

Growing Innovative Companies to Scale

HOW DOES MASSACHUSETTS
MEASURE UP?



MIT Industrial Performance Center
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Growing Innovative Companies to Scale: How Does Massachusetts Measure Up?

Executive Summary

MIT Industrial Performance Center

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Executive Summary

This report describes the results of a study of scale-up among some of Massachusetts' most innovative companies. The study was carried out at the MIT Industrial Performance Center over an 18-month period. The goal was to gain a more detailed understanding of the processes by which innovative companies scale up their businesses, and to assess how the Massachusetts economy compares in this dimension of performance with other regions of the country.

Massachusetts has been described as an innovation engine for the world, with its research universities, teaching hospitals, public research laboratories and corporate startups serving as a prolific source of new ideas, concepts, products, and services that have been taken up by firms around the world. But in recent years **concerns have been raised that the Massachusetts economy may be lagging when it comes to capturing the downstream economic benefits of its own innovations**, and that Massachusetts-based companies are not scaling to their full potential or are disproportionately scaling up out of state. The overall health of the Massachusetts economy depends on a healthy rate of new business formation and a healthy rate of company scale-up. But here in Massachusetts and nationally **the scale-up process has received much less attention from policy-makers, researchers, and commentators than has the process of new business formation**. This report begins to correct that imbalance. It draws on a combination of publicly available data and interviews with business executives to understand how well Massachusetts has been doing over time and compared to other states when it comes to scaling up innovative firms. The analysis is preliminary and much more work needs to be done. But the report brings together a critical mass of observations, data, and analysis on this important subject for the first time.

'Scale' is a relative term, and can be measured in different ways, including employment, revenue, and market capitalization. There is no precise threshold above which a company can be said to have achieved scale. Here we define companies that have achieved \$500 million in annual revenue as 'companies of scale,' while those with revenues between \$100 million and \$500 million are referred to as companies 'on the pathway to scale.'

The study focuses on the scale-up process in four key industry groups: advanced manufacturing; life sciences; computer-related; and software and Internet services. **These are among the Commonwealth's most innovative and technology-intensive sectors**. They account for 90% of the Massachusetts startups that have received financial backing from venture capital firms over the past quarter century (and 77% of venture-backed firms nationally.) They also account for half of all Massachusetts companies that have undergone an initial public offering since 1990.

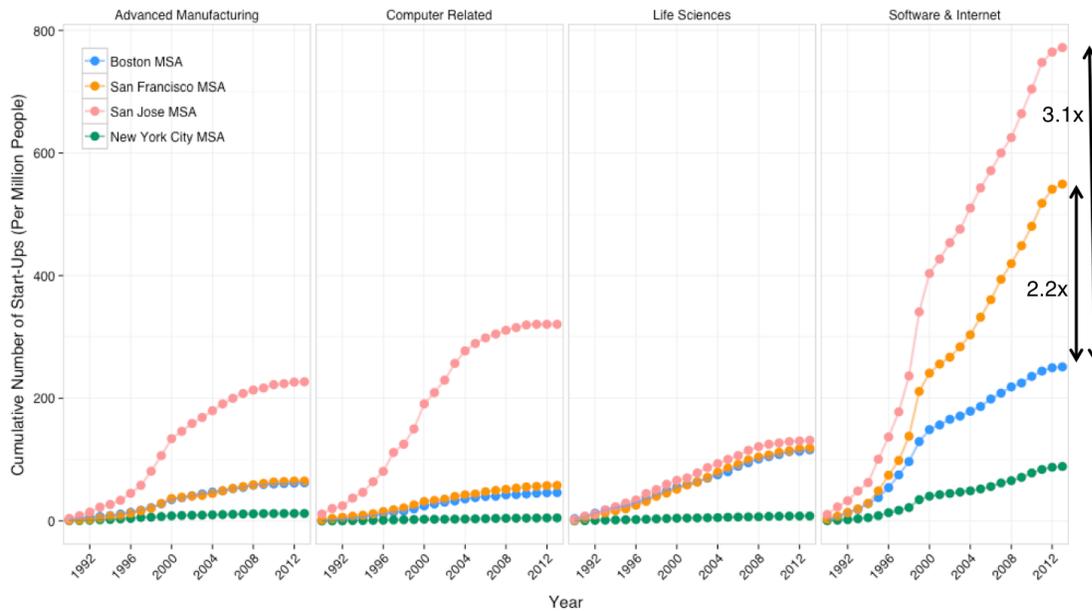
We conducted interviews with senior leaders of 20 Massachusetts companies with annual revenues greater than \$100m (but for biotech) drawn from these four industries. The interviews shed light on the strategies and processes pursued by these companies as they scaled up their operations, and on the strategic and operational benefits of achieving scale. The interviews also provided insights into the direct and indirect benefits provided to the regional economy more broadly by larger companies. Finally, the interviews pointed to certain characteristics of the regional innovation ecosystem that were particularly important in supporting scale-up (as distinct from startup.) Three factors were highlighted as being particularly important in this regard: (1) the regional talent pool, and especially the availability of experienced senior managers; (2) the presence of business networks, mentors, and role models; and (3) a business culture that provides recognition of successful entrepreneurs and successfully scaling companies.

We analyzed **the scale-up performance of the four focus industries in Massachusetts, California, and New York, comparing firm populations at two stages of scale-up – venture-capital-backed startups and later-stage public companies – over a 24-year period** (from 1990 to 2014). By most measures California and Massachusetts are the most active in the country when it comes to technology-based innovation, and New York is also highly ranked. The three states are the leaders in venture capital investment (California being first, Massachusetts second and New York third). To account for the size differences between the three states and the heterogeneities within them, we made these comparisons at the level of Metropolitan Statistical Areas (MSAs) using population-normalized data: the Boston MSA (which includes the cities of Boston and Cambridge and their suburbs in Massachusetts), the San Francisco and San Jose (“Silicon Valley”) MSAs in California, and the New York City MSA (only areas within New York). These account for most of the activity in the four key industries and are the top four MSAs in the country when it comes to venture capital investment.

The results of our research are summarized in the following key points:

- While **the Boston MSA outperformed the New York City MSA** in the rate of formation of startups capable of attracting venture capital, **Boston has trailed Silicon Valley** in all the focus industries **except life sciences**. In computer-related industries the gap was already evident in the early 1990s, and a gap began to emerge in advanced manufacturing and S&I later in that decade. Those gaps have continued to widen in the most recent decade and in S&I, the most active sector, both Silicon Valley and San Francisco have significantly outpaced Boston. By contrast, Boston has kept pace with both San Francisco and Silicon Valley in life sciences.

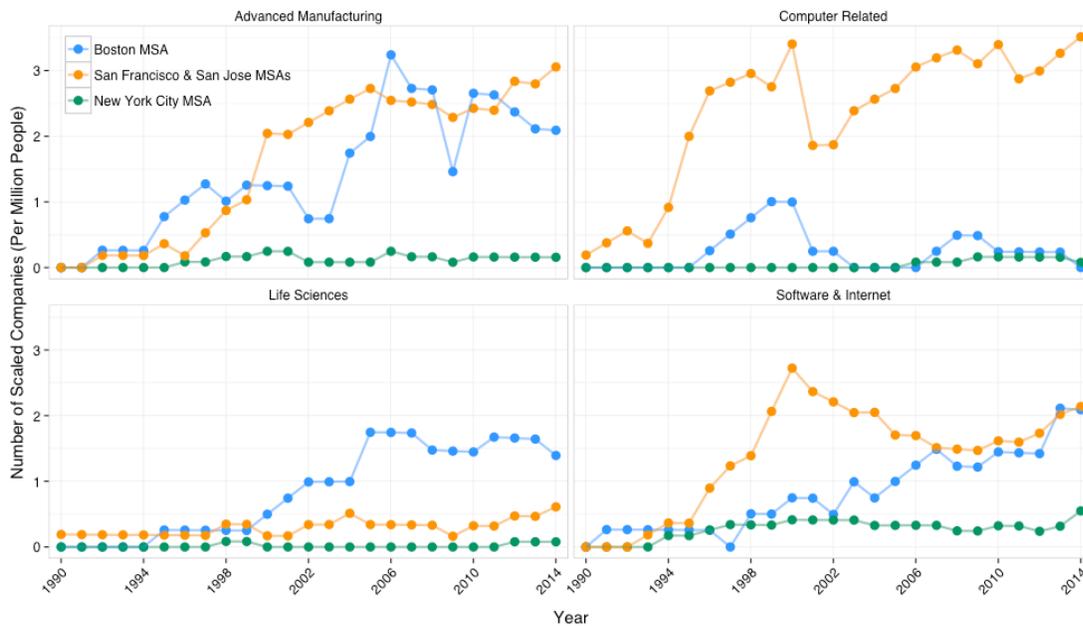
Cumulative Number of VC-Backed Startups by MSA and Industry, Adjusted for Population, 1990–2013



Data Sources: ThomsonReuters VentureExpert and U.S. Census Bureau.

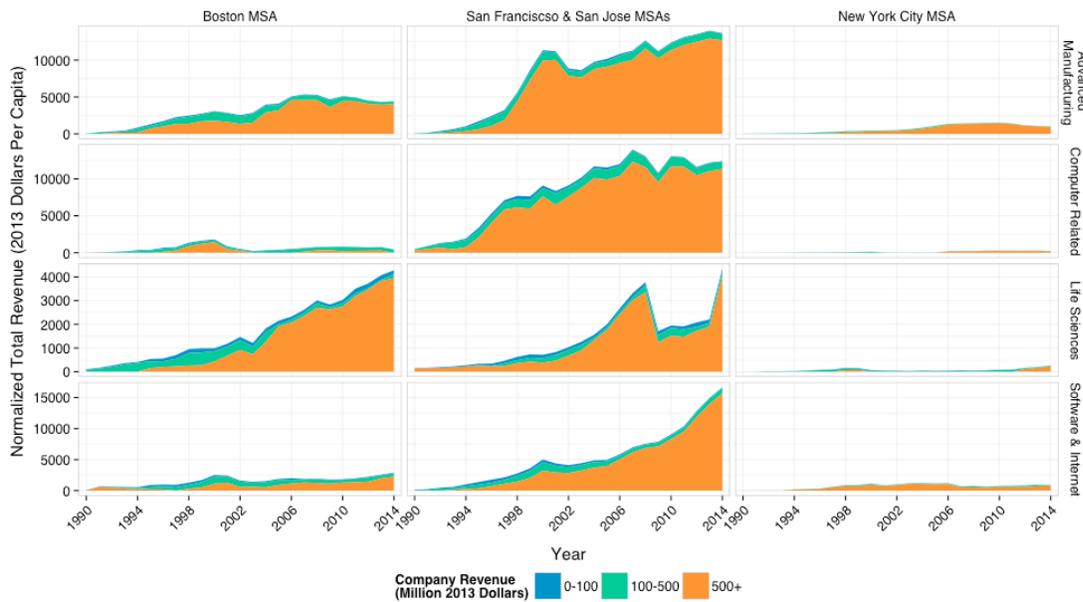
- The Boston MSA has been relatively successful at growing companies to scale** (where as noted we define scaled companies as those with \$500 million or more in annual revenue). On a population-adjusted basis, Boston has outpaced New York and has roughly matched the California MSAs when it comes to growing scaled companies in advanced manufacturing and in software and Internet services, and it has outpaced the California MSAs in this dimension in the life sciences sector. However, **the Boston MSA has been generally less successful than the California MSAs at growing 'super-scale' companies** earning billions of dollars in revenues annually, although the life sciences sector is an exception to this.

Number of Public 'Companies of Scale' (>\$500m in Annual Revenue) by MSA and Industry, Adjusted for Population, 1990–2014



Data Sources: S&P Compustat and U.S. Census Bureau

Revenue Distribution for Companies with IPOs Between 1990 and 2014 by MSA and Industry, Adjusted for Population



Data Sources: S&P Compustat and U.S. Census Bureau.

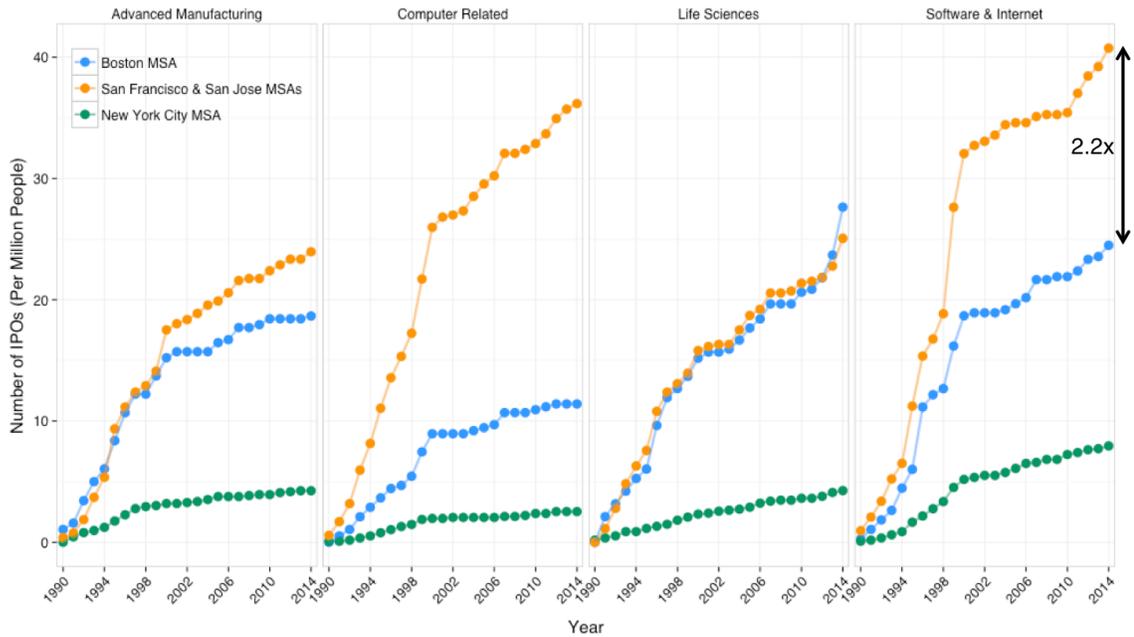
- **The life sciences have been the crown jewel in the Massachusetts innovation economy**, not only at the early stages of the growth cycle but also when it comes to companies that are on a pathway to scale or have achieved scaled or super-scaled status. At each of these stages, Massachusetts has been on par with or surpassed California on a population-adjusted basis.

- Despite suggestions to the contrary, there is **no evidence that venture-backed Massachusetts companies are being sold at an earlier stage in their lifecycle than their counterparts in California or New York**. Moreover, the likelihood that venture-backed companies will be acquired at any point in the lifecycle seems broadly similar among the three states. The one exception is the case of software and Internet services, where Massachusetts companies seem slightly more likely to be acquired than their counterparts elsewhere.

- In **the important software & Internet services (S&I) sector**, while Massachusetts has been losing ground to California in the earlier stages of company formation and growth, it appears to have been holding its own in terms of scale up. On the other hand, when it comes to 'super-scaled' companies in the sector, Massachusetts lags far behind:
 - **The Massachusetts S&I sector has trailed California both at the startup stage** (as measured by the rate of formation of venture-backed companies) **and at the initial scale-up stage** (as measured by the number of IPOs). In both cases the Boston MSA has lagged the two California MSAs by a multiple of roughly 2.5 to 1 since approximately 2000.

 - Despite these lags, **the Commonwealth has held its own relative to California when it comes to S&I companies that have achieved scale**. It also has tracked California relatively closely in terms of the number of S&I companies on the pathway to scale (revenues between \$100 - \$500 million).

Cumulative Number of IPOs by MSA and Industry, Adjusted for Population, 1990-2014



Data Sources: S&P Compustat and United States Census Bureau.

- However, when measured in terms of total revenue generated by these scaled companies the performance of the Commonwealth pales in comparison to that of California, because there are **no companies in Massachusetts that can match super-scaled California-based companies** like Google, Facebook, and others.
- As noted previously, Massachusetts is losing a slightly larger share of S&I companies in the growth pipeline to acquisition than either California or New York (41 percent compared to 35 percent and 29 percent respectively). Moreover, the majority of these acquisitions are now being conducted by companies headquartered in California. We do not know what the implications of these acquisitions are for the Massachusetts region. However, while acquired companies may retain a significant post-acquisition presence in their home regions, strategic decisions are most likely to be made wherever senior management is located.

Policy Implications: Many of the factors that affect scale-up – IPOs, M&A opportunities, financing that favors long-term investments – do not fall directly into the realm of local, state, or regional policymaking and are perhaps better left either to market forces or to federal government policy. But there are several areas where public and/or private actions within the region could potentially help support innovative companies on the pathway to scale and the regional innovation ecosystem more broadly. As we outline in the report, while they have different priorities, **firms at the startup phase and the scale-up phase depend on similar and interrelated parts of the larger innovation ecosystem.** Below we outline five such actions:

1) Focus more attention on companies that are on the path to scale. There are companies across multiple industries in the region that have achieved at least \$100 million in annual revenues. These companies are already important to the region’s innovation ecosystem and may become more so in the future. Few of these companies are household names. But supporting the ‘\$100 million club’ through various means – such as mentoring and regional networks – will highlight their importance to the region, deepen their ties here, and encourage their growth. Our interviews underscored the point that the desires of company leaders largely determine whether a company grows to scale. Creating a network of mentors and role models to encourage this path (such as exists today with MassScale) is a valuable first step.

2) Continue to support the region’s strength in the life sciences. By almost every measure, the life sciences represent the most successful industry cluster in Massachusetts. In few clusters is the interdependence of the startup and scale-up ecosystems more evident than in Kendall Square, with its mix of large biopharma companies and emerging biotech companies. Supporting further scale-up by local life sciences companies requires fostering connectivity and physical proximity between startups and the large biopharma firms. This includes making sure there is sufficient affordable space in the Kendall Square area and beyond for startup companies as a way to nurture the “nursery” for future companies of scale as well as creating affordable space and support across the state for early-stage biomanufacturing.

3) Develop a strategy for growing software & Internet startups that builds on the region’s strengths. While the Boston area has seen a steady increase in the number of venture-backed software and Internet (S&I) startups and has held its own when it comes to growing companies to scale in this industry group, Massachusetts is losing ground to California in terms of both the number of S&I startups and the growth of large S&I companies. Venture-backed Massachusetts S&I firms are also increasingly likely to be acquired by California-based companies. The compounding effects of these trends is putting the Commonwealth at a competitive disadvantage in a key sector of the economy and may pose serious challenges for the region in the long term. Given the important role of S&I, it is imperative that the region develop an S&I strategy that builds on its distinctive strengths and assets. This suggests building on regional expertise in business-to-business (B2B) software, expanding capacity in business-to-consumer software (B2C), and applying this expertise and capacity in “verticals” where there are already significant

strengths – for example, in the life sciences (e.g., digital health care), financial services (e.g., FinTech) and cybersecurity. It is also imperative to increase the number of software engineers in the region’s workforce.

4) Focus on developing talent from the university to the executive suite. Talent is the lifeblood of the region’s innovation economy. Our research confirmed that human capital is at the core of why innovative companies start here. Fostering and developing the talent needed to grow companies can occur at various points in time in career development. As a start, we would like to see entrepreneurship education augmented to teach students not only about how to start companies but also about the challenges and rewards of growing companies to scale. Regional tours should introduce students and soon-to-be graduates to companies in the region that have successfully scaled and offer interesting career opportunities and experience. A collective effort is also needed across industries and companies to welcome and develop senior management talent in the region.

5) Recognize and celebrate the region’s successful entrepreneurs and companies. Companies often seek to change their internal culture but different strategies are needed when the goal is cultural change at the regional level. The culture of New England and Massachusetts is a great asset and is part of the basis for the region’s vibrant innovation economy. However, more explicit steps could be taken to recognize and celebrate successful entrepreneurs and companies that are on a pathway to scale or that have already achieved scale. Leaders from the public and private sectors should pursue concerted, collective efforts in this area and should seek to engage the local and national media in this effort.

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Our analysis has shown the critical role played by companies of scale, not only in terms of their importance to the regional economy overall, but also because of their ability to foster and attract talented people, as well as capital, which directly and indirectly supports startup formation and the regional innovation ecosystem as a whole. We have shown that Massachusetts has a solid track record of growing innovative companies to scale, although in several important respects it has not been able to keep pace with California. To prosper in the national and global economy of the future, Massachusetts needs to have more companies of scale and super-scale, particularly in the area of software and Internet services. The strategies we recommend include public and private interventions at multiple levels – individuals, firms, industries, and the region as a whole. The findings presented in this report point to the need for active leadership and targeted efforts to ensure that the state continues to succeed not only in producing the innovations that will launch tomorrow’s leading companies, but in supporting innovative companies as they navigate the challenges of scale-up and succeed in growing to realize their full potential.

For a copy of the full report, please email us at ipc@mit.edu or visit us online:

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