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# Regional ecologies of entrepreneurship

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Why do some regions produce more entrepreneurs than others? An ecological lens provides insight into this question: The demography of organizations in a region – particularly the proportion of small and young employers – shapes many aspects of the environment for would-be entrepreneurs: (i) beliefs about the desirability of founding a firm, (ii) opportunities to learn about entrepreneurship and to build the abilities needed to succeed, and (iii) the ease of acquiring critical resources. Births of new industries and the demise of mature ones can therefore catalyze rapid changes in the rates of entrepreneurship that become self-reinforcing.

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In 1994, Annalee Saxenian portrayed Boston as the epitome of an ossified business community (Saxenian 1994). It had few startups and its employees ended up isolated in a handful of corporate juggernauts, silos of human capital, ideas, and know-how. By contrast, for her, Silicon Valley represented the archetypal entrepreneurial region. Its employees combined and recombined in novel ways as companies formed and dissolved. Even the organizations themselves seemed to have porous boundaries—employees would move and continue to exchange information with their former colleagues.

Fast forward twenty years. Silicon Valley has maintained much of its entrepreneurial vitality. But Boston has been transformed. Walking west from MIT to Harvard, one passes block upon block of renovated industrial buildings and modern structures, housing dozens of fledgling firms, research institutes, and venture capital partnerships, as well as an array of trendy restaurants and coffee shops that fuels their employees. The area brims with energy and the statistics suggest that it has become Silicon Valley’s equal in entrepreneurship: In 2015, the Kauffman Index of Growth Entrepreneurship placed Boston ahead of both San Jose and San Francisco as a hot-spot for high-potential startups (Morelix et al. 2016).

What in Boston changed? Did it suddenly

attract the right talent or build the necessary infrastructure? MIT and Harvard have been major players in science and engineering for much more than twenty years (Bathelt 2001), indeed much longer than Stanford and Berkeley have. Boston has also long had one of the most educated populations in the United States (Glaeser 2005). It has never had a shortage of talent. And venture capital appeared first in the Boston area, decades before its center of mass shifted toward the Bay Area (Hsu and Kenney 2005).

This example presents a microcosm of a larger puzzle. Both countries and regions vary in their levels of economic dynamism—the entry and exit rates of organizations. Some regions produce more entrepreneurs than others, and with them, more jobs and economic growth (Reynolds et al. 1994; Fritsch and Storey 2014). Many have attempted to understand these entrepreneurship rates as a consequence of regional variation in the underlying factors of production, the availability of financial, human, and intellectual capital (e.g., Florida and Kenney 1988; Armington and Acs 2002; Lee et al. 2004; Audretsch and Lehmann 2005; Drucker 2016). But the sorts of variables easily quantified and compared across regions have failed to explain much, if not most, of this variation in entrepreneurial activity.<sup>1</sup>

Economic geographers therefore have turned

<sup>1</sup>The number of small firms in a region has been a strong predictor of entrepreneurship rates at the regional level (e.g., Audretsch and Fritsch 1994; Reynolds et al. 1994; Sorenson and Audia 2000). But that factor differs from others because it effectively measures lagged entrepreneurship. The ecological dynamics discussed below elucidate processes that may account for that lagged effect.

to culture – the beliefs, norms, and values held by residents of a region – for the answer (e.g., Piore and Sabel 1984; Saxenian 1994; Davidson 1995; Storper 1997; Gertler 2004; Bathelt and Glückler 2014; Spigel 2017).<sup>2</sup> Returning to Boston, in the 1970s and 1980s, people there did not see founding a firm or joining a startup as an attractive career path. Few people did it. Those that did often had been misfits to the main employers of the day, places like Digital Equipment (DEC), Fidelity, and Polaroid. But now, many of the most promising graduates of Harvard, MIT, and the region's other colleges and universities choose jobs at startups over plum positions with established employers. Perhaps these changing attitudes towards entrepreneurship led to the revitalization of the region.

But this shift to culture as an explanation raises its own issues. Although a number of compelling case studies describe ways in which regions differ in terms of their beliefs, norms, and values (e.g., Saxenian 1994; Feldman 2001; Aoyama 2009; Spigel 2017), quantitative analyses have had little ability to account for differences in entrepreneurship rates using information on local attitudes and practices (Beugelsdijk and Noorderhaven 2004; Bosma and Schutjens 2011; Kibler et al. 2014).

Even when culture does appear able to explain differences in dynamism across regions at a particular point in time, further questions arise when one looks through a longitudinal lens. The case studies and quantitative analyses that have identified culture as an important ingredient have relied on cross-sectional variation across regions. That approach has seemed sensible. Given that culture has been seen as almost immutable, the regional culture at any point in time should reflect its stable character. But, as the Boston example illustrates, the economic dynamism of a region can change, often in a short span of time. For culture to explain rates of entrepreneurship, it would need to have a similar pliability.

By adopting an ecological lens, I argue that these shifts in rates of entrepreneurship should and do occur naturally. Far from

being a near-miraculous transformation of the culture of the community, they emerge endogenously as a consequence of the organizational demography of the area. Regions rich in startups produce individuals better equipped to found firms and to staff startups. They create a climate (culture) in which entrepreneurship becomes “normal” (legitimated in the parlance of sociology) and support an infrastructure that reduces the costs of being an entrepreneur. Regions rich in startups therefore engender ecosystems that foster the emergence of future entrepreneurs (Sorenson and Audia 2000).

That idea, however, raises something of a chicken-and-egg problem. Where do the first startups come from? How does a region dominated by corporate juggernauts become a hot bed of entrepreneurship? These transitions appear to arise in response to particular precipitating circumstances. Mass layoffs, for example, can leave many talented individuals in need of jobs (Malmberg and Maskell 2002; Feldman et al. 2005). Liquidity events – such as acquisitions and public offerings (IPOs) – can produce pools of people flush with cash and eager to pursue the next challenge (Stuart and Sorenson 2003b). Conceptual and technological innovations can create a euphoria around the possible emergence of a novel industry. Because the people experiencing these events remain rooted in place (Dahl and Sorenson 2009, 2010), their effects concentrate within a community. If sufficient in number, the startups precipitated can provide the critical mass needed to transform a region into an entrepreneurial one.

But entrepreneurial regions need not remain so. As companies expand and encapsulate more and more of the talent and resources in a community, the interest in entrepreneurship and the ease of founding a firm wane. Detroit had once been the Silicon Valley of its time, the place for entrepreneurs – primarily in the automobile industry – to pursue fame and fortune. But then the industry consolidated. Ford, Chrysler, and General Motors came to dominate the scene. Entrepreneurship, except

<sup>2</sup>Social scientists have long speculated that culture influences economic activity. But early formulations focused on culture as a national-level phenomenon (e.g., Weber 1930). The more recent literature suggests that communities of individuals within particular countries have their own distinct local cultures that may foster growth.

for the opening of shops and restaurants and other sorts of mundane services, became a distant memory. The dynamism of Detroit's economy followed the life cycle of the automobile industry, the dominant employer in the region.

Below, I first present the theoretical case for this ecological perspective on the emergence and persistence of entrepreneurial culture and entrepreneurial ecosystems. I then develop some of the implications of this theory for how one would expect industries, regions, and regional attitudes to evolve. Note that, although I present this perspective as an ecological one, it also seems very much consistent with and in the spirit of both an evolutionary economic geography (Boschma and Frenken 2006) and a relational one (Bathelt and Glückler 2003).

## Entrepreneurial cultures and ecosystems

One of, if not the, central question in economic geography has been why have the residents of some places become wealthier than those of others? Early research, motivated by the importance of heavy manufacturing in an earlier age, focused on transportation costs and proximity to important natural resources, such as coal and iron ore, as potential answers to this question (Weber 1928; Isard 1949; Greenhut 1956). But as high technology, information goods, and services have become more and more important to economies, explanations for economic prosperity have turned to the local availability of ideas and information and to the advantages that producers might accrue from preferential access to them (Marshall 1922; Storper and Walker 1989; Porter 1990).

The most recent elaborations of the sources of regional advantage, moreover, have highlighted the importance of entrepreneurship to the creation of wealth (Saxenian 1994; Delgado et al. 2010; Stam 2015). As noted above, regions differ dramatically in their levels of economic dynamism (Fritsch and Storey 2014). Reynolds et al. (1994), for example, reported that the most entrepreneurial regions, within the countries that they studied in Europe, had three to four times as many startups in any given year as the least entrepreneurial

ones. These regional differences, moreover, become more pronounced as one examines ever-smaller areal units and as one moves from comparing aggregate rates of entrepreneurship to focusing on the founding of firms within particular sectors or industries. Single-industry studies – such as those for footwear (Sorenson and Audia 2000), biotechnology (Stuart and Sorenson 2003a), automobiles (Boschma and Wenting 2007; Klepper 2010), and video games (De Vaan et al. 2013) – often find that the most dynamic regions have startup rates an order-of-magnitude, or more, higher than the average.

These regional differences matter because entrepreneurship appears to be an engine of economic growth. Recent research, for example, has found that startups account for a disproportionate share of net job creation in the United States (Haltiwanger et al. 2013), as well as in dozens of other countries (Ayyagari et al. 2014; de Wit and de Kok 2014; Lawless 2014). Not surprisingly, this connection between entrepreneurship and economic growth has been strongest when focusing not on businesses with local bases, such as restaurants and retail outlets, but on the manufacturing and service firms that can also sell to customers outside the region (Wong et al. 2005). Samila and Sorenson (2011), for example, found that the small sliver of startups funded by venture capital could account for a substantial share of all job creation and economic growth in the United States in the 1990s.

Despite the importance of entrepreneurship to regional economic growth, research into why some regions produce more entrepreneurs than others has met with limited success. Much of this failure stems from the inability of the ideas introduced to account for change. Human capital, financial capital, access to innovations, and a supportive infrastructure all help to create an environment conducive to entrepreneurship. But meaningful improvements in these inputs requires decades while regional rates of entrepreneurship can rise in the course of mere years. What could account not just for the relative rates of entrepreneurship across regions but also for their variation over time?

In discussing the processes that might ac-

count for these differences, I shall distinguish between two ideas. By *entrepreneurial culture*, I mean only that founding a firm or joining a startup as an employee represents something seen as desirable by those living in a region. Note that this definition imposes a more restrictive use of the term than one often finds.<sup>3</sup> One could also claim that this concept captures an individual attitude rather than a culture. Although I would not disagree with that designation, I nevertheless use the term “culture” for convenience and to emphasize that if one considers such attitudes to be a part of culture that they can and do change.

By contrast, I use *entrepreneurial ecosystem* to refer to regions that have both a demography of organizations conducive to developing entrepreneurs and an infrastructure to support them.<sup>4</sup> This idea overlaps with other concepts. Successful places have been characterized as industrial districts, clusters, regional production systems, regional innovation systems, and learning regions (Storper and Walker 1989; Becattini 1990; Porter 1990; Asheim 1996; Cooke 2001)—to name a few. Each of these labels calls attention to a different aspect of the region. The notion of a cluster, for example, emphasizes the importance of the agglomeration of similar firms while the idea of a learning region focuses on the collective accretion of knowledge across firms. Like the repackaging of a stale product, this relabeling can breathe renewed interest into the phenomenon. But the underlying places being described, and many of the characteristics accorded to them, remain the same regardless of the nomenclature. For my purposes, the nuanced distinctions between these concepts does not matter. I therefore will not attempt to distinguish an entrepreneurial ecosystem from these other concepts. I nevertheless prefer the term ecosystem because it applies even to diversified economies and accords well with the notion of an ecological perspective.

<sup>3</sup>Spigel (2017), for example, has portrayed entrepreneurial culture as a complex set of beliefs and symbols that influence the ways in which people in a region approach being an entrepreneur.

<sup>4</sup>Some elements of the ecosystem may extend beyond the region. Suppliers and later-stage venture capital, for example, may have their headquarters elsewhere (Sorenson and Stuart 2001; Bathelt et al. 2004; Owen-Smith and Powell 2004). I nevertheless focus on the resources and interactions within regions. To the extent that entrepreneurs can access components of an ecosystem at a distance, those resources should play less of a role in producing differences across regions.

## The ecology of entrepreneurship

The central insight of organizational ecology has been that other organizations shape the environments in which firms operate, determining the opportunities for entrepreneurs and imposing competitive pressure on incumbents (Hannan and Freeman 1977). Organizations from this perspective also form the environments for employees, constraining the availability of jobs and opportunities for advancement, developing their abilities in particular directions, and influencing their beliefs and experiences (Haveman and Cohen 1994; Sørensen and Sorenson 2007; Sørensen and Sharkey 2014).

The environments created by these ecologies of organizations, moreover, differ from place to place. Because individuals typically do not commute more than a few miles and do not move far from their prior places of residence when they relocate, the relevant population of organizations, the environment, for the purposes of employment exists at a regional level. That fact holds even more true for entrepreneurs, who have an even greater propensity to remain rooted in place, to found their firms in the regions in which they have been living and working (Figueiredo et al. 2002; Michelacci and Silva 2007; Dahl and Sorenson 2009).

The demography of organizations within a region – their age and size distributions, in particular – shapes the employment experiences of the individuals there. In an Italianate industrial cluster, the average individual has experience in several small firms (Piore and Sabel 1984; Becattini 1990); in Cincinnati, by contrast, a typical person might have had a career in one large one, perhaps Kroger or Proctor & Gamble. These differential experiences, in turn, influence the proclivity and ability of those in the region to become entrepreneurs. In regions with more small and young firms, founding a firm becomes seen as a more de-

sirable career path; the pool of those prepared to become entrepreneurs expands; and infrastructures emerge that reduce the costs of becoming an entrepreneur.

Before considering each of these factors in detail, note that these differences in the experience of the average employee imply that an entrepreneurial culture could emerge to some extent simply as a consequence of compositional differences in the demography of organizations across regions and over time. But the processes of attitude formation and ability development also involve a number of feedback loops, as people discuss their ideas and opinions with family, friends, and acquaintances, and as their job selection and career trajectories depend on past experiences. Small changes or differences in the demography of organizations in a region therefore can have disproportionate effects on the emergence or dissipation of an entrepreneurial culture.

## Legitimation

One of the first studies that I did on regional differences in entrepreneurship rates examined the shoe industry (Sorenson and Audia 2000). As part of my research, I read every biography that I could find of the founder of a shoe manufacturing company. Nearly all of these entrepreneurs had been employed in the footwear industry prior to founding their firms, often as a plant manager. In nearly every case, the biographer described a eureka moment at which the future entrepreneur observed someone else starting a company – often an acquaintance or the manager of another plant – leading to the epiphany that he too could found his own firm. People often did not even consider becoming an entrepreneur until they saw someone else do it.

The observation of others engaged in entrepreneurship encourages people to become entrepreneurs themselves for at least two reasons. On the one hand, it can influence individuals' expectations for their own odds of success (Sorenson and Audia 2000). To the extent that people see successful entrepreneurs as similar to themselves and therefore as salient examples, they will perceive their probability of success as higher (Bosma et al. 2012). But it may

not even matter if the entrepreneurs they see succeed. Nascent entrepreneurs appear to interpret others entering as a signal of the attractiveness of opportunities, the munificence of the environment, rather than as potential competitors (Sørensen and Sorenson 2003). Entry therefore tends to beget more entry.

On the other hand, seeing others engaged in entrepreneurship legitimates the practice (Etzioni 1987; Stuart and Ding 2006). In some places, the stigma of failure looms large (e.g., Vaillant and Lafuente 2007). In others, being affiliated with an established firm accords status to the individual (e.g., Dore 1987). Founding a firm or joining a startup then becomes a difficult decision not only because of the opportunity costs, in terms of what one could earn as an employee elsewhere, but also because doing so entails substantial social costs. But as more individuals become entrepreneurs or employees at startups, these career paths become normal, taken-for-granted, and the social costs of following them decline (Etzioni 1987).

In communities with very large numbers of entrepreneurs and in those with unusually successful ones, entrepreneurship may become not merely legitimate but lionized. Entrepreneurs become heroes of capitalism and of the local community. Consider Silicon Valley. Last year, entrepreneurs accounted for all but two of the forty individuals named to the coolest-people-under-forty list (Carson et al. 2016). Who would want to do anything else? Entrepreneurship in these places might then convey rewards well beyond the financial and the freedom of being one's own boss.

Entrepreneurship may also become common in communities with a preponderance of small firms because it becomes one of the few routes for career advancement. In large firms, individuals, even ambitious ones, can rise within the firm, moving up from one position to the next, each time gaining authority, responsibility, and rewards. But small firms cannot accommodate such internal promotions. Individuals wishing to gain responsibility and rewards must move across organizations. At some point, they can only advance further by founding their own firms (Sørensen and Sharkey 2014).

Consistent with these mechanisms, studies across a variety of settings have found that exposure to entrepreneurs or to former entrepreneurs increases the odds that individuals attempt to start their own businesses. Both Stuart and Ding (2006) and Nanda and Sørensen (2010), for example, found that those working with colleagues who had founded firms in the past more frequently became entrepreneurs themselves. Falck et al. (2010) reported similar results for those who had gone to school with people who later became entrepreneurs (see also, Lerner and Malmendier 2013).

The probability of being exposed to an entrepreneur or a former entrepreneur depends on the prevalence of these activities in the region. Places that have been home to more startups offer more opportunities for those living there to have a former entrepreneur as a classmate, as a neighbor, or as a fellow employee. Entrepreneurship, therefore, becomes perceived as more desirable and less risky in these regions. In other words, regions rich in small firms and in startups acquire an entrepreneurial culture.

## Entrepreneurial capacity

In addition to legitimating entrepreneurship as a career path, regions with large populations of small and young firms also produce deeper pools of individuals prepared to become entrepreneurs for at least three reasons. First and foremost, these regions have more people who have had experience at a startup. Second, being connected to entrepreneurs gives those considering this path a means of learning more about the process. Third, the repeated recombination of individuals into different firms engenders a denser social network, one with shorter average path lengths – fewer steps – between would-be entrepreneurs and those holding the resources that they need to grow their ventures. Let us consider each in detail.

Those with experience in small firms do better as entrepreneurs. For starters, they develop a wider range of aptitudes. Small organizations, by necessity, have less division of labor, meaning that their employees engage in

and learn a variety of functions within the organization (Baron et al. 1986). These areas of responsibility can also shift as individuals cover for others, help with urgent projects, and re-define their roles to accommodate the addition and loss of other employees. To the extent that founders must often handle nearly all aspects of their businesses, at least during the early days, this exposure to and experience with a broad range of organizational activities better prepares the employees of startups to become founders (Lazear 2005).

Startups may also provide better organizational blueprints for founders. Experiences at past employers serve as models for structuring a firm—the division of labor, the allocation of authority, and the design of operational routines (Freeman 1986; Phillips 2002). Spin-offs, cases in which an entrepreneur comes from one of the incumbent firms in an industry, survive longer and grow faster than those in which the entrepreneur comes from another industry (Phillips 2002; Dahl and Sorenson 2014). Some have argued that prior employment at a successful firm gives these entrepreneurs privileged access to established operational routines and organizational designs (Klepper 2001; Phillips 2002). But the ideal organizational structure for a startup differs from that for an established firm (Sørensen and Phillips 2011). One requires more flexibility, the other more reliability. Individuals who have prior experience in startups may therefore have a better sense of how to organize their own fledgling firms.

Given their broader range of experiences and their access to more appropriate blueprints, it should not come as a surprise that the employees of small firms become entrepreneurs at higher rates than those employed at large firms (Gompers et al. 2005; Sørensen 2007; Dahl and Sorenson 2014). Some of that relationship, of course, may reflect selection (based on a preference for being in a small firm). But entrepreneurs coming from stints of employment at smaller firms also have more successful businesses, in terms of earnings (Sørensen and Phillips 2011; Dahl and Sorenson 2014). Experience at small firms therefore appears to prepare people better for becoming entrepreneurs, and these opportunities occur

more commonly in communities with a large proportion of small and young employers.

Individuals in these communities may also have better information about the process of and challenges involved in founding and running a firm. As noted above, exposure to entrepreneurs influences people's perceptions of entrepreneurship as a career path. It also affords them access to those who have done it (Nanda and Sørensen 2010). They can learn second-hand from these experiences. This information, moreover, might prove particularly valuable if it pertains to the specifics of doing business in the region or in the industry. But because this information eludes easy transfer – in part, because of its tacit nature, in part, because its value can depend on the regional context – it represents just the sort of information that remains rooted in place (Maskell and Malmberg 1999; Bathelt and Glückler 2005).

Communities with a large proportion of small, young firms may also better prepare people to become entrepreneurs in a third, indirect, way. Because startups have short half-lives, founders and those employed in startups end up moving across organizations on a regular basis. They most commonly move to another startup, perhaps in a different industry, almost always with new colleagues. This formation, dissolution, and re-formation of firms creates a dense web of interconnections between individuals, their former colleagues, and the current and former colleagues of their former colleagues. In the language of topology, it reduces the average path length between any two people in the region.

These social connections play many important roles in the founding process, particularly in assembling the resources needed to thrive (Sorenson 2003). Venture capitalists, for example, rarely fund entrepreneurs with whom they do not have a direct or indirect relationship (Sorenson and Stuart 2001; Shane and Stuart 2002). Recruiting employees can prove even more daunting—whereas investors can diversify their investments, employees commit to a single firm (Sorenson 2003). Convincing individuals to join a startup therefore often depends on having a strong connection to someone on the founding team, perhaps a trusted former colleague from a prior employer. Re-

gardless of the resource, shorter average path lengths mean that entrepreneurs can more easily acquire the people and capital that they need. Indeed, more integrated communities – those with shorter path lengths – have been found to support more, and more successful, startups (Samila and Sorenson 2017).

The dense patterns of interconnections formed by these repeated recombinations may also facilitate the flow of information in the region, to the benefit of the firms located there. Saxenian (1994) describes anecdotes of engineers at one company in Silicon Valley being able to contact former colleagues at other (rival) companies to get help on a problem. More integrated communities may therefore better support “buzz” (Bathelt et al. 2004)—casual, usually unplanned, conversations and interactions that appear serendipitous in their transmission of useful information. Indeed, numerous descriptions of the dynamics of regions with high rates of entrepreneurship have noted their ability to accelerate the movement of ideas and information (e.g., Asheim 1996; Cooke 2001; Malmberg and Maskell 2002).

## Fertile environments

Beyond legitimating entrepreneurship and deepening the pool of individuals prepared to become entrepreneurs, dynamic organizational populations – those with high rates of entry and exit – may also become easier places to found a firm for at least two additional reasons. First, when firms fail, they release resources into the environment, ensuring that entrepreneurs have more ready access to potential employees and strategic partners. Second, having a continuous stream of startups means that these regions can support suppliers and ancillary services tailored to entrepreneurs' needs. They may also adopt entrepreneur-friendly public policies.

Consider first the issue of resource release. Large, established firms tie up many of the inputs that entrepreneurs need for their ventures—ideas, intellectual property, employees, suppliers, distribution channels, and even physical spaces. Because these established incumbents can bring so many resources to bear to defend their positions, entrepreneurs can



find it difficult to get started in these regions. That appears an apt description of Boston in the 1980s (Saxenian 1994).

But the short lifespans of startups preclude such hoarding of resources. When firms fail, their former employees become available to others interested in their abilities and experience. The ideas that had been bound within those firms disperse with these former employees into the community. Buyers and suppliers that had been restricted by contracts can partner anew. Like a primordial pool, these communities become ripe with the ingredients for future organizational entry and growth. Startups, moreover, should benefit most from this resource release as they have the least ability to compete against incumbents for these inputs.

Second, large numbers of startups, particularly when concentrated within an industry or sector, can facilitate the emergence of specialized services and policies that support entrepreneurs. Some of these services and policies can simplify the life of nearly any founder. Kenney and Patton (2005), for example, highlight the importance of having local legal services familiar with startups. Venture capital has also long been seen as a critical component of a supportive environment for entrepreneurs (Florida and Kenney 1988; Samila and Sorenson 2011). But others serve particular industries (Saxenian 1994; Delgado et al. 2010). Hollywood, for example, offers a range of services for filmmakers, from the rental of props to script editing (Scott 2002). As firms grow, they may decide to bring these activities inside the firm. But for entrepreneurs, the ability to contract for these services transforms fixed costs into variable ones, reducing the financial resources required to get started (Storper and Walker 1989; Malmberg and Maskell 2002). These specialized service providers therefore represent a crucial step in moving from having a demography of organizations conducive to entrepreneurship to having an entrepreneurial ecosystem.

Although these various ecological processes of legitimation, of increased entrepreneurial capacity, and of a reduced cost of entry can explain why a region with many startups would develop an entrepreneurial culture and poten-

tially an entrepreneurial ecosystem, it does not quite account for how a region dominated by a small number of large, established employers might first become entrepreneurial or why a region with high rates of entrepreneurship might see them decline.

## Industrial and cultural cycles

How do regions shift from an entrepreneurial culture to a more staid one and vice versa? Consider first Detroit. As Steve Klepper has so vividly described, at the beginning of the 20th century, Detroit had been seen as the Silicon Valley of its time (Klepper 2010). It became home to dozens if not hundreds of startups involved in designing and manufacturing automobiles and in supplying and supporting those automobile companies. Entrepreneurs interested in the industry moved to the city, attracted by the dynamic environment and the opportunities available. But over time, these startups succumbed. They either failed or became part of one of the three titans that came to dominate the industry.

The Boston computer community that Saxenian encountered in the 1980s also represented the maturation of an earlier wave of entrepreneurship. DEC, Data General, and others in the area had been the hot minicomputer startups of the 1950s and 1960s (Bathelt 2001). By the time Saxenian described the region, however, the minicomputer industry had already begun to consolidate and decline as demand for these systems withered in the face of competition from computer workstations and microcomputers (Bathelt 2001). The startup phases of these companies had become faint memories.

Both of these cases point to a deep connection between the rates of entrepreneurship and the life cycles of the industries most prevalent in the region. Similar insights appear in the stage model promoted by Storper and Walker (1989) and in the evolution of regional capabilities discussed by Maskell and Malmberg (1999). Entrepreneurship, and the numbers of small, young companies in an industry, explode with the birth of an industry. As the industry matures, however, organizations merge

and fail. Large incumbents come to dominate the scene.

Consider some of the implications of these connections for the emergence of an entrepreneurial culture and the development of an entrepreneurial ecosystem. Industries – particularly those that involve goods and services that sell beyond a particular region – often begin with a burst of entrepreneurship in a short space of time and in a particular place (Malmberg and Maskell 2002). In the automobile industry, Detroit and the first two decades of the twentieth century defined the place and the time (Klepper 2010). In biotechnology, rapid entry began in the 1980s, in San Diego and the Bay Area, and to a lesser extent in Boston (Bathelt 2001; Stuart and Sorenson 2003a). These gold rush periods in which entrepreneurs surge into emerging industries often engender the rapid emergence of an entrepreneurial culture.

Although initiated by an innovation in a particular product or service, the bursts of entrepreneurial activity associated with the births of industries can spill over to other parts of the economy as entrepreneurship becomes seen as desirable. When these effects diffuse outside the original industry, they begin to transform the organizational demography of the entire region, to rewire the social relationships there, and to increase the odds that supportive services, such as venture capital, develop. In other words, these spillovers can give rise to the development of an entrepreneurial ecosystem.

Entrepreneurial cultures can also (re-)emerge in places that have become ossified. Boston in the 1990s still had many of the ingredients of an entrepreneurial ecosystem but it had lost the secret sauce, the desire of individuals to become entrepreneurs. Then it experienced a renaissance. That renewed interest in entrepreneurship probably came from the combination of several factors, some local, some global: Employees laid off from minicomputer manufacturers and other hardware companies shifted into startups in software and data services in the area (Bathelt 2001). The

success of Biogen and Genzyme sparked interest in the burgeoning biotech industry. Meanwhile, the Internet boom of the late 1990s fed a nation-wide fervor for entrepreneurship. The wave of entry spurred by these factors shifted the age and size distributions of firms to being younger and smaller. The regional environment, already rich in financial and human capital, then fostered a rapid rise in high-tech startup activity in the Boston area.

As in Boston, the re-emergence of an entrepreneurial culture may stem as much or more from the decline, death, or disappearance (through acquisition) of one or more large incumbents – the late stages of an industry life-cycle – as from an innovation, the birth of another industry.<sup>5</sup> These transitions, moreover, might require little time in places that had once had an entrepreneurial ecosystem and therefore that still have remnants of the important components of these ecosystems. One or two mass layoffs, acquisitions, or firm failures can let loose a lot of human capital. Necessity initially forces many of these individuals to join startups despite the absence of a supportive culture. As these firms form and fail, they unleash the dynamics discussed above in which entrepreneurship begets an entrepreneurial culture.

But layoffs and liquidity events do not always give rise to sufficient numbers of or sufficiently successful startups to reach the critical mass required for entrepreneurial autocatalysis. In many places, rather than a renaissance, the decline of a dominant industry leads only to high levels of unemployment and emigration. Detroit seems the perfect case in point. Some of this failure may represent the confluence of chance events. But these declines appear far more common in certain sorts of regions. Those that had been centers of heavy manufacturing, for example, have depressed rates of entrepreneurship for decades after these industries decline (Stuetzer et al. 2016). Perhaps the extended division of labor in this sector leaves its former employees ill-prepared for founding their own firms.

An interesting question in this process, and

<sup>5</sup>Public policy may also have the ability to revitalize regions by providing incentives, funding, and other resources to entrepreneurs. But doing justice to the questions of whether, when, and how public policy could contribute to entrepreneurial gentrification would require more space than I have available here.

one related to whether an entrepreneurial culture reemerges, concerns what lines of business entrepreneurs choose to enter. Given their experience in a particular industry, the recently laid-off may choose to found firms to address niches of that mature industry. Resource partitioning may then have a spatial dimension. Consolidation among the large, generalists in an industry has been found to promote the entry and growth of specialists in the same industry (Carroll 1985; Carroll et al. 2002; Reis et al. 2013). Although that research has not examined the spatial distributions of these specialist populations, the specialists may emerge in the regions vacated by failing incumbents, as former employees of these firms start their own ventures. Or, these individuals may attempt to enter different industries (Boschma and Wenting 2007; Frenken and Boschma 2007)—ones in which their abilities and experience have value but ones not in decline. The mobile telephony cluster in northern Jutland, for example, came from the remnants of the earlier marine radio companies that had been located there (Dahl et al. 2010). Espoo, Finland, and Waterloo, Canada, may therefore represent interesting places to follow as the former employees of Nokia and RIM decide what to do next.

These industry dynamics can also lead to the eventual demise of entrepreneurial culture. As industries mature, economies of scale and competition set in, organizations merge. As industries consolidate, the average firm in the region dominated by these industries becomes both older and larger. More of the available assets in the region become sequestered inside organizations, a process that Maskell and Malmberg (1999) describe as the deterioration of regional capabilities. The entrepreneurial culture of a place, however, may require time to wither. The dream of becoming a successful entrepreneur probably persists far longer than the reality. But wither it will.

Silicon Valley, so far, retains much of its entrepreneurial culture, even though the technology companies there have grown into giants. Alphabet (Google), Apple, Cisco, Facebook, Intel and others employ tens of thousands of people. They no longer qualify as startups. Real estate and services in the region cost more

than almost anyplace else in the United States. The very success of these technology companies may therefore eventually erode the entrepreneurial culture. It will probably not become Detroit but it may begin to look more like the Boston of the 1980s described by Saxenian. Indeed, the recent and regular disputes over the theft of trade secrets suggest that incumbents in Silicon Valley have already begun to impose barriers to the movement of people and information across firms, to become more siloed (e.g., Nolter 2017).

These dynamics also point to the places where one might see an entrepreneurial culture persist over long periods of time. Some regions appear to have elevated levels of entrepreneurship for decades on end (Fritsch and Wyrwich 2014; Stuetzer et al. 2016; Fotopoulos and Storey 2017). What could account for this persistence if not culture? Organizational demography again suggests an answer. Not all industries consolidate. Some types of businesses elude large-scale production, either because the processes do not produce economies of scale or because scale has its own costs. For example, craft goods, such as those made in many of the Italianate industrial districts described by economic geographers, usually rely on small batch production. These organizations have little incentive to grow and often do not survive beyond the retirement of their owners. As a consequence, the regions remain perpetually in a state where small and young firms account for a large share of employment—precisely the conditions needed to maintain an entrepreneurial culture.

As I noted in the introduction, this ecological perspective on entrepreneurship appears to share many of the features that represent the strengths of the relational economic geography (Bathelt and Glückler 2003) and the evolutionary economic geography (Boschma and Frenken 2006). It gives agency not to regions but to individuals and focuses on how the environments with which those individuals interact influence their choices. Space nevertheless plays a central role because it determines both actors patterns of interaction and the opportunities available to them. Regions aggregate the actions of these individuals but they become more than a simple sum of the parts because

these processes feed on one another. These virtuous and vicious cycles therefore can generate path dependence, allowing regions to diverge in their degrees of economic prosperity for long periods of time. But, of course, the measure of any perspective should come not from its aesthetics but from its usefulness in understanding and predicting phenomena.

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