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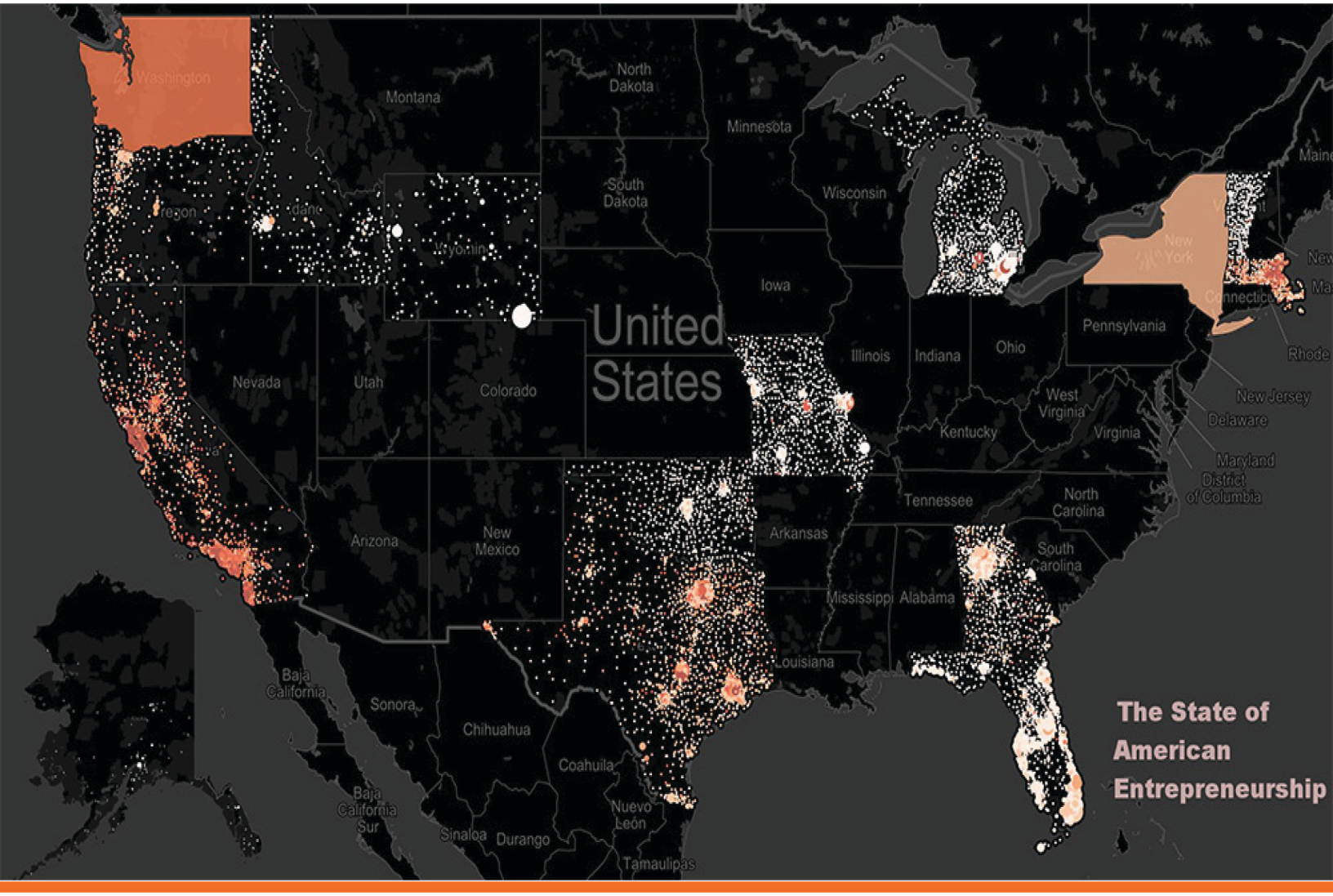

A NEW VIEW OF THE SKEW: A QUANTITATIVE ASSESSMENT OF THE QUALITY OF AMERICAN ENTREPRENEURSHIP

Catherine Fazio, Jorge Guzman, Fiona Murray, Scott Stern

A New View of the Skew:
A Quantitative Assessment of the Quality of American Entrepreneurship[1]

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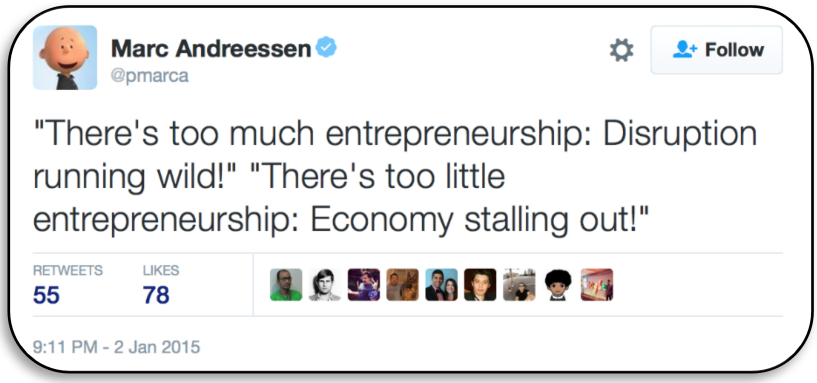


Introduction

The state of American entrepreneurship shapes the outlook for the American economy. High-growth startups contribute disproportionately to net job creation and to impactful innovation, laying a crucial foundation for economic dynamism and prosperity. Fostering these firms is a strategic priority**.**

Among all new businesses, however, only a very small fraction experience the explosive growth (in terms of jobs, revenue, or valuation) that propels the economy. The state of American entrepreneurship—and its potential to fuel economic dynamism and prosperity—therefore depends more on whether there are enough startups being founded with the potential to realize this outsized performance than on the quantity of new business starts. As Robert Litan, former vice president of research and policy at the Kauffman Foundation, noted in the wake of the Great Recession, "America's great challenge is to … bring about a substantial increase in the numbers of highly successful new companies … Nothing less than the future welfare of America and its citizens is at stake."[3] From the perspective of a policymaker, a central difficulty in assessing the state of American entrepreneurship is being able to systematically account for "the skew:" the fact that the overall ability of entrepreneurship to facilitate American economic prosperity depends disproportionately on the realized performance of a very small number of new firms. But how do we identify whether the economy at a given point in time is nurturing the types of startups that have the potential for exponential growth?

Accounting for the skew requires confronting a measurement quandary: at the time a company is founded, one cannot observe whether that particular firm will experience explosive

growth (or not). On the one hand, this challenge is fundamental, since by its nature entrepreneurship involves a high level of uncertainty and luck. And, some outsized successes certainly result from unlikely origins. Ben & Jerry's, for example, was founded with the intention to be a one-store, homemade ice-cream shop.[4] On the other hand, many startups aspire to a specific level of performance and then achieve it, including startups that we refer to as innovation-driven enterprises (IDEs) and more traditional small and medium-size enterprises (SMEs).[5] Across all new business starts, firms span a wide gamut in terms of their founders' ambitions and potential for growth. A very large number of new businesses aim to offer successful local services (such as a neighborhood handyman striving to build a steady book of regular clients) in the traditions of the SME phenomenon.[6] Others aspire to be regional players or to grow over time in an incremental manner. Still others have aspirations to be the next Google or Facebook (classic IDEs).[7] To the extent that the new firms that ultimately contribute to the skew are disproportionately drawn from those IDEs with significant growth ambitions and underlying potential at the time of founding, mapping the skew in a systematic way requires accounting for these differences at an early stage in the entrepreneurial process.

Traditional approaches towards measuring entrepreneurship have by and large abstracted away from firms' initial differences in growth potential—tracking the rate of entrepreneurship by either counting new firms (considering all firms within a given sector to be equal) or selecting on achieving a performance outcome (such as the receipt of venture funding). Though these quantity-based and performance-based approaches are both instructive, neither provides a clear view of the skew. The first cannot discern whether changes in the quantity of entrepreneurship within a sector reflect changes in the founding rate of firms whose underlying potential for growth is modest versus those with the potential for exponential growth. The second conflates the analysis of startup potential at the moment of founding with other factors influencing later success (such as the relative supply of risk capital, regional ecosystem effects, or luck).

More significantly, these different measurement approaches have led to divergent perspectives about the state of American entrepreneurship and fueled a polarized policy debate.

- Quantity-based measures document a troubling, three-decade-long decline in the U.S. rate of entrepreneurship and business dynamism (the pace at which the economy reallocates economic activity), with only a very modest leveling off and increase in high-tech, confined to the late 1990s.[8, 9, 10] These findings have prompted urgent calls to jumpstart the creation rate of new firms. As the Chairman and CEO of Gallup, Jim Clifton, cautioned: "We are behind in starting new firms per capita, and this is our single most serious economic problem. … This economy is never truly coming back unless we reverse the birth and death trends of American businesses."[11]

- Conversely, outcome-based measures indicate that the rate of entrepreneurship is rising. Early-stage angel and venture capital financing of new ventures has been on a significant upswing over the past several years. In addition, a recent report co-authored by one of us (Fiona Murray) documents a striking shift in the propensity for MIT undergraduates to join startup firms at graduation.[12] Some leading entrepreneurs and financiers in ecosystems such as Silicon Valley fear not that there are too few startups, but that we are in the midst of an entrepreneurship bubble![13]

As Marc Andreessen succinctly put it: "There's too much entrepreneurship: Disruption running wild!" "There's too little entrepreneurship: Economy stalling out!"[14]

This policy brief builds on research conducted by two of us (Guzman and Stern, "The State of American Entrepreneurship: New Estimates of the Quantity and Quality of Entrepreneurship for 15 U.S. States, 1988–2014,"[15]) that aims to break through this impasse. This work calculates consistent estimates of the underlying growth potential of startups using a combination of comprehensive business registries and predictive analytics and drawing on startup characteristics observable at or near the time of founding. These new metrics allow for the evaluation of the state of entrepreneurship across time (and place) and yield several new findings. Contrary to the secular decline in the rate of net firm births observed with quantity-based measures, the rate at which high-potential growth startups are founded follows a cyclical pattern that is sensitive to the capital market and overall market conditions. Among the key new findings are (1) a sharp, upward swing in the number of expected growth outcomes starting in 2010; and (2) strong differences across place and time in the likelihood of startups (for a given quality level) to realize their potential and scale. These findings demonstrate the importance of accounting for *quality* when measuring the *quantity* of entrepreneurship and evaluating its potential impact on future economic growth.

The state of American entrepreneurship looks quite different when one has a clear view of the skew. Startups with the ambition and potential for exponential growth have strikingly different patterns of creation than SMEs. Further, traditional measures of the overall rate of entrepreneurship do not effectively capture the likely potential of these firms to scale. Finally, to the extent that the current state of American entrepreneurship is facing a crisis, it is not in the rate of creation of high-growth-potential startups or even in the initial funding of those firms, but, instead, in the potential of those firms to scale in a meaningful way over time.

These findings set the table for a new conversation about the direction of innovation and entrepreneurship policy—one that calls for reconsideration of whether efforts to jumpstart entrepreneurial *quantity* independent of *quality* can effectively lever economy-wide growth and prosperity. As emphasized by former Small Business Administrator Karen Mills, we can do better for both SMEs and IDEs by designing policies more directly tailored to the acceleration of each.[16]

Traditional Measures Do Not Effectively Capture Entrepreneurial Potential

Broadly speaking, academics traditionally have measured the rate of entrepreneurship in two basic ways: (1) quantity-based, population-level statistics tracking firm birth and exit rates that abstract away from any variation in growth potential or ambition; and (2) performance-based measures that account for heterogeneity in retrospect based on outcomes. Both are highly informative about different aspects of entrepreneurship and regularly used by policymakers to guide decisions aimed at catalyzing high-growth outcomes. But do these measures provide a good signal of entrepreneurial potential to realize explosive growth? We conclude that the signal each offers of the skew is weak, at best. This section provides a brief background of leading examples of each of these types of measures and then highlights four important disconnects with other indicators and/or drivers of performance.

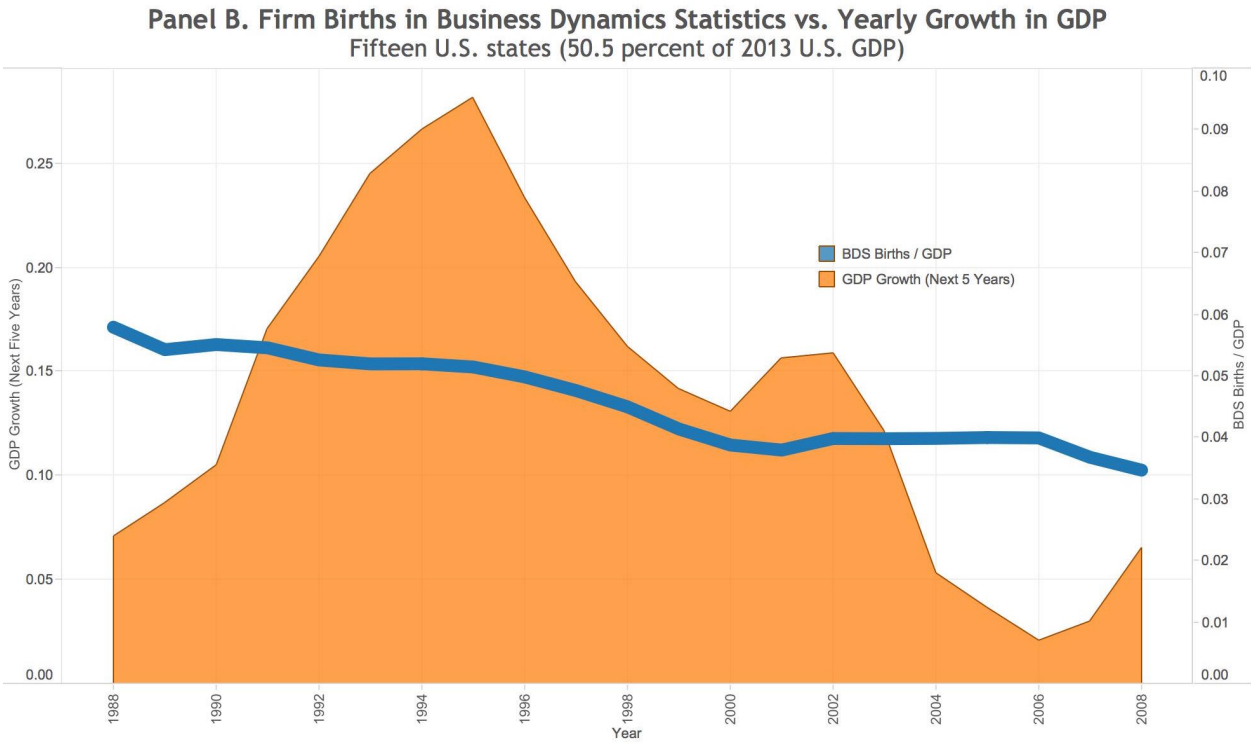
Two leading examples of quantity-based measures of the state of American entrepreneurship are the Business Dynamics Statistics series from the U.S. Census ("BDS") and the Kauffman Index of Startup Activity. BDS measures the overall quantity of new business starts, specifically emphasizing the number of new firm births relative to firm exits. Except for sector differences, the BDS considers firm potential to be equal at the time of founding. In a series of important and insightful papers using the BDS, John Haltiwanger and co-authors document a troubling three-decade-long secular decline in the U.S. rate of entrepreneurship, with only a very modest leveling off and increase in high-tech, confined to the late 1990s.[17, 18, 19] They find that this decline in the overall rate of entrepreneurship appears to be linked to a decline in business dynamism—the pace at which the economy reallocates economic activity. While this drop is most pronounced in industries such as retail trade, the overall pattern of decline also is present in other sectors, including high-tech. The foremost index tracking startup activity in the United States, states and metropolitan areas—the Kauffman Index: Startup Activity[20]—is a quantity-based measure of new self-employment rates using the Current Population Survey.[21] This careful tracking of all new entrepreneurs allows one to evaluate differences across regions and time in the rate at which individuals become entrepreneurs (of any type).[22]

By construction, neither the BDS measures nor the Kauffman Index: Startup Activity evaluate whether changes in the quantity of entrepreneurship reflect changes in the founding rate of firms or founders whose underlying potential is modest versus a change in the founding rate of firms or founders with the potential for exponential growth. The methodology used does not account for differences in initial potential for growth (outside of those that might generally exist across sectors). The question remains whether the trends observed provide a good signal of the high-potential growth skew.

There are at least three disconnects that lead us to conclude they do not:

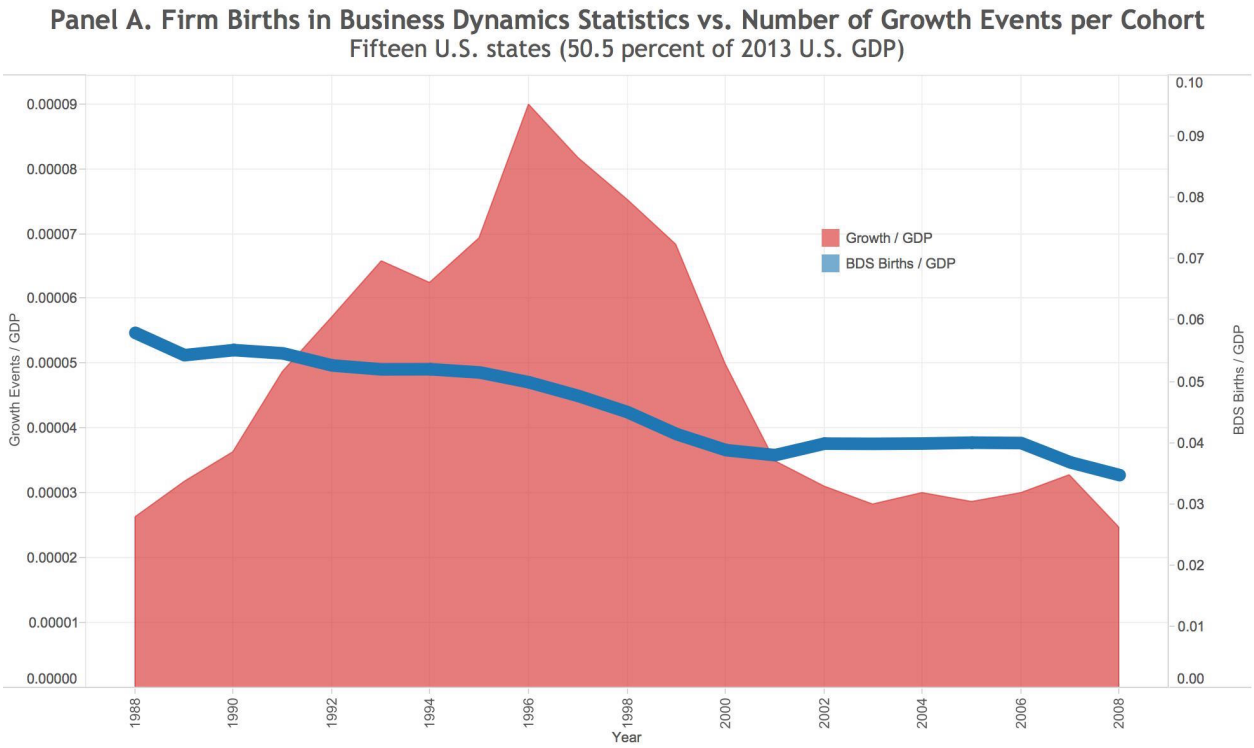
- *Disconnect 1: Quantity-Based Measures of Entrepreneurship Have Little Relationship to GDP Growth.* Yearly fluctuations in counts of firm births appear to hold little relationship to medium-term measures of economic performance. The Business Dynamics Statistics series from the U.S. Census find that young firms produce the most employment growth.[23, 24, 25, 26] Accordingly, we would expect to see the fluctuations in the founding of new firms to roughly track economic boom and bust cycles (or for those cycles to follow the trajectory of new firm starts with a lag). Instead, we see new firms on a long-term secular decline largely independent of the economic cycle.

Figure 1 (Source: Guzman and Stern, 2016)



- *Disconnect 2*: *Quantity-Based Measures Hold Little Relationship to Equity Growth.* The steady decline in entrepreneurship shown in quantity-based measures does not track the more cyclical nature of high-value startup exits. If quantity-based measures were an effective signal of entrepreneurial growth potential, we would expect the opposite. Put differently, more firm births should mean more "shots on goal" and a higher rate of growth firms emerging. Conversely, fewer firm births should lead to fewer shots on goal and fewer growth firms emerging. Yet, when we compare the original "birth dates" of firms within Census Business Dynamic Statistics that achieved successful exits (defined as an IPO or acquisition at a multiple of the firm's valuation within six years) relative to overall firm births, again, we find no apparent relationship.

Figure 2 (Source: Guzman and Stern, 2016)



- *Disconnect 3*: *Quantity-Based Measures Cannot Find Silicon Valley*. Though directly informative about the rate of self-employment, perhaps the most well-known regional index tracking startup activity across the United States—the Kauffman Index: Startup Activity[27]—regularly finds the rate of startup activity to be higher in Montana and Alaska than in California.[28] Indeed, both the 2014 and 2015 Startup Activity ranking found Montana to be first in the nation in number of startups founded. Kauffman's 2015 ranking finds more startup activity in Miami, Florida, than in either San Francisco or San Jose, California. The Index likewise ranks Miami, as well as Columbus, Ohio, and Phoenix, Arizona, above Boston, Massachusetts. This mismatch between Index rankings and top hotspots of entrepreneurial activity (like Silicon Valley and Kendall Square) signal strongly that, to the extent that trends in entrepreneurial growth potential are being captured, they have been swamped by the effects of more local or regional businesses.

Alternatively, two leading examples of performance-based measures of entrepreneurship include the 2015 IPO Report by Wilmer Hale and the "PwC/NVCA MoneyTree™ Report." Instead of counting the number of new firms or founders, both track the number of startups that have achieved certain performance outcomes. The 2015 IPO Report tracks the number of IPOs and dollar volumes by year and finds: "The number of IPOs has seen a steady annual increase in all but one of the past six years, and the last seven quarters have each produced fifty or more IPOs—a level of consistently high activity not seen since 2000."[29] Similarly, the PWC/NVCA MoneyTree Report shows a significant increase in annual venture capital investment dollars following the Great Recession in 2009.[30] Though instructive indicators of whether surviving startups have been able to scale, these performance-based measures also fail to measure startup potential for growth by virtue of how they are constructed.

- *Disconnect 4*: *Performance-Based Measures Put the Cart Before the Horse*. Selecting on performance after it has occurred makes it difficult, if not impossible, to disentangle the different effects that might have contributed to or detracted from that outcome. The number of IPOs or employment growth experienced by startups, for example, could have happened for any number of reasons (including luck, market dynamics, ecosystem effects, and the underlying potential of the new firms that realized performance). Rates of performance in periods measured could reflect more about the period in question than about the underlying potential of new firms for growth. Past performance may not be a valid indicator of future rates of success.

Thus, it is not safe to assume that the secular decline in the net births of new firms mirrors trends for high-potential-growth startups. Nor can we assume that current rates of employment growth or equity outcomes are a good proxy for the present growth ambitions or potential of new firms. Instead, performance measures may be reflecting other issues—such as the effect of an ecosystem on a startup's ability to realize its growth potential.

To effectively evaluate the state of American entrepreneurship, we need a new approach—one that prospectively accounts for the differences in the potential for growth at the time of founding and recognizes that all new firms have at least some growth potential.

A Quantitative Approach to the Measurement of Entrepreneurial Quality

The State of American Entrepreneurship: New Estimates of the Quantity and Quality of Entrepreneurship for 15 U.S. States, 1988–2014"[31] introduces a new lens through which to evaluate startup trends over time—entrepreneurial quality. Its findings complement and enrich quantity and performance-based measures, offering reliable estimates that predict new firms' average potential for growth, the number of growth outcomes expected, and whether the firms' potential will be helped or hampered by the ecosystem where they are located.

The quantitative estimation of entrepreneurial quality builds on three interrelated insights. First, a practical requirement for any growth-oriented entrepreneur is business registration (as a corporation, partnership, or LLC).[32] State-level, public business registration documents therefore represent a robust sample of entrepreneurs at a similar and foundational stage of their entrepreneurial process (and a viable alternative to firm births in the Business Dynamics Statistics). Second, beyond counts of business registrants, characteristics noted within business registration filings (made at or close to the time of firm founding) are good endogenous signals for growth ambition or potential (what we call "entrepreneurial quality"). These "startup characteristics" include how a firm is organized (e.g., corporation vs. partnership), whether it is registered in Delaware, and how it is named (e.g., after its founder vs. a type of technology, and long vs. short). The paper verifies that early firm name choices are correlated with the founders' intentions with respect to growth.[33] For example, businesses named after an individual (e.g., Florentino's Handyman Services) or with terms like "café" or "realtor" are more likely to be local SMEs. Firms with short names or tied to specific high-tech sectors (like Stemcentrx in biotech) are likely positioning themselves as innovation-driven enterprises and signaling their intention and aspiration for growth. In addition, other "digital signatures" of early-stage milestones (e.g., filing for a patent or trademark close to their founding date) can help to identify high-potential firms.[34] Third, meaningful growth outcomes for startups (IPOs or high-value acquisitions within six years of founding) are observable with a lag and can be mapped back to startup characteristics to estimate the relationships between them. This mapping enables the estimation of entrepreneurial quality for any business registrant within the sample (even where outcomes have not yet materialized).[35] Entrepreneurial quality is thus measured as the estimated probability of achieving a growth outcome given startup characteristics at founding.[36]

Table 1 reports the core empirical relationship, which is based on a logit regression model that allows one to examine how the presence or absence of a startup characteristic correlates with the probability of growth (conditioning on the presence or absence of other startup characteristics). Before examining specific results, it is useful to highlight an important broad finding: there is an extremely strong (and robust) correlation between startup characteristics and the probability of growth. Substantial changes in the predicted likelihood of a growth outcome are associated with characteristics observable in real time from business registration records ("nowcasting") as well as characteristics observable with a lag (e.g., patent and trademark applications). At the time of founding, for example, corporations are four times more likely to grow, firms with short names are 2.5 times more likely to grow, and eponymous firms are 70 percent *less* likely to grow. The likelihood of growth is five times higher for firms with trademarks and thirty-five times higher for firms that apply for patents. Firms registering in Delaware have an even bigger disparity: they are forty-five times more likely to grow. Firms that both register in Delaware and apply for patents have an outsized 196X boost in their probability of growth. It is very important to emphasize that these startup characteristics are not the *causal* drivers of growth, but instead are "digital signatures" that allow us to distinguish firms in terms of their entrepreneurial quality. Registering in Delaware or filing for a patent will not guarantee a growth outcome for a new business, but the firms that historically have engaged in those activities have been associated with skewed growth outcomes.[37, 38] Finally, these changes in predicted probabilities are multiplicative in nature: a Delaware firm with both a patent and trademark is 984 times more likely to grow than a firm that only registers in its home state and does not apply for intellectual property protection.

Table 1
The Empirical Model:
The Predicted Relationship Between Startup Characteristics and Growth

	Change in the Probability of Growth
Has Short Name	248%
Firm Named after Founder	-70%
Corporation (Not Partnership or LLC)	405%
Trademark in First Year	501%
Patent and No Delaware Registration	3,534%
No Patent and Delaware Registration	4,470%
Both Patent and Delaware Reg.	19,640%
Sectoral Controls	Included
State Controls	Included

These findings can be used to construct, for every registered firm, its underlying probability of growth at founding. The probability of growth for an average firm is very low (on the order of one in 3,500). However, for those firms with multiple startup characteristics that positively predict growth, the probability of growth is dramatically higher (the top 1 percent of firms have a better than one in 100 chance of achieving growth outcomes). These estimates of entrepreneurial quality at the firm level can, in turn, be used to develop new economic statistics illustrating the state of American entrepreneurship over time (and across locations within the United States). We focus on three new indices that simultaneously account for both the quantity and the quality of entrepreneurship:

- EQI—the Entrepreneurial Quality Index—the *average* growth potential (or "quality") of any given group of new firms.
- RECPI—the Regional Entrepreneurship Cohort Potential Index—the number of startups within a particular location or region expected to later achieve a significant growth outcome.
- REAI—the Regional Entrepreneurship Acceleration Index—the ability of a region to convert entrepreneurial potential into realized growth.

Each index calculates a different quantitative measure that incorporates the quality of entrepreneurship. The EQI, RECPI, and REAI indexes give a better indication than possible under traditional methods about just how skewed the distributions of growth potential and likely growth outcomes are (and whether and to what extent a greater number of small to medium-sized businesses could be expected to catalyze the same growth outcomes as a high-potential growth firm).[39] Additionally, REAI systematically quantifies the ratio of r*ealized* to *expected* growth events for a given cohort of new firms, providing an indication of whether the ecosystem in which a cohort of new firms is located is conducive to growth (or not). As such, these indexes offer policymakers and stakeholders a better view of whether and to what extent their regions are attracting/generating startups with high-growth potential vs. helping/hampering these firms' efforts to realize their potential.

The State of American Entrepreneurship

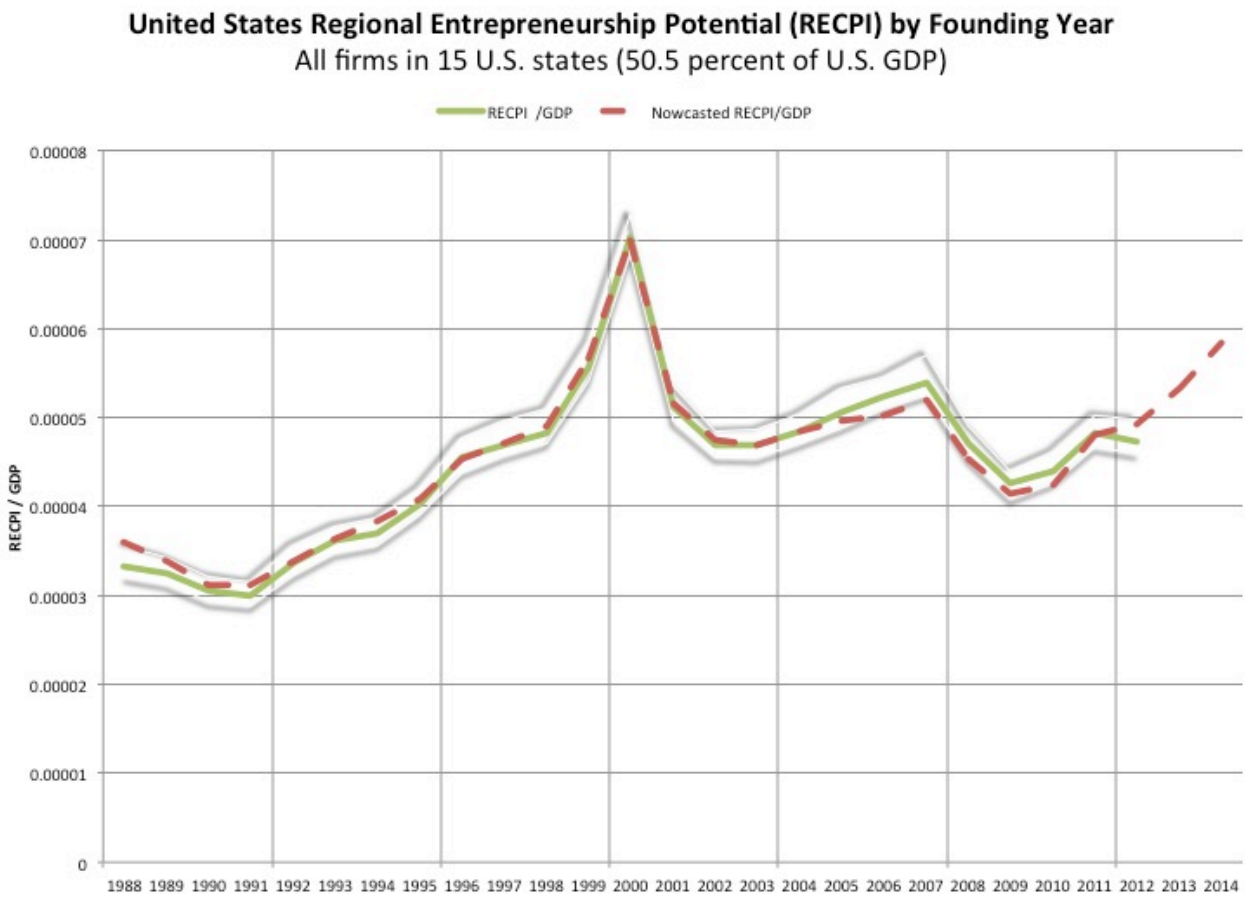
Looking at EQI, RECPI, and REAI on an annual basis from 1988–2014 for fifteen states (representing close to 51 percent of U.S. GDP), presents a different and deeper view into the state of American entrepreneurship. Figure 3 highlights several interrelated patterns:

- The expected number of growth outcomes (think successful startups) in the United States (RECPI relative to GDP or "U.S. RECPI") has followed a cyclical pattern that appears sensitive to the capital market environment and overall market conditions.
- U.S. RECPI reflects broad and well-known changes in the environment for startups, such as the dotcom boom and bust of the late 1990s and early 2000s.[40]
- While the expected number of high-growth startups peaked in 2000 and then fell dramatically with the dot-com bust, starting in 2010 there is a sharp, upward swing in the expected number of successful startups formed and the accumulation of entrepreneurial

potential for growth (even after controlling for the change in the overall size of the economy).

- Notwithstanding the cyclical nature of U.S. RECPI trends, U.S. RECPI has exhibited an overarching *upward* trend across the full time-series of our sample (Figure 3). The rate of expected successful startups fell to its lowest point in 1991, at a level that has not been approached again. U.S. RECPI downturns in the wake of the dot-com burst (from 2000–2004) and Great Recession (from 2007–2009) ebbed at levels significantly above its 1991 nadir. U.S. RECPI thus provides a strong signal that the state of American entrepreneurship is not imperiled by a lack of formation of high-growth-potential startups, but, instead, by other dynamics or ecosystem effects that may be inhibiting the ability of startups to realize their growth potential.
- Finally, relative to quantity-based measures,[41, 42, 43] of entrepreneurship, regional variation in entrepreneurial quality appears to hold a stronger relationship to economic growth. Once one controls for the initial level of GDP, MSA-level GDP growth between 2003 and 2014 is uncorrelated with the baseline quantity of entrepreneurship but has a statistically and quantitatively significant relationship with the baseline level of entrepreneurial quality. (see Guzman and Stern, 2016, Table 5).

Figure 3 (Source: Guzman and Stern, 2016)



While variation across cohorts' average growth potential has a clear relationship to later performance, there remain striking differences across place and time in the likelihood of startups for a given quality level—EQI to realize their potential (REAI). Figure 4 presents the overall pattern of REAI from 1988–2012:

- The cohorts of new firms with the greatest average growth potential did not end up being the most successful (in terms of realized growth outcomes). While the 1996 cohort of new firms turned out to be the most successful, the 1998 and 1999 cohorts exhibited the highest level of average growth potential. This may suggest that the "financial guillotine" [44, 45] unleashed after the dot-com crash may have significantly reduced the ability of startups to realize their potential.
- REAI—the likelihood of startups to reach their potential—declined sharply in the late 1990s and did not recover through at least 2008 (Figure 4). During this time period (which preceded the Great Recession), the American ecosystem for entrepreneurship was *not* conducive to startup growth. For example, conditional on the same estimated potential, a 1996 startup was four times more likely to achieve a growth event in six years than was a startup founded in 2005.
- These estimates highlight a potential improvement in the United States' ability to catalyze startup growth between 2009 and 2011 in parallel with the increased availability of venture capital during that time. But 2009–2011 REAI preliminary estimates still remain markedly lower than REAI levels observed during the 1990s. Put another way, the U.S. entrepreneurial ecosystem is still dramatically *less* conducive for growth than it was in the dot-com era.
- There is striking variation in entrepreneurial potential for growth (EQI) across regions and over time. Figure 5 shows a map of the United States where each point represents the EQI of the corresponding zip code. The size of the point reflects the *quantity* of entrepreneurship, while the color reflects the *quality*. The darker the shade of red, the greater the average probability of growth. The brighter the shade of white, the greater the number of new firms with lower potential/ambition for growth.[46] As illustrated in Figure 5, consistent with practitioner perceptions, there are extremely high and persistent levels of entrepreneurial quality in Silicon Valley and Route 128 (in Massachusetts), as well as a pronounced rise in startup activity in the two urban cores closest to both hotspots (San Francisco and Cambridge/Boston). At the same time, however, there are also regions where the "startup nation" has yet to take off, despite some of the highest levels of self-employment per capita in the nation, such as Miami, Florida.

Figure 4 (Source: Guzman and Stern, 2016)

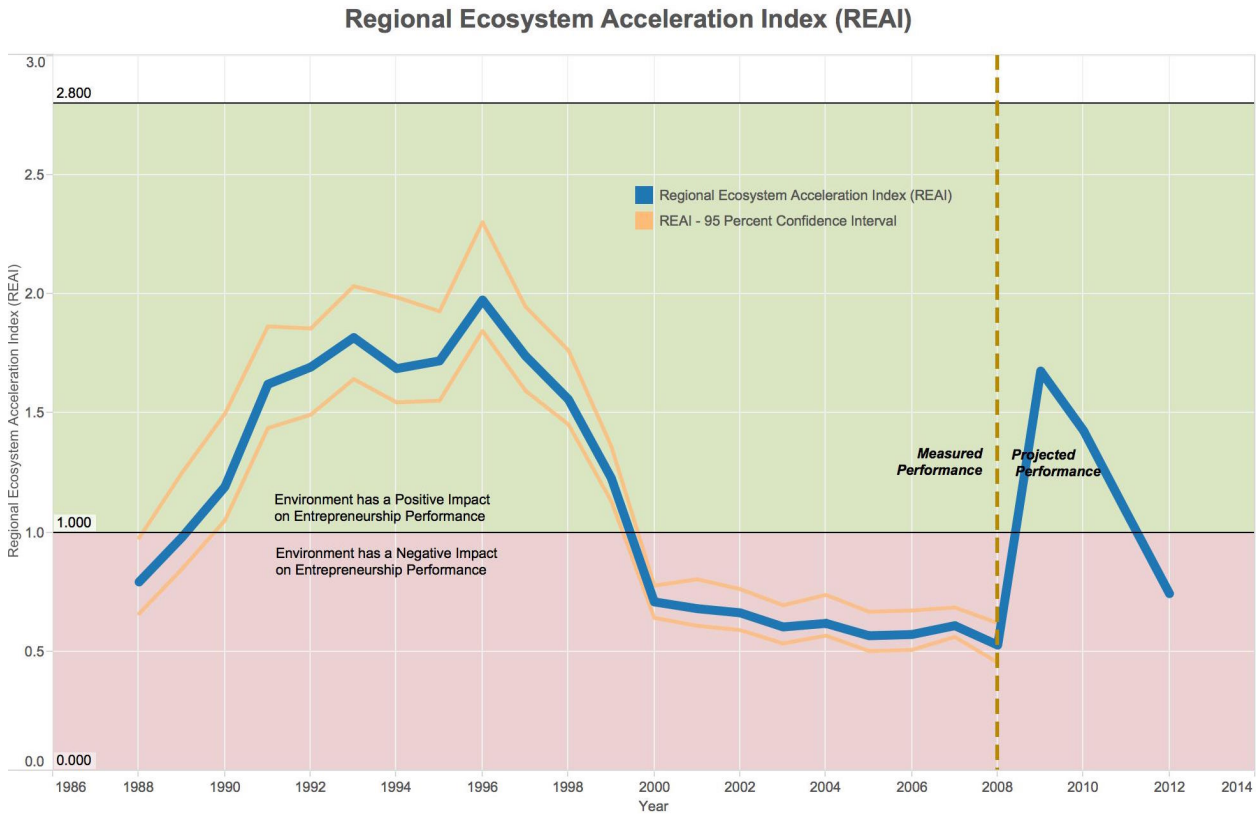
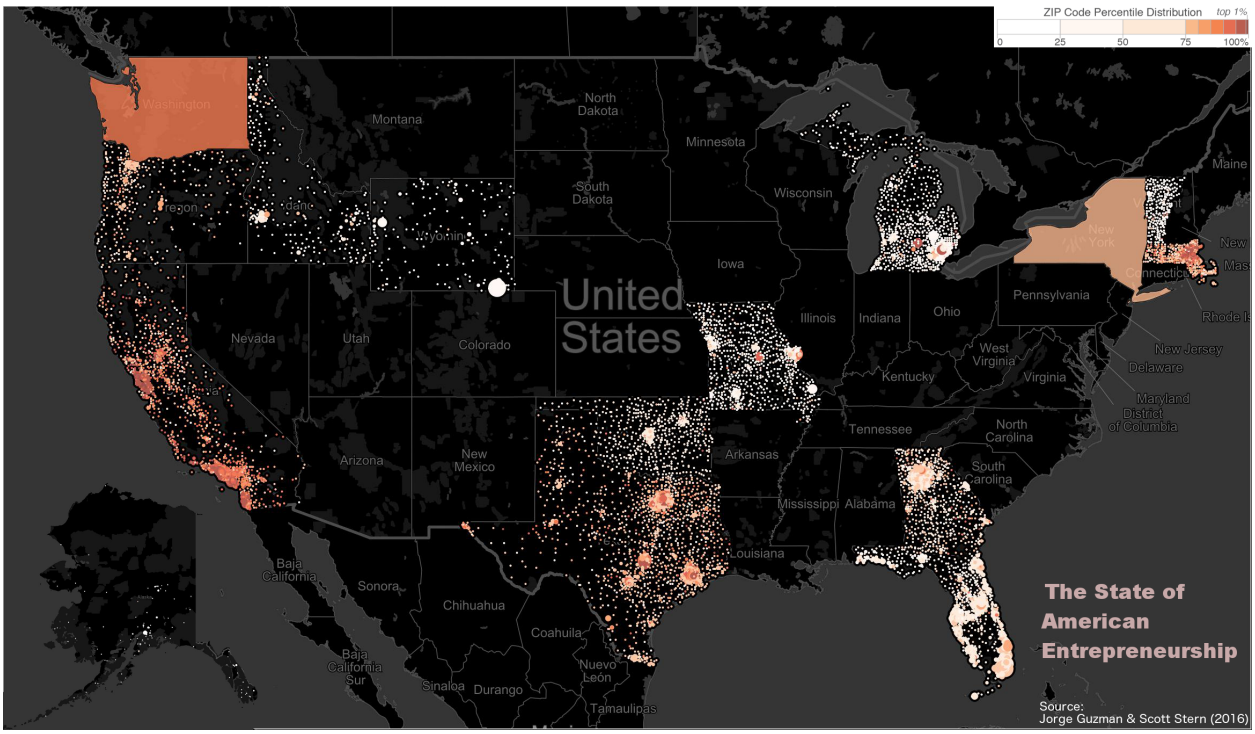


Figure 5 (Source: Guzman and Stern, 2016)



These findings bring into sharp relief the importance of accounting for differences in quality when considering the state of American entrepreneurship. Not every newly founded company has the ambition and potential for significant growth, and those startups that do differ in important ways from those that do not. Thus, policies that aim to increase "shots on goal" and implicitly treat all firms as equally likely candidates for growth are likely to expect "too much" from the vast majority of new businesses, by focusing on a lever—new firm formation—that is only weakly related to economic growth.

While the overall decline in business dynamism observed in quantity-based measures does raise cause for concern,[47] that concern, with respect to high-growth-potential startups, may be misplaced. U.S. RECPI does not register a long-term decline, but, instead, shows more cyclical boom and bust cycles with a general upward trend. There has been a sustained increase in U.S. RECPI starting in 2010.

Much more worrisome than the rate of creation of high-growth-potential firms is the decline in the United States' ability to accelerate the growth of new businesses conditional on initial quality—the REAI—which has been falling since the late 1990s and only recently, and mildly, began to recover. Even as the number of new ideas and potential for innovation is increasing, there seems to be a reduction in startups' ability to scale in a meaningful and systematic way. Whether this is primarily a challenge for capital markets or reflects systematic reductions in

various aspects of ecosystem efficiency remains an important challenge for both future research and policy intervention.

Finally, the regional variation found in startup performance reflects very significant differences in both the underlying quality of ventures started there and the ability of different ecosystems within the United States to nurture startups in order to realize growth. Systematic and real-time metrics for the measurement of entrepreneurial quality and ecosystem performance can serve as powerful tools for policymakers and stakeholders seeking to accelerate and reinforce the impact of entrepreneurship on economic and social progress within their communities.

Time for a New Policy Conversation

The distribution and skewness of entrepreneurial quality empirically demonstrates the need to frame the policy conversation around American entrepreneurship from a different vantage point. Policymakers should account for quality when mapping the rate and trajectory of new firms founded and set objectives for enabling high-growth-potential IDEs that are different from (though coordinated with) their programs and objectives for SMEs.

Though more research is necessary to confirm and deepen these findings, the increasing rate of creation of high-growth-potential startups implies that policy dialogue may benefit from a heightened focus on improving the scaling capability of regional ecosystems. Given the striking variation in entrepreneurial potential for growth (EQI) across regions and over time, tailored analysis of each region's innovation and entrepreneurial capacity is needed to find where gaps in a region's ability to accelerate entrepreneurial potential may lie and to develop tailored strategies for policy intervention. Experimental approaches may be needed to collect evidence regarding the effectiveness of proposed interventions.

With respect to other types of firms, including small to medium-sized local businesses whose relative decline is accurately reflected in indices that focus on quantity, different solutions are required. Programs should specifically target the needs of this category of young firms, without expecting that they will necessarily fuel economy-wide growth.

Finally, the mix of support and programs offered should reflect the makeup of new businesses and high-potential-growth startups found in a given region and should be tailored to their specific needs. Where strong innovation-driven entrepreneurial ecosystems (e.g., Silicon Valley, Greater Boston/Kendall Square) may be producing enough startups, the question becomes what types of other businesses are needed. Where regions, like Miami, have high rates of new self-employment but register a low score for entrepreneurial quality, there may be a case for considering dedicated investments in building the foundations for a more robust innovation-driven entrepreneurial ecosystem that also leverages local comparative advantage.

Accurately diagnosing the challenges facing specific ecosystems is likely to be a challenge. As the former administrator of the U.S. Small Business Administration and current Senior Fellow at Harvard Business School, Karen Mills, noted: "there is no one-size-fits-all package to help small businesses, precisely because each of the different types of small businesses has different needs.

The SME business owner needs a different kind of capital from the high-tech entrepreneur. For each city or region, the right mix of programs depends on what outcomes the leadership of that area is trying to achieve."[48]

At MIT, we have had a chance to put elements of such a playbook into action through the Regional Entrepreneurial Acceleration Program, which works with stakeholder teams from around the world to not only undertake systematic analysis of their innovation-driven entrepreneurial ecosystems, but also to put their insights into action through the development and implementation of a regional entrepreneurship acceleration strategy.[49]

Conclusion

"To tackle our biggest societal challenges, we need an innovation pipeline that delivers every drop."[50] Quality-based measures of entrepreneurship enrich our understanding of the state of American entrepreneurship and better inform where policy and program interventions in support of startups should be focused. Changes in both entrepreneurial potential and ecosystem effects are important for understanding the state of American entrepreneurship. While the supply of new high-potential-growth startups appears to be growing, the ability of U.S. high-growth-potential startups to commercialize and scale seems to be facing continuing stagnation. Policy interventions to enhance the process of scale-up may be more impactful than those that simply aim to increase shots on goal. Ultimately, we may be able to do better for both fledgling small to medium-sized enterprises and innovation-driven enterprises that aspire to exponential growth by accounting directly for the differences between them. Allowing each to make their distinct contributions to U.S. performance requires a new conversation.

End Notes

[1] This paper builds on the MIT Innovation Initiative Laboratory for Innovation Science and Policy working paper "The State of American Entrepreneurship: New Estimates of the Quality and Quantity of Entrepreneurship for 15 U.S. States, 1988–2014," by Jorge Guzman and Scott Stern and research presented at the 2015 Kauffman Foundation New Entrepreneurial Growth conference. We thank Erik Brynjolffson, John Haltiwanger, Joshua Gans, and Phil Budden for helpful suggestions. We are also grateful to Tetyana Pecherska for copy editing assistance. We acknowledge and thank the Jean Hammond (1986) and Michael Krasner (1974) Entrepreneurship Fund and the Edward B. Roberts (1957) Entrepreneurship Fund at MIT for financial support. This briefing is included in the Kauffman Foundation New Entrepreneurial Growth Agenda Online Volume. It is reprinted with permission. All errors and omissions are, of course, our own.

[2] Fazio and Guzman, MIT; Stern and Murray, MIT and NBER.

[3] Litan, Robert E. "Inventive Billion Dollar Firms: A Faster Way to Grow." SSRN Working Paper #1721608 (2010).

[4] As Ben Cohen of Ben & Jerry's fondly recalls: "[W]e took a $5 correspondence course in ice-cream technology and started making ice cream in our kitchen … When we first started, it was just a lark. We never expected to have anything more than that one homemade ice-cream shop …" How We Met: Ben Cohen And Jerry Greenfield. Interviews by Ronna Greenstreet, INDEPENDENT, May 27, 1995. Available at http://www.independent.co.uk/arts-entertainment/how-we-met-ben-cohen-and-jerry-greenfield-1621559.html.

[5] Aulet, William, and Fiona Murray. "A Tale of Two Entrepreneurs: Understanding Differences in the Types of Entrepreneurship in the Economy." Available at SSRN 2259740 (2013).

[6] Hurst, Erik, and Benjamin Wild Pugsley. "What do small businesses do?" Brookings Papers on Economic Activity (2011): 73–143.

[7] Aulet, William, and Fiona Murray. "A Tale of Two Entrepreneurs: Understanding differences in the Types of Entrepreneurship in the Economy." Available at SSRN 2259740 (2013).

[8] Decker, Ryan, John Haltiwanger, Ron Jarmin, and Javier Miranda. "The role of entrepreneurship in U.S. job creation and economic dynamism." *Journal of Economic Perspectives* 28.3 (2014): 3–24.

[9] Decker, Ryan, John Haltiwanger, Ron Jarmin, and Javier Miranda. "Where has all the skewness gone? The decline in high-growth (young) firms in the U.S." NBER Working Paper # *21776*. National Bureau of Economic Research, (2015).

[10] Haltiwanger, John. "Top Ten Signs of Declining Business Dynamism and Entrepreneurship in the U.S." Working Paper (2015). Web. Accessed on Feb. 8, 2016. http://econweb.umd.edu/~haltiwan/Haltiwanger_Kauffman_Conference_August_1_2015.pdf.

[11] Clifton, Jim, Chairman and CEO of Gallup. "American Entrepreneurship: Dead or Alive?" *Business Journal*, Jan. 13, 2015. Available at http://www.gallup.com/businessjournal/180431/american-entrepreneurship-dead-alive.aspx.

[12] Roberts, Edward B., Fiona Murray, and J. Daniel Kim. "Entrepreneurship and Innovation at MIT: Continuing Global Growth and Impact." MIT Innovation Initiative. (2015).

[13] "San Francisco, Silicon Valley, and the strip of land that runs along the shore of the Bay between them have had a tremendous decade … Every year new ideas grow from specks to spectacular. Startups are so commonplace that in San Francisco's Mission district you can buy greeting cards that say, 'Congratulations on closing your first round.' Uber, a six-year-old taxi-hailing company, is valued at $41 billion; Airbnb, a seven-year-old firm through which people turn their homes into hotels, is valued at $26 billion. … And at the same time, you hear the worry that the boom … cannot last …"

"To fly, to fall, to fly again." *The Economist.* Print Edition. July 24, 2015.

[14] Andreesen, Marc (pmarca). '"There's too much entrepreneurship: Disruption running wild!" "There's too little entrepreneurship: Economy stalling out!"' Jan. 2, 2015. 9:11 PM. Tweet.

[15] Guzman, Jorge, and Scott Stern. "The State of American Entrepreneurship: New Estimates of the Quantity and Quality of Entrepreneurship for 15 U.S. States, 1988–2014." MIT Innovation Initiative Laboratory for Innovation Science and Policy Working Paper (2016).

[16] Mills, Karen. "A Playbook for Making America More Entrepreneurial." *Harvard Business Review*. May 27, 2015.
[17] Decker, Ryan, et al. (2014) Op. cit.

[18] Decker, Ryan, et al. (2015) Op. cit.

[19] Haltiwanger, John. "Top Ten Signs of Declining Business Dynamism and Entrepreneurship in the U.S." Working Paper (2015). Web. Accessed on Feb. 8, 2016. http://econweb.umd.edu/~haltiwan/Haltiwanger_Kauffman_Conference_August_1_2015.pdf.

[20] Fairlie, Robert W., E. J. Reedy, Arnobio Morelix, and Joshua Russell. "Kauffman Index: Startup Activity. National Trends" (2015). Web. Accessed on Feb. 8, 2016. http://www.kauffman.org/microsites/kauffman-index/reports/startup-activity.

[21] The Current Population Survey (CPS), sponsored jointly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics (BLS), is the primary source of labor force statistics for the population of the United States. http://www.census.gov/programs-surveys/cps.html.

[22] See, e.g., Kauffman Startup Indexes for 2013, 2014, and 2015.

[23] For more than two decades, an important line of research has highlighted the role of young, rather than small, firms in employment growth and economic performance in the United States (see [14–16]).

[24] Davis, Steven J., and John Haltiwanger. "Gross Job Creation, Gross Job Destruction, and Employment Reallocation." *Quarterly Journal of Economics* (1992): 819–863.

[25] Davis, Steven J., John C. Haltiwanger, and Scott Schuh. "Job creation and destruction." *MIT Press Books* (1998).

[26] Haltiwanger, John, Ron S. Jarmin, and Javier Miranda. "Who creates jobs? Small versus large versus young." *Review of Economics and Statistics* 95.2 (2013): 347–361.

[27] Fairlie, Robert W., E. J. Reedy, Arnobio Morelix, and Joshua Russell. "Kauffman Index: Startup Activity. National Trends" (2015. Web. Accessed on Feb. 8, 2016. http://www.kauffman.org/microsites/kauffman-index/reports/startup-activity.

[28] See, e.g., Kauffman Startup Indexes for 2013, 2014, and 2015.

[29] The "2015 IPO Report" by WilmerHale. https://www.wilmerhale.com/uploadedFiles/Shared_Content/Editorial/Publications/Documents/2015-WilmerHale-IPO-Report.pdf.

[30] Annual figures drawn from The "PwC/NVCA MoneyTree™ Report. Available at https://www.pwcmoneytree.com/HistoricTrends/CustomQueryHistoricTrend.

[31] Guzman, Jorge, and Scott Stern. "The State of American Entrepreneurship: New Estimates of the Quantity and Quality of Entrepreneurship for 15 U.S. States, 1988–2014." MIT Innovation Initiative Laboratory for Innovation Science and Policy Working Paper (2016).

[32] This is true whether the new firm aims to grow in a linear fashion (as most small to medium-sized businesses do) or in an exponential fashion (as most startups do).

[33] Belenzon, Sharon, Aaron K. Chatterji, and Brendan Daley. "Eponymous entrepreneurs." Working paper (2014).

[34] While the startup characteristics identified and used to estimate entrepreneurial quality have proven an informative starting point, alternative predictors are, of course, possible, and we consider this a fruitful area for research going forward.

[35] The paper separately tests whether the process by which startup characteristics map to growth outcomes remains stable over time to ensure that the underlying correlations relied upon remain valid across the full time frame of the sample.

[36] As discussed in full detail in Guzman and Stern (2016), the paper defines a significant growth event (an initial public offering or acquisition within six years) as the outcome of interest. The paper then draws from the full population of new businesses registered with a state as a corporation, partnership, or LLC, and builds a dataset of characteristics for each new firm observable at or near the time of founding (a set of measures referred to as "startup characteristics"). The regression model is based on a probit model of the relationship between the growth event and observable startup characteristics. Finally, the model's predictive capability is tested using the standard ten-fold cross-validation approach, which compares the predicted values generated by the model to observed growth across ten different random holdout (testing) samples.

[37]It is important to note that this equity growth outcome is different from employment growth, which has been the focus of many studies, including those by Davis, Decker, Haltiwanger, Jarmin, and Miranda (see references 8–10, 19, 24–26). While we hypothesize that those startups that achieve equity growth outcomes under this approach are highly correlated with those that disproportionately contribute to employment growth, the precise relationship between these two groups remains an open research question.

[38] To test the model's predictive capability and evaluate the skewness of entrepreneurial growth potential, the paper compares estimated probabilities of growth outcomes to realized growth outcomes in a ten-fold cross validation. Sixty-nine percent of realized growth events fall within the top 5 percent of the models' estimated entrepreneurial quality distribution, and more than 50 percent of the realized growth outcomes fall in the top 1 percent. Thus, not only is the model highly predictive, but the distribution of realized growth outcomes (conditional on initial entrepreneurial quality) also is likewise highly skewed**.**

[39] The level of skewness of entrepreneurial quality is highly informative. It indicates how much more likely a startup at the high end of the entrepreneurial quality distribution is to grow than an average firm. If skewness were low, then adding several average firms could have as much regional impact as one high-growth-potential firm. But, if skewness is high (as the findings indicate), then a much larger number of firms with average growth potential is needed to generate the expected impact of one high-potential firm. Given the level of skewness observed, almost 4,000 local limited liability companies (average firm) are needed to generate the same potential as only one new Delaware corporation with an early patent and trademark. Put another way, initial ambition/potential for growth is a key dimension of heterogeneity across new firms. The subset of high-potential-growth startups is very small and fundamentally different than the vast majority of new firms.

[40] RECPI also offers an important comparison relative to simple measures of "success" (e.g., counting the number of high-value exits in a given year or cohort). As described above, success-oriented measures, though informative, necessarily conflate the founding of growth-oriented firms and the process by which the growth potential is realized. RECPI, on the other hand, provides a direct measure of the expected number of high-growth startups independent of other factors or conditions that may impact the realization of growth outcomes.

[41] Fairlie, et al. Op. cit.

[42] Haltiwanger, John, Ron Jarmin, and Javier Miranda. "Business Dynamics Statistics: An Overview." *The Kauffman Foundation*. (2009).

[43] Singer, Slavica, José Ernesto Amorós, and D. Moska Arreola. "Global entrepreneurship monitor: 2014 global report." Global Entrepreneurship Research Association (2015): 1–116.

[44] Nanda, Ramana, and Matthew Rhodes-Kropf. "Investment cycles and startup innovation." *Journal of Financial Economics* 110.2 (2013): 403–418.

[45] Nanda, Ramana, and Matthew Rhodes-Kropf. "Financing risk and innovation." *Management Science (Forthcoming)*.

[46] In the states of New York and Washington, firm registrations do not contain zip code information. Accordingly, estimations of entrepreneurial quality can only be calculated at a state level. The average entrepreneurial quality of new firms is shown at a state level in a single shade of color.

[47] Decker, et al. Op. cit.

[48] Mills, Karen. "A Playbook for Making America More Entrepreneurial." *Harvard Business Review*. May 27, 2015.

[49] For more information on the MIT Regional Acceleration Program, see reap.mit.edu.

[50] Reif, Rafael. "A better way to deliver innovation to the world." *The Washington Post.* Opinions. May 22, 2015.