the survey data that association with MIT had significantly helped their credibility with suppliers and customers. A total of 51% of the entrepreneurs also felt that their association with MIT helped in acquiring funding.

All of these forces — from initial orientation and culture to all encompassing clubs and activities to now-concentrated educational opportunities — contribute to building and sustaining the MIT entrepreneurial ecosystem, with extensive interactions across the Institute. That system has been uniquely productive in helping to create new firms that have had impressive economic impact.

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