

Young Firms and Regional Economic Growth:

Knowledge-Intensive Entrepreneurs Critical

May 2020



heartlandforward.org

NOTES





PRESIDENT'S NOTE



The rapidity and severity of COVID-19's effects on America's health and economy have left all of us stunned. Even though I participated in sessions on "the next global pandemic" after SARS while at the Milken Institute, I felt ill-prepared. I did not envision the need to voluntarily close the economy to the extent necessary to mitigate this pandemic's spread. To provide perspectives on how the coronavirus would impact regional economies and to monitor its severity, Heartland Forward has undertaken a series of research pieces. They are available at heartlandforward.org/covid-19.

While the draft of this study was completed before the extent of COVID-19 impacts were known, its recommendations are prescient in the context of how we reopen and chart a course for recovery. In short, we need to get entrepreneurs and the young firms they create out of intensive care to put the U.S. economy back on the road to recovery. These firms typically lack the financial resources to stay open without revenue for a few months, so we are at risk of losing an entire cohort of young firms as a result of COVID-19. The Paycheck Protection Program provided an initial \$350 billion in short-term forgivable business loans, and another \$310 billion is on the way. This effort will assist many in surviving the pandemic, but they will need an ecosystem of services to flourish and grow.

It is vital to sustain these young firms because they play a key role in economic growth at the national, metropolitan and micropolitan levels. Startups created roughly 2.6 million jobs in 2016, according to the Census Bureau's Business Dynamics Statistics. For comparison, firms of all other ages lost 267,000 jobs on net. We must support this group of small firms and change our economic development paradigm over the long term towards supporting entrepreneurs start and scale up their firms.

Ross C. DeVol

AUTHORS



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Ross DeVol is President and CEO of Heartland Forward. Heartland Forward’s goal is to promote regional innovation and entrepreneurial ecosystems that foster job creation, wage gains and economic growth for the American Heartland.

Heartland Forward pursues its mission through independent, data-driven research; action-oriented convenings, such as the Heartland Summit; and impactful policy recommendations. Heartland Forward works with universities, colleges, the business community, public policy leaders and philanthropy to analyze resources supporting the startup community and identify workforce and talent gaps.

DeVol is a former chief research officer for the Milken Institute, an economic think tank headquartered in California, where he spent nearly 20 years. He oversaw research on international, national and comparative regional growth performance; access to capital and its role in economic growth and job creation; and health-related topics. He has been ranked among the “Superstars of Think Tank Scholars” by International Economy magazine.



Richard Florida is one of the world’s leading urbanists. He is University Professor at University of Toronto’s School of Cities and Rotman School of Management and a Distinguished Fellow at NYU Schack Institute of Real Estate. He is the author of several global best sellers, including the award winning *The Rise of the Creative Class* and his most recent book, *The New Urban Crisis*. He is the co-founder of CityLab and founder of the Creative Class Group which works closely with companies and governments worldwide. He is a Visiting Fellow at Heartland Forward.



Dave Shideler is the Chief Research Officer at Heartland Forward, oversees research focused on identifying practical tools and policies Heartland communities can use to enhance economic performance and prosperity. Before Heartland Forward, Dave was Professor of Agricultural Economics at Oklahoma State University and Community and Economic Development Specialist with the OSU Extension Service. Those roles focused on entrepreneurship and assisted rural communities with economic development planning and implementation. Dave holds a Ph.D. in Agricultural, Environmental and Development Economics from The Ohio State University.

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Special thank you to **Tevari Barker** for his outstanding research contributions to this report. Tevari is an honors student studying engineering, working on his master’s degree at the University of Arkansas. He played in the college marching band as an undergraduate and worked as a 2019 summer intern at Heartland Forward. His recent achievement includes a nomination for the top capstone student award.

EXECUTIVE SUMMARY



Young Firms and Regional Economic Growth demonstrates how knowledge-intensive and Main Street entrepreneurs are critical to long-term economic success. Metropolitan and micropolitans that started with stronger entrepreneurial ecosystems, as measured by the share of total employment at firms age five years or fewer (young firm employment share) and by the share of employment at those young firms with a bachelor’s degree or higher (young firm knowledge intensity), saw notably faster employment growth between 2010 and 2017 in the United States.

Most Heartland communities did not participate fully in entrepreneurial-driven job growth. There are multiple causes for the subpar rate of job creation in the Heartland besides low engagement in entrepreneurial activities; lower educational attainment with less emphasis placed on innovation tied to research and development stands out among them. However, no other single factor can claim a higher explanatory power than entrepreneurial activities.

Huge financial incentives to lure manufacturing facilities or other operations into a region is no longer cost-effective. The key to long-term economic success lies in developing environments that are conducive for entrepreneurs to start and scale up their firms. Communities must take a holistic approach to build their entrepreneurial ecosystems, and they must be inclusive. It is the ability to connect and engage the elements of an ecosystem as efficiently as possible to maximize job creation. Demographers like to say that “demography is destiny.” Young firms and the entrepreneurial ecosystems that spawned and nurtured them determine the economic destiny of communities.



BY THE NUMBERS



2.6 MILLION

JOB WERE CREATED BY STARTUPS IN 2016



267,000 NET JOBS LOST

BY ALL OTHER FIRMS IN 2016



ONE-THIRD FEWER

WORKERS ARE EMPLOYED AT YOUNG FIRMS TODAY THAN IN 1993

HOWEVER, COMMUNITIES CAN EXPECT



15 PERCENT FASTER

EMPLOYMENT GROWTH WITH HIGHER YOUNG FIRM EMPLOYMENT*



34 PERCENT FASTER

EMPLOYMENT GROWTH WITH HIGHER KNOWLEDGE INTENSITY*



THE HEARTLAND IS HOME TO

**5 METROPOLITANS
& 14 MICROPOLITANS**

RANKED IN THE TOP 50 FOR YOUNG FIRM ACTIVITY

*Estimated growth rates assume an increase of one standard deviation in the average metropolitan region over 7 years.

RESEARCH SUMMARY

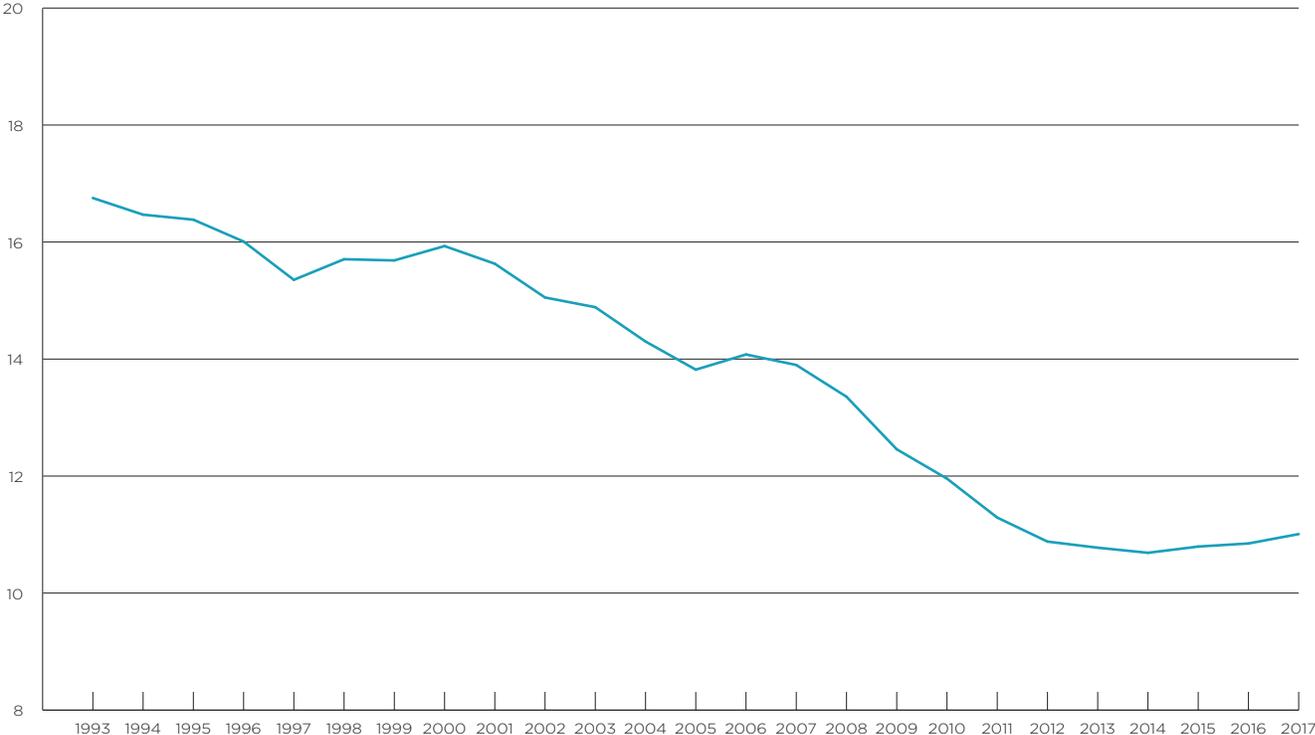


The Role of Young Firms in Economic Growth

Young firms are defined as new business entities that are five years old or less—these are distinct from young establishments, such as a new Burger King, which are new locations of an existing firm. Young firms play a key role in economic growth at the national, metropolitan and micropolitan levels. For example, in 2016, startups created roughly 2.6 million jobs, according to the Census Bureau’s Business Dynamics Statistics. For comparison, firms of all other ages lost 267,000 jobs on net (job creation less job

destruction). This differential is relatively consistent over the past several years. An estimated 50 percent of jobs established among an annual cohort of startups will be lost within the first five years due to business exits. It is the rapid growth of a relatively small number of young firms—mostly knowledge-intensive—that is responsible for the long-enduring job creation. High growth firms’ compensate for the majority of losses associated with an annual startup cohort so that it retains 80 percent of its original employment after five years.²

ES FIGURE 1: NATIONAL YOUNG FIRM EMPLOYMENT SHARE FROM 1993 TO 2017
PERCENT OF PRIVATE U.S. EMPLOYMENT AT YOUNG FIRMS





Furthermore, the young firm share of employment is a useful measure of the broader entrepreneurial awareness, support and capacity in a geographic area. An entrepreneurial ecosystem includes mutually supporting factors and operators that facilitate productive entrepreneurship within a specific geography.³ At the core of an entrepreneurial ecosystem is the network of entrepreneurs, and a range of factors supporting the ecosystem, including finance, talent, leadership, knowledge, support services and the social capital binding them together.⁴

Some entrepreneurship aims to exploit local market demand and indirectly provides employment and income for founders and their family members. Many call this “Main Street” entrepreneurship. Nevertheless, service sector family-based entrepreneurship can employ both a sizable number of family and non-family members. Communities with a high young firm share of private employment, even if largely “Main Street” entrepreneurship, have a highly effective entrepreneurial ecosystem that creates more new firms and sustains them in the early stages of scale-up.

ES Figure 1 illustrates how the U.S. young firm employment share has declined in recent decades and the trend explains some of the lost dynamism in the U.S. economy overall. Following moderate stability during the 1990s, the U.S. saw a notable decrease in the share that lasted roughly 15 years. Today, approximately one-third fewer workers hold jobs at young firms than in 2000. The reason for the decline is debated and could be the result of phenomena ranging from societal changes in the perception of entrepreneurship to increased student loan

debt to larger firms—especially in technology sectors—dominating their industry longer.

The percentage of total employees at young firms with a bachelor’s degree or above can provide a measure of the sophistication or knowledge intensity of a firm. The young firm knowledge intensity supplies information on the aspirations of the founders and the characteristics of the industry in which they are engaged. For example, young firms providing professional, scientific and technical services will have a higher proportion of staff with bachelor’s and advanced degrees as they create and deliver the services. They will have a higher propensity to go after non-local markets.

Most of the founders of knowledge-intensive firms desire to disrupt regional, national and international markets as they scale up and have sizable local employment and wage impacts. Research universities and government labs are central to a knowledge-based entrepreneurial ecosystem. Both are key ingredients for the formation of a knowledge-based entrepreneurial ecosystem that commercializes research in the form of spinout firms and through licensing to newly established firms within the region. This form of “transformational” entrepreneurship can involve creating new markets or fundamentally altering existing ones. Knowledge-intensive young firms have a higher probability of achieving middle-market status where they generate rapid job gains for their communities.

Therefore, it is important to examine both the young firm share of total employment and knowledge intensity to provide a comprehensive picture of entrepreneurial activity.

Regional Trends

Young firms are not uniform across geography. Like other types of economic activity, young firms are clustered, concentrated and spiky. To get at such geographic variation, we create a composite measure of the entrepreneurial ecosystem and its ability to create jobs and economic growth. By combining the young firm share of employment and young firm knowledge intensiveness for 2017, the latest

year available, we create this composite index. We apply equal weights to the young firm share of employment and young firm knowledge intensiveness. The metropolitan statistical area with the highest average score on the two measures is rebased to equal 100. If you score high on both measures, your prospects for job creation appear to be high.

Metropolitan Trends

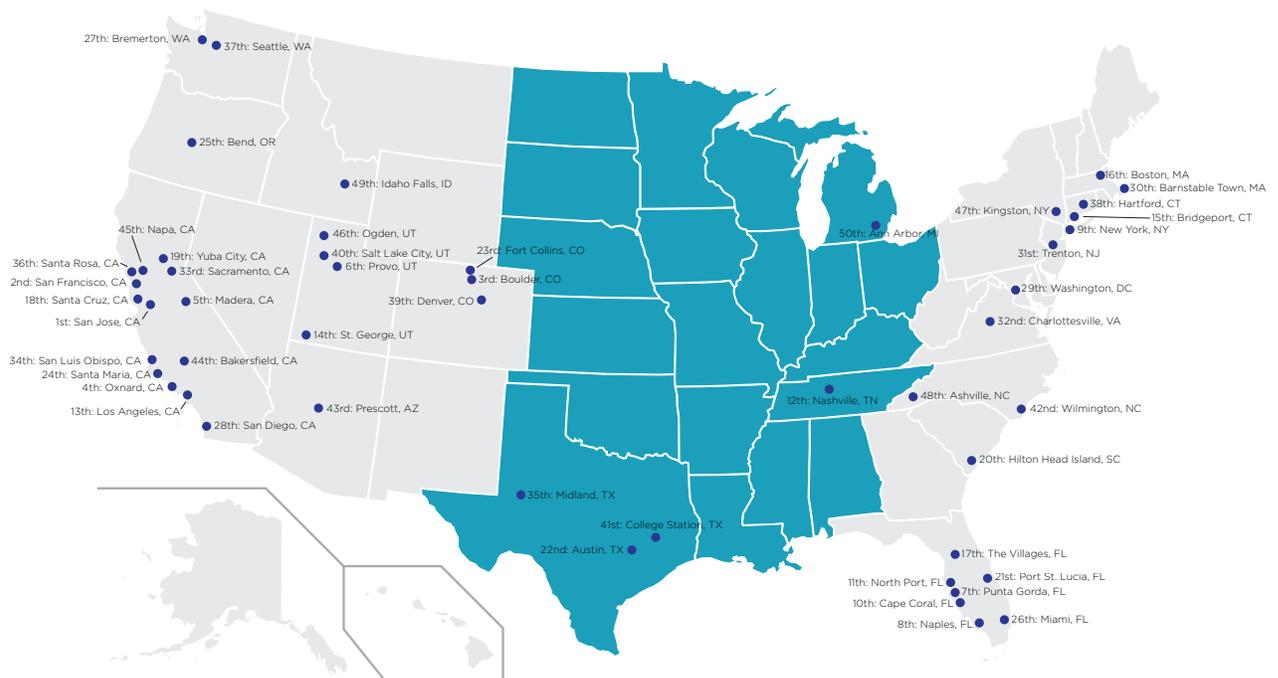
Metropolitan areas are regions containing a central city of more than 50,000 in population and surrounding counties with an economic connection to the central city. There are roughly 380 metropolitan areas in the United States; the top 50 metropolitan areas, based upon our composite index, are plotted in ES Figure 2. The top three are all major tech hubs with San Jose-Sunnyvale-Santa Clara, California, taking the lead as a center for startups and perhaps the nation's most fully developed entrepreneurial ecosystem, ranking first with a score of 100. Nearby, San Francisco-Oakland-Hayward, California, is a close second with an index score of 98.2, just 1.8 percentage points lower. The San Francisco metro area has a higher young firm share of employment than the San Jose metro. Boulder, Colorado, is third in this measure at 91.3.

The next metros are not as obvious as our top three. Oxnard-Thousand Oaks, California, has respectable scores on both components and is fourth overall. The biotech firm Amgen is headquartered in the metropolitan area. Madera, California, is fifth overall, courtesy

of its first place in young firm share of employment. Provo-Orem, Utah, is sixth with an index score of 86.6. Punta-Gorda, Florida, is seventh and Naples-Immokalee-Marco Island, Florida, is eighth. The New York metro area is ninth and Cape Coral, Florida, is tenth.

The Heartland has five metros among the top 50 and 14 out of the top 100, a disappointing performance overall. Nashville-Davidson-Murfreesboro, Tennessee, was 12th and the highest-ranking Heartland metro. It combined respectable scores of 57th on the young firm share of employment and 18th on knowledge intensity to warrant its position. The Nashville metro is one of the true Heartland success stories.⁵ Austin-Round Rock, Texas, was 22nd in the composite measure. The University of Texas-Austin, a significant contributor of talent to Austin for generations, provides a strong research and commercialization anchor. Midland, Texas, was 35th, College Station-Bryan, Texas was 41st and Ann Arbor, Michigan was 50th. Again, most of these metros are established tech hubs like Austin, Nashville or similar college towns.

ES FIGURE 2: TOP 50 METROS FOR YOUNG FIRM ACTIVITY



Note: Labels indicate the largest city in each metro.





Micropolitan Trends

Micropolitan areas are defined as communities with an economic hub/central city of 10,000 to 50,000 people. Thus, they fall between rural and metropolitan areas. There are roughly 550 micropolitan areas in the United States. The population residing in micropolitans makes up 8.5 percent of the total U.S. population.

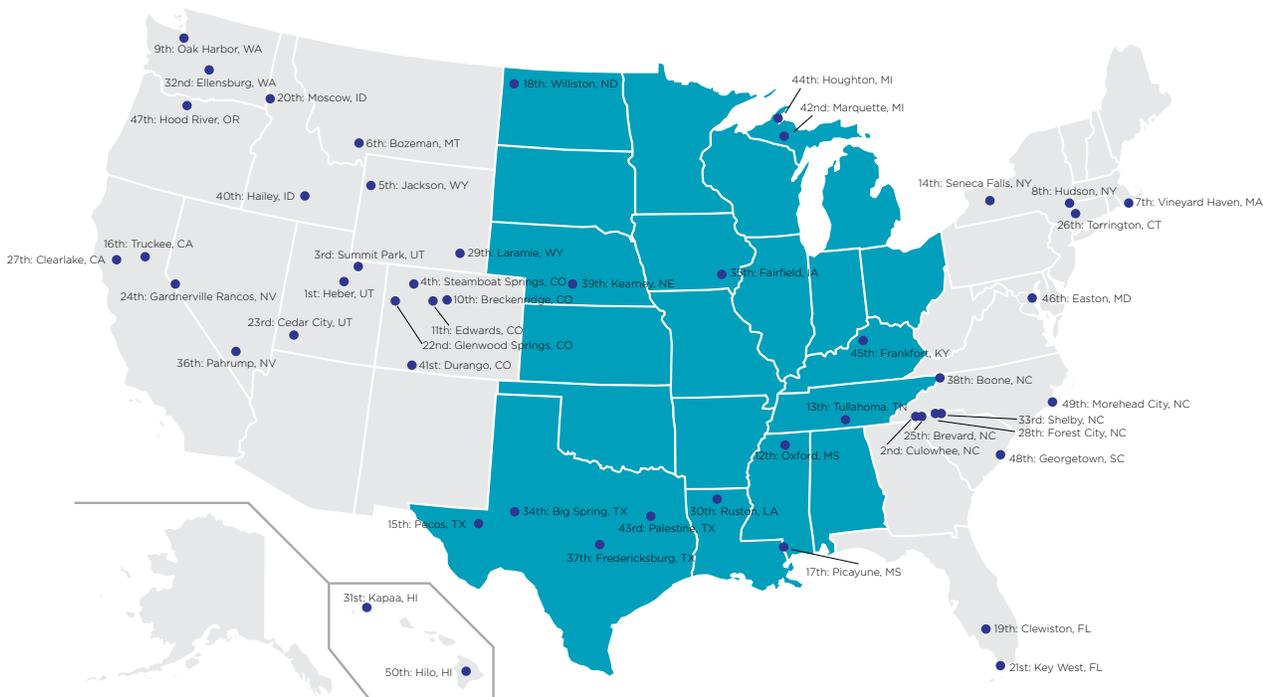
Using data from 2017, we applied the same methodological approach used in metropolitan areas to create the composite micropolitan index of the entrepreneurial ecosystem and its knowledge intensiveness. The two components are equally weighted. The top micropolitan areas of this ranking have been the leaders in job creation in the nation since 2010. We plot the top 50 micropolitans, by the composite index, in ES Figure 3.

Heber, Utah, captured the top position among micropolitans by combining its seventh-ranking score on the young firm share of total employment and 21st position on young firm knowledge intensiveness. The high level of engagement in starting new firms combined with knowledge-intensive sectors results in a nation-leading ability to create and sustain jobs. The 94.9 index score for Cullowhee, North Carolina, placed them in second. Summit Park, Utah, is third overall, primarily due to its strong performance on knowledge intensity and its solid position on the young firm share of employment. Steamboat Springs, Colorado, comes in fourth without making the top 10 on either of the two components. Jackson Hole, Wyoming-Idaho, is fifth, followed by Bozeman, Montana, in sixth. Vineyard Haven, Massachusetts, comes in seventh, Hudson, New York, is eighth, Oak Harbor, Washington, ninth and Breckenridge, Colorado, is tenth.

The Heartland has 14 micropolitans among the top 50 and 30 out of the top 100. If the Heartland achieved its proportionate share, there would have been 63 micropolitans in the top 100. The performance rankings highlight the lackluster growth in the Heartland micropolitans. Oxford, Mississippi, the highest-ranked Heartland micropolitan, comes in 12th. Oxford demonstrates the right ingredient combination—plans, and the ability to execute—and is a role model for other Heartland micropolitans to improve their economic performance and job creation. Additional Heartland micropolitans in the top 20 include: Tullahoma-Manchester, Tennessee (13th); Pecos, Texas (15th); Picayune, Mississippi (17th) and Williston, North Dakota (18th).

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ES FIGURE 3: TOP 50 MICROS FOR YOUNG FIRM ACTIVITY



Note: Labels indicate the largest city in each micro.

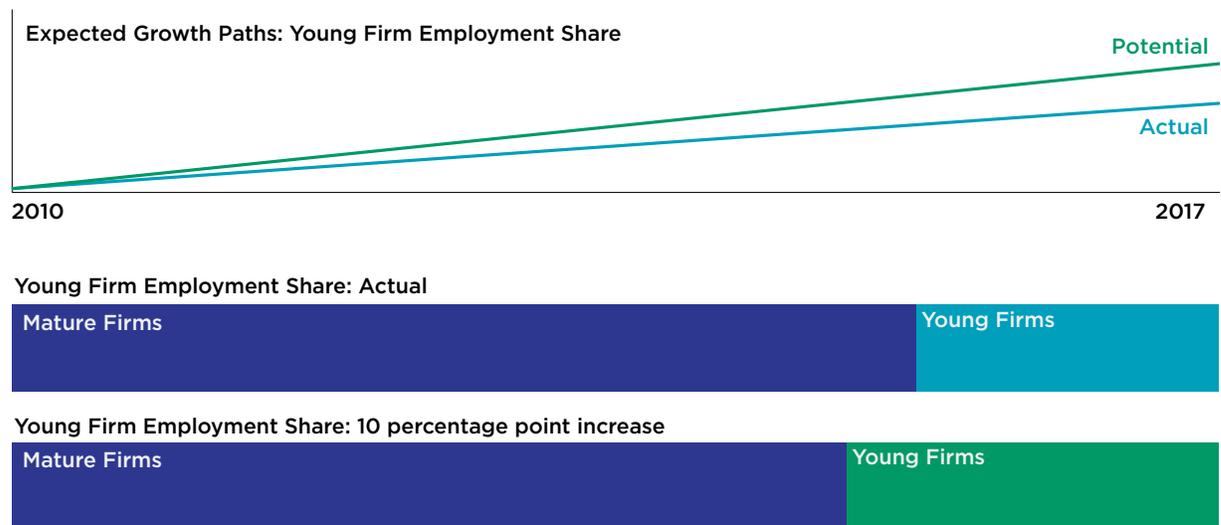
Importance of Young Firms in Determining Regional Job Growth

We conducted a statistical analysis to look at the importance of young firms and other factors that appear to affect job growth. Using data from the Census Bureau's Longitudinal Employer-Household Dynamics Quarterly Workforce Indicators (LEHD-QWI) database, we created a dataset of private-sector job growth between 2010 and 2017 across all U.S. metropolitan and micropolitan areas. Utilizing our compiled data from the 2010 young firm share of employment and young firm knowledge intensity (the percent of employees at young firms with a bachelor's degree or above), we tested the proportion of

the job growth they can explain between 2010 and 2017. By controlling for a variety of factors during this period, we can better understand the importance of measuring the existing entrepreneurial ecosystem to determine the recent job creation seen across communities.

Both the young firm share of private employment and young firm knowledge intensity are essential factors to explain the variations in job growth across metropolitan and micropolitan areas. (See full report for statistical details).

ES FIGURE 4: THE IMPACT OF YOUNG FIRM EMPLOYMENT SHARE ON FUTURE EMPLOYMENT GROWTH



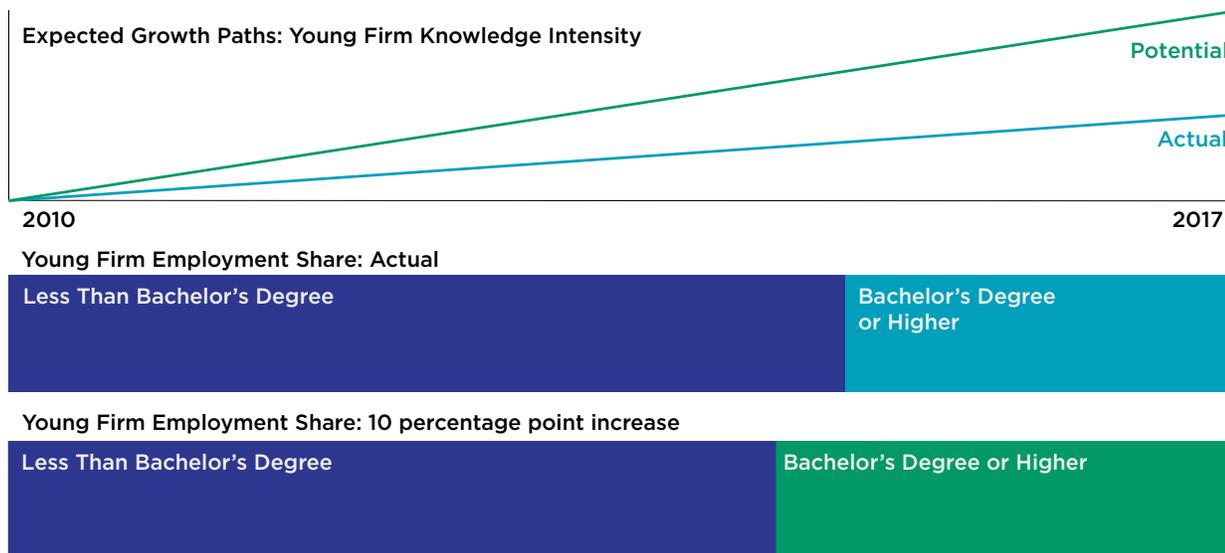
For metropolitans, the relationship between the young firm share of employment and employment growth shows that for every one percentage point increase in the share (e.g., an increase in the share from 8 percent to 9 percent), we can expect 2010-2017 employment growth to increase 0.5 percentage point. Given that the young firm employment share has a standard deviation of 3.6 percentage points and the average 2010-2017 employment growth is 12.6 percent, a 0.5 percentage point increase is

sizable. For example: if a metro has an average 2010-2017 employment growth, we expect a one standard deviation increase in the young firm employment share to result in a 15 percent faster growth rate. ES Figure 4 demonstrates the impact of a 10-percentage point increase in the young firm employment share.

Furthermore, the estimated relationship between knowledge intensity and employment growth is a one percentage point increase in the young



ES FIGURE 5: THE IMPACT OF YOUNG FIRM KNOWLEDGE INTENSITY ON FUTURE EMPLOYMENT GROWTHSHARE ON FUTURE EMPLOYMENT GROWTH



firm knowledge intensity leads to roughly one percentage point change in future employment growth. Given the standard deviation of the young firm knowledge intensity is 4.7 percentage points, the average-growing metro from 2010 to 2017 could expect a 34 percent faster employment growth if their 2010 young firm knowledge intensity were one standard deviation higher. ES Figure 5 depicts a 10 percentage-point increase in the young firm knowledge intensity.

The results for micropolitans are comparable to those of metropolitan. A one percentage point increase in the young firm share of employment is associated with a 0.6 percentage point greater job growth between 2010 and

2017. This share has a standard deviation of 3.9 percentage points. Looking at the average micro for 2010-2017 employment growth (7.6 percent), we would expect 31 percent faster growth if its young firm employment share had been one standard deviation higher in 2010.

Again, for micropolitans, a one percentage point increase in young firm knowledge intensity is associated with a 0.7 percentage point increase in job growth between 2010 and 2017. This implies that the average-growing micropolitan from 2010 to 2017 would have seen a 31 percent higher growth if its young firm knowledge had been one standard deviation higher in 2010.

What It All Means for Economic Growth and Development:

Our findings suggest there may be a misallocation of development resources, especially the incentives directed toward recruiting firms from other locations. Providing assistance and additional support services for budding entrepreneurs allows them the opportunity to scale-up their firms.

Improve Attitudes Toward Entrepreneurs

Creating positive attitudes towards entrepreneurial activities is an area that needs emphasis, especially in the Heartland. In most communities, entrepreneurs are not held in as high esteem as corporate managers.

Establish and Fund Entrepreneurial Support Organizations

Establishing and providing resources to entrepreneurial support organizations, whether they are called networks, connectors, enablers or ecosystem builders, are a necessary part of the process for creating the social capital that is required for success.

Enable Dealmakers

A particular form of social capital and connectors in entrepreneurial ecosystems has been isolated for its growing importance—“dealmakers.” Dealmakers are individuals with valuable social capital who can facilitate relationships that support new firm formation; while this could include financial connections, it could also be connecting entrepreneurs with similar ideas or an entrepreneur with a manufacturing firm to commercialize this product. Empirical research has provided strong evidence that these dealmakers are highly correlated with new firm births and scaling in locations across the country.⁶

New Real Estate and Service Provider Models

“Hard” infrastructure is still necessary. Physical spaces such as incubators and accelerators can ease the process of establishing firms and facilitating their growth.⁷ Other service providers need to explore alternative revenue models, such as taking a form of equity in new firms rather than charge them their standard hourly rates.

Demand University Entrepreneurial Engagement

Too few communities fully comprehend the importance of entrepreneurship and science, technology, engineering and mathematics (STEM) graduates created in their geography. Universities need to offer entrepreneurial education as part of their curriculum and provide commercialization program support for students and faculty.⁸ Communities must insist that universities see entrepreneurial ecosystem involvement as a critical component of their missions.⁹





A more balanced portfolio approach that includes recruiting, retention and entrepreneurial support is necessary for the Heartland and beyond. Organic entrepreneurial-based economic development requires a long-term, patient and focused approach. So, where do Heartland and other communities that are lagging in entrepreneurial acumen begin? It is necessary to build an entrepreneurial ecosystem.



Promote Early Stage Risk Capital Networks

An active effort focused on encouraging business angel investors to provide startup capital and smart money management needs to occur, especially because angels are looking to invest locally. More public sector funding and underwriting of operating costs for business angel networks can allow them to act as “dating agencies” and to educate accredited investors on the opportunities.

Position Government as Central Hub for Entrepreneurial Resources

The government can play an effective role as part of the entrepreneurial infrastructure. Since they are already part of the startup process, by issuing sales tax permits, corporate registration and licensing, government agencies can act as a central hub and facilitate access to resources available to entrepreneurs.

Link in Corporations

Corporate engagement is critical to successful entrepreneurial ecosystems and can be considered part of the infrastructure supporting them. Corporations might create spinoffs that would be impossible to incubate within their organizations.

Build and Enhance Quality of Place and Amenities

A growing body of research provides an empirical basis for the role quality of place, including arts and culture, plays in promoting the prosperity of place. The presence of the arts improves the image of a region and assists in making a stronger case for attraction and in fostering denser entrepreneurial ecosystems.¹⁰



INTRODUCTION



Urban and regional economic development is undergoing a sea of change. The days of luring in manufacturing plants or even headquarters with substantial financial incentives are over: such practices are too costly and ineffective. The key to success today—in building regions and communities that are economically successful and sustainable—lies in building thriving clusters and ecosystems of young, entrepreneurial high growth firms. It is convenient to point to examples like Intel, Apple, Microsoft, Genentech, Google and other similar high-tech startups in leading-edge tech hubs like the San Francisco Bay Area, Boston-Cambridge, Seattle or Austin. But the fact of the matter is that young entrepreneurial firms power innovation, job growth and economic development in hundreds upon hundreds of large, medium-sized and small cities across the country.

More than a century ago, the great economist Joseph Schumpeter identified the role of risk-taking entrepreneurial firms in powering the great “gauges of creative destruction” that create whole new industries, reshape existing ones, and power long-run economic growth. And, a large number of academic studies in economics and other disciplines have substantiated his insights about the role of entrepreneurial firms in powering innovation and economic growth ever since.

Entrepreneurial firms do not operate in a vacuum. They are part of vibrant entrepreneurial ecosystems made up of great research universities, clusters and networks of other entrepreneur firms, active venture capital investors and related service providers and deep pools of diverse talent. As a large number of studies have documented, these clusters of entrepreneurial firms are place-based and vary greatly by geography.

Our study takes a detailed, empirical look at the growth and geography of young entrepreneurial firms across the United States since the end of the Great Recession in 2010. We define young entrepreneurial firms as those that are five years old or less. A large number of economic studies find that the economic benefits typically attributed to entrepreneurial enterprises or small businesses generally actually derive from these young firms. To get at this, we use data on the jobs or employment created by such young firms via the US Census’ Longitudinal Employer and Household Dynamics dataset. We also develop a new measure of the knowledge intensity of young firms, based on the percent of employees at young firms with a bachelor’s degree or above, to capture young entrepreneurial firms that are involved in more high-tech, high value-added economic activity.



Our research tracks the national trends in young firms since 1993, plots the geography of young firms across hundreds of metropolitan and micropolitan areas and uses statistical models to detail the connection between young firms and future economic growth. Our data covers more than 370 metropolitan areas and more than 500 micropolitan areas, smaller economic units with central cities of between 10,000 and 50,000 people. We look at regions that are leading, as opposed to lagging, on young firms and more specifically, at how regions of the U.S. Heartland are performing. We define the Heartland as the 20-state region stretching from Michigan south to Alabama, west to Texas and north to North Dakota.

Our research uncovers a series of important facts about the role of young firms in the U.S. economy, their geography, the situation of the Heartland and the factors that underpin the performance of young firms across places and communities.

For one, the U.S. shows a disturbing decline in the share of young firms in the U.S. economy. Young firms declined from about half of all U.S. firms in the 1980s to roughly 35 percent by the second decade of the 2000s.

There is also considerable geographic variation: Young knowledge-based firms are clustered, concentrated and spiky in patterns that resemble the broader winner-take-all geography of the U.S. broadly. Two obvious metros—the San Jose-Sunnyvale-Santa Clara metro in the heart of the Silicon Valley and the nearby San Francisco-Oakland-Hayward metro—are at the top of our rankings for young firm knowledge intensity, with the Boulder, Colorado metro in third and New York in ninth place. These are all leading U.S. tech hubs. A number of smaller, less tech-oriented metros rank highly, such as the Oxnard and Madera, California metros as well as the Punta Gorda, Cape Coral and Naples metros in Florida.

We also examined the performance of more than 500 smaller micropolitan areas across the country. Many micropolitans are amenity-rich communities that attract both talent and entrepreneurs—micropolitan places

like Steamboat Springs and Breckenridge, Colorado; Jackson Hole, Wyoming; Bozeman, Montana; Vineyard Haven, Massachusetts and Hudson, New York.

The Heartland region underperforms on young firms, which are so critical to innovation, economic development and job growth. The Heartland's lagging performance is cause for concern because our detailed statistical analysis shows that young firms are not only important in their own right but add substantially to job growth, a key driver of regional economic performance.

The Heartland's lagging performance on young firms is even more so a call to action. It is time for mayors and economic developers to get away from the long-held and unproductive practice of using tax incentives to lure companies. The focus must shift to the many smaller, more fine-grained and textured things that grow the ecosystems required to support and nurture the dynamic young firms that drive economic growth. That means bolstering and/or creating entrepreneurial support organizations and networks. It means working with economic development and community development organizations to ensure entrepreneurship is part of their core mission. It means working hard to promote inclusive entrepreneurship across all organizations. It means working with universities to increase their focus on entrepreneurship, commercializing innovation and technology transfer. It also means focusing on attracting and developing the talent base and amenities required to attract and nurture entrepreneurs.

Economic development practice and policy must change as the nature of the economy changes. With the rise of dynamic innovation and talent powered knowledge economy, sustainable economic development can no longer come from luring manufacturing plants or even large headquarters. Instead, it comes from working hard and smart to develop the institutions, networks, entrepreneurial ecosystems and talent pools required to support young firm powered growth.

THEORY AND CONCEPTS



Theory

The role of entrepreneurial, young firms in economic growth and development has been the focus of inquiry for more than a century. Perhaps the first person to think systematically about the role of entrepreneurship in economic growth and development was the economist Joseph Schumpeter.¹¹ In his landmark 1911 book, *The Theory of Economic Development*, Schumpeter famously argued that economic growth was propelled by the process of 'creative destruction,' the agent of which was the risk-taking entrepreneur. Creative destruction is the idea that innovations (new products, production processes, inputs/materials, markets, or organizational structures) create competition and increase the variety of products available to consumers, and these 'new combinations,' as Schumpeter called them, force less competitive products, services or firms out of the market.

A new generation of thinkers and researchers led by David Audretsch and Zoltan Acs, and their colleagues and collaborators, have added a great deal of empirical detail to Schumpeter's theories of entrepreneurship and innovation. These researchers reiterate Schumpeter's ideas and credit the entrepreneur as the mechanism by which ideas and knowledge translate into economic growth.^{12 13 14 15}

One study¹⁶ argues that knowledge creation is not a sufficient condition for economic growth. Rather, the knowledge must be converted by an entrepreneur for it to affect growth; their research demonstrates that technical knowledge (knowledge affecting the internal/production operations of a firm) can, directly and indirectly, affect economic growth. Technical knowledge directly affects economic growth by making the firm more competitive, while indirect effects might include the use of innovation in applications external to the firm. Another study¹⁷ provides evidence that entrepreneurship causes economic growth. Hence, the influence of entrepreneurship on economic growth strengthened during

the 1990s in developed countries.

Yong Suk Lee¹⁸ hypothesized that firm births, a common proxy for entrepreneurship, would have significant effects on economic outcomes, specifically employment, payroll and wages. He found that increasing firm births by 10 percent generated 1.3 - 2.4 percent increases in employment, 2.4 - 4 percent increases in payroll and 1.2 - 2 percent increases in wages ten years after the bump in firm births. (These increases extend beyond the initial job and accompanying payroll increases due to firm births, suggesting the firm births stimulated additional economic activity in the regions studied.)

Other researchers have focused on Schumpeter's concept that new, competitive firms drive economic growth. One study¹⁹ found that young firms (especially those in operation less than five years) add more jobs on average than more mature firms. Another study²⁰ documents the ways new firms add jobs to the economy. They found that startup firms impact employment growth in 3 ways: an increase in employment at startup, a decline in employment from firms who fail (peak decline is typically 3-4 years after starting), and an increase in employment from surviving firms due to rising demand for their product and cost-effective operations (i.e., being competitive; peak growth typically occurs around 6-7 years). Additionally, one study²¹ finds that entrepreneurship outperformed other sources of economic growth (namely, migration, trade and human capital) in Canadian provinces.

While the economic development literature has acknowledged for decades the benefit of human capital in augmenting labor productivity,²² knowledge and human capital play another vital role in the Schumpeterian tradition. Knowledge and ideas are the raw material for innovations, and intimately connect with educational attainment and human capital development.



Zoltan Acs²³ notes that human capital investments facilitate research and development expenditures and technology commercialization. Several studies^{24 25} affirm that regions with higher human capital will realize more startups in high-tech industries. A different study²⁶ tested a model that allowed for knowledge spillovers from both incumbent and startup firms and found that entrepreneurs specifically were responsible for economic growth in the Organization of Economic Cooperation and Development (OECD) countries over their study period.

An additional contribution to this literature provided evidence that social networks that connect faculty, students, campus-based intermediaries and off-campus resources promote ‘academic entrepreneurship,’ or the development of spin-off companies from academic research.²⁷ Human capital and entrepreneurship may also reinforce one another, as highlighted in a study²⁸ that argued feedback loops exist where human capital generates ideas for innovation while entrepreneurs are partially motivated by their learning and knowledge gained from innovation; this recursive process contributes to the development of an entrepreneurial culture discussed below.

The entrepreneurship literature has also addressed what kinds of human capital matters for entrepreneurship. The above-referenced studies primarily defined human capital as educational attainment; other research^{29 30} ³¹ identified creativity and social diversity as important influences on idea generation and therefore, economic growth. Other studies^{32 33} ³⁴ explore alternative measures and forms of human capital, such as the share of employment in creative class occupations, self-employment, human capital, creativity, university spillovers and high-technology clusters as factors driving economic growth in lagging regions in or adjacent to Appalachia. Generally, they concluded that creativity, educational attainment and self-employment are key sources of economic growth, particularly in lagging regions. Another study³⁵ developed a model to explain the process connecting educational attainment to economic growth, and they show that human capital increases ‘absorptive capacity’ (the ability to identify and commercialize ideas) for entrepreneurship, and heightened levels of entrepreneurship leads to more knowledge-

based entrepreneurial activity in a region. They also find that cultural diversity contributes to the vibrancy of regional systems of entrepreneurship.

Another key insight of Schumpeter is that innovations are ‘lumpy.’ That is, innovations tend to beget innovation in both time and space. Schumpeter reasoned that the presence of one or two entrepreneurs will encourage others to emerge, and this process results in clusters of entrepreneurial activity in time and space. This idea is consistent with a body of literature that examines the clustering of firms and innovative activity.

The literature argues that clusters enjoy agglomeration economies, or efficiencies in production that arise from proximity and knowledge spillovers between competing firms, which reinforce their competitiveness and the region’s prosperity.³⁶ Examples of this would be the information technology cluster in Silicon Valley, California, Raleigh-Durham-Chapel Hill, North Carolina’s Research Triangle, or the financial services cluster located between New York, New York and Boston, Massachusetts.

Michael Porter³⁷ first articulated the structure and advantages of clusters in his famous ‘cluster diamond’ figure. The cluster diamond identifies four driving forces that reinforce the cluster’s existence: firm strategy, structure and rivalry (how firms operate and engage one another); factor conditions (presence and quality of inputs, such as a highly trained and specialized workforce); demand conditions (sophistication and preferences of consumers for the cluster’s products); and related and supporting industries (presence of specialized resources that support the cluster, like specialized legal and financial services or customized training programs). As these four components interact within a region, firms benefit by having access to experienced/talented workers, support services, and customers to provide helpful feedback. In addition to these benefits, knowledge and innovation spillovers occur because of the proximity of firms; firms learn from each other as they compete for workers, observe product announcements, attend meetings and seminars, etc., as well as through informal interactions like at civic, philanthropic and social events).

A new startup firm would benefit from being in this dynamic environment, so it would want

to locate in the cluster, thereby reinforcing the clustering effect. In addition to the benefits afforded firms within the regional cluster, the region itself also benefits through the presence of expertise in firm formation, access to startup capital and services needed by startups (e.g., lawyers and accountants familiar with intellectual property rights), city and/or state policies that support firm formation, educational institutions delivering customized training and support, etc.

Further research pointed out that clustering occurs on two different but complementary scales.³⁸ First, clustering occurs at a city level, where diversity and creativity catalyze new ideas and innovations.³⁹ Clustering can also occur at the neighborhood scale, and specialization is the force behind this kind of clustering since common infrastructure and access to specialized labor require proximity. The complementarity of these two scales manifests when a city is made up of numerous specialized clusters in related industries.⁴⁰ One study⁴¹ found that innovation activity is spatially concentrated in the early stages of the industry's life cycle, the stage when new products are introduced to the market and technologies are employed to assist with scaling production and reducing costs. Another study⁴² went so far as to conclude that innovation and entrepreneurship require the city environment. A nuanced insight⁴³ suggested that while clustering and innovation may be related concepts, they do not necessarily imply sales growth to firms within the cluster.

Along with the co-location of firms, clusters often develop cultures and environments that support and sustain firms located therein. Victor Hwang similarly describes this process to what occurs in a rainforest.

“Humans are biological animals, so our society is a biological system. Biological systems, like natural rainforests, thrive because of the unplanned, uncontrolled results of countless interactions among flora and fauna. As a result, they adapt. They evolve. It's similar for human beings. Our society, our networks, are a type of ecosystem too. They are rainforests but made of people. Our world depends on the interactions of people who possess talent, capital, and ideas. That means everyone.”⁴⁴

An entrepreneurial ecosystem includes mutually supporting factors and operators that facilitate

productive entrepreneurship within a specific geography.⁴⁵ At the core of an entrepreneurial ecosystem are the network of entrepreneurs, supported by a range of factors including finances, talent, leadership, knowledge, support services and the social capital binding them together.⁴⁶ Researchers⁴⁷ adopted this systematic approach to entrepreneurship. One researcher⁴⁸ defined the entrepreneurial ecosystem as the demography of organizations conducive to developing entrepreneurs and infrastructure to support them, which includes human capital, financial capital, access to innovations and supportive infrastructure. Another researcher⁴⁹ added technology transfer processes and support for ventures at the state, corporation and educational levels as critical components of this ecosystem. One researcher, attempting to measure ecosystem components,⁵⁰ defined the entrepreneurial ecosystem as consisting of six domains: culture, formal institutions, infrastructure and amenities, diversity, and demand characteristics. Others⁵¹ have emphasized diverse social interactions linking campus resources (like faculty and students) with off-campus resources as critical to the successful new firm formation.

Academics^{52 53} demonstrated that such entrepreneurial ecosystems are more competitive and create jobs more quickly. One study notes that a region's innovation capacity (its ability to introduce 'new combinations') is determined by the existence of, and access to, networks of public and private entities that provide a host of experience to founders of new firms, ranging from advisors with entrepreneurial expertise to financing and encouragement. Other researchers⁵⁴ refer to the importance of institutions (meaning the elements of the economy that support economic activity such as government, non-profit organizations, service industries like banks and insurance companies, and intangible dimensions like cultural norms, attitudes and expectations), which also comprise the entrepreneurial ecosystem.

Collectively, this literature points to the complexity of entrepreneurship development, requiring a combination of resources focused on individuals and individual businesses as well as resources focused on a broader scale to build networks, affect attitudes and culture, and ensure a sufficient stream of ideas exist for conversion into businesses.



Concepts

The intensity of entrepreneurial activity is a function of the extent to which individuals recognize the entrepreneurial opportunities and possess the aptitude, inspiration and talent to exploit them.⁵⁵ The interaction between recognition of entrepreneurial opportunities and the capacity to pursue them increases the level of startup activity, new firm formation, the proportion of young firms and job creation, especially if concentrated in knowledge-intensive industries in a region.

We believe that the young-firm share of employment should prove to be an effective measure of the broader entrepreneurial awareness, support and capacity (entrepreneurial ecosystem) in a geographic area.

Some entrepreneurship is aimed at exploiting local market demand and, indirectly, providing employment and income for founders and their family members. Some might call this “necessity” entrepreneurship, but that terminology can be interpreted as a pejorative. A more positive interpretation would be to call it “Main Street” entrepreneurship. However, service sector family-based entrepreneurship can employ both a sizeable number of family and non-family members. Communities with a high young-firm share of total employment have a highly effective entrepreneurial ecosystem that creates more new firms and sustains them in the early stages of scale-up.

The percentage of total employees at young firms with a bachelor’s degree or above can provide a measure of the sophistication or knowledge intensity of the firm. The young firm knowledge intensity supplies information on the aspirations of the founders and the characteristics of the industry in which they are engaged. For example, young firms providing professional, scientific and technical services will have a higher proportion of staff with bachelor’s and advanced degrees as they create and provide the services. Engineering, legal, accounting, financial and management consulting services offered by young firms would be included in this group.

Other examples include information and communication services, data processing and hosting services, computer system design, web design, cloud-based software and many other digital services. A range of high-tech and advanced manufacturing industries have a high proportion of their employees with these university credentials. Electronic components, semiconductors, communications gear, navigation equipment, medical devices and material science-based sectors are illustrations.

Most of the founders of these knowledge-intensive firms desire to disrupt regional, national and international markets as they scale up and have sizable local employment and wage impacts. Some might have established themselves by exploiting a local business opportunity, but their ultimate objective is to reach a broader geographic market. Central to a knowledge-based entrepreneurial ecosystem are research universities and government labs that commercialize research in the form of spinout firms and through licensing to newly-established firms within the region.⁵⁶ This is a form of “transformational” entrepreneurship that can involve creating new markets or fundamentally altering existing ones.⁵⁷ Knowledge-intensive young firms have a higher probability of achieving middle-market status where they generate rapid job gains for their regions.

The formation of new knowledge-intensive firms is vital because they diversify the regional ecosystem and can evolve and grow to replace large incumbent firms that stagnate or ultimately don’t survive. While dominant (anchor) firms provide the core research and development infrastructure within a geography, they can miss an emerging technology that might cannibalize existing lines of business.⁵⁸ However, young firms can access the management capabilities resident in a region’s established firms and exploit emerging technology breakthroughs much more efficiently than young firms in a region without these anchor firms.⁵⁹

A critical advantage for the most dynamic, innovation-driven, knowledge-intensive regions has been the emergence of the so-called serial entrepreneurs. These are individuals who cash out of the more established firms they helped launch to develop the next new idea into a startup. They recirculate money and entrepreneurial expertise back into the region, giving it an edge over others.

The boost in capital availability to knowledge-intensive entrepreneurs has aided new firm formation and economic growth in many regions. This improved access to risk capital is exceptionally vital to technology startups because the service or product is largely unproven and the market potential is difficult to estimate with any precision. Many firms established from research backgrounds require substantial sums of external financing to fully develop their ideas into successful businesses.⁶⁰ This is where early-stage risk capital fills the void, whether through loosely organized individual investors—such as angel investors, crowd-based funding—or venture capital firms that pool investments from multiple sources. However, venture capital remains highly concentrated in the U.S. according to CityLab and Pitchbook. The San Francisco, San Jose, New York,

Boston, Los Angeles, Chicago, Seattle and Washington metros received over 87 percent of total U.S. venture capital spending in 2017.

The analysis which follows extends this literature in two critical dimensions. First, we take advantage of recently released data, Quarter Workforce Indicators, from the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program to measure entrepreneurship as the proportion of firms less than or equal to five years old. This measure builds specifically on the work of Haltiwanger, Jarmin and Miranda,⁶¹ and Fritsch and Mueller⁶² who found that firm age, and not size, was an important indicator of economic growth, and we argue that it is more consistent with Schumpeter's concepts of an entrepreneur. Second, we focus on the intersection of young firms and knowledge intensity, given the importance of human capital and knowledge to entrepreneurship, to examine how young firms employing highly educated workers impact economic growth. While simply promoting post-secondary education is one policy action, our objective in this research is to promote the complexities that exist between educational attainment and the entrepreneurial ecosystem as indicated by the aforementioned literature.





RANKINGS



Data and Methods

We begin our analysis by ranking metropolitan and micropolitan areas. Three indices are constructed and used to rank metropolitan and micropolitan areas: the proportion of total employment at young firms (hereafter, young firm share), the proportion of employment at young firms with a bachelor's degree or higher (hereafter, young firm knowledge intensity), and an index that combines the two measures. Rankings of the top 50 metropolitan and micropolitan areas by these indices are provided below. (Visit our website for index values for each metropolitan and micropolitan area.) Appendix I contains a detailed description of how the indices are constructed, in addition to a description of all data used in this report.

The measures of young firm share and young firm knowledge intensity come from the U.S. Census Bureau's Longitudinal Household Dynamics, Quarterly Workforce Indicators dataset (LEHD-QWI).⁶³ The LEHD-QWI dataset contains quarterly state, metropolitan, micropolitan, county, and workforce investment

area-level information on employment and wages. The geographic regions can be subset by the age of firm, defined as the number of years since any branch of the firm was first established in the U.S.; the size of firm, defined as the number of employees across all of a firm's branches in the U.S.; industry of the job; sex of the worker; age of the worker; education level of the worker; race of the worker and ethnicity of the worker.

The young firm share and young firm knowledge intensity indices are constructed by calculating the relative distance a given region's value of young firm share and young firm knowledge intensity was from the maximum value and then normalized to a value between 0 and 100. Therefore, the region with the highest young firm share or young firm knowledge intensity received a value of 100, while the lowest region for both indicators received a value of 0. The combined index value was calculated as the average of the two indices. The reader is referred to Appendix I for additional details regarding this methodology.



KEY FINDINGS

TRENDS IN YOUNG FIRMS OVER TIME

Figure 1 plots the trends in young firm employment share from 1993 to 2017. Following moderate stability during the 1990s, the U.S. saw a sizable decline in the share that lasted roughly 15 years. Today, approximately one-third fewer workers hold jobs at young firms than in 2000. The reason for the decline is up for debate, and could be the result of phenomena ranging from societal changes in the perception of entrepreneurship to increased student loan debt.⁶⁴ The young firm employment share decline accelerated from the beginning of the Great Recession in 2007 to 2012; it has hovered at around 11.5 percent since then. This progression could have initially been the result of high recession vulnerability for young firms relative to older firms, and later driven by fear of another major recession or a tight labor market limiting young firm hiring opportunities. This trend is in line with findings from the Brookings Institution and the Kauffman Foundation and others that use other Census Bureau datasets to plot the ratio of young firms to all firms and show trends that are similar to that of our young firm employment share.⁶⁵

FIGURE 1: NATIONAL YOUNG FIRM EMPLOYMENT SHARE FROM 1993 TO 2017

PERCENT OF PRIVATE U.S. EMPLOYMENT AT YOUNG FIRMS

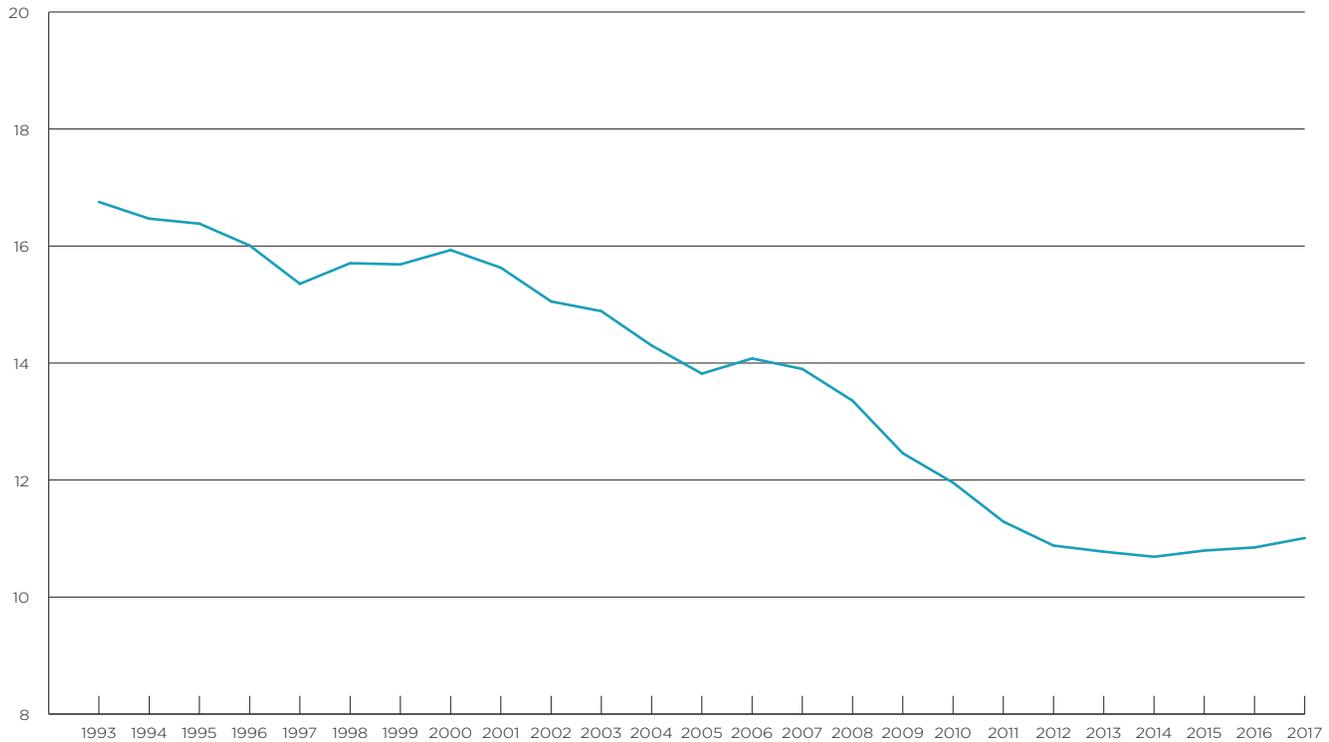
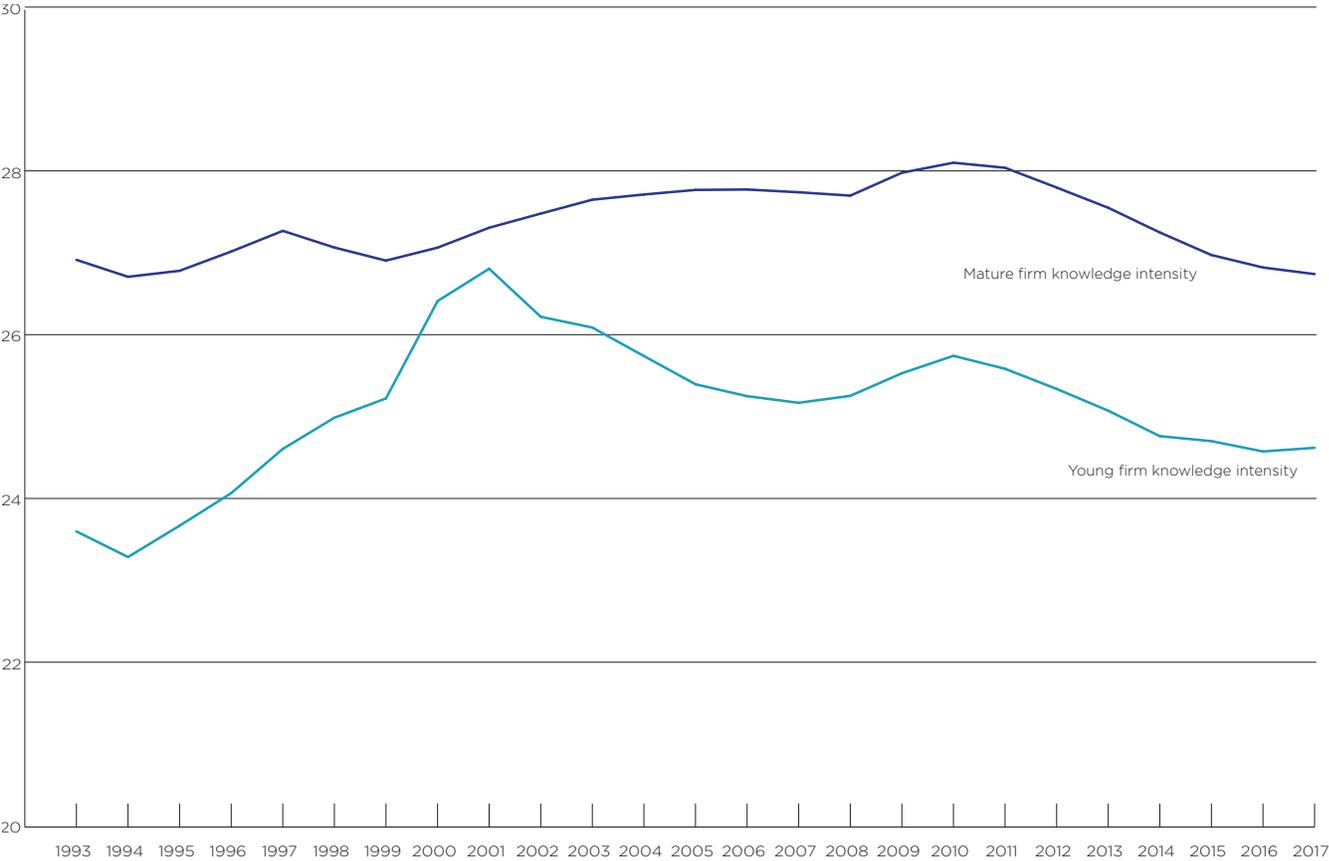


Figure 2 tracks young firm knowledge intensity over the same period. It plots young firm knowledge intensity alongside the knowledge intensity at all firms over the age of five, mature firm knowledge intensity. While the mature firm knowledge intensity has generally hovered between 27 and 28 percent, the young firm knowledge intensity has been a bit more volatile. In 1993, there was a roughly three-percentage-point gap between mature firm knowledge intensity and young firm knowledge intensity. The gap shrank as the decade progressed and the young firm knowledge intensity grew more quickly than its mature firm counterpart. The gap was nearly gone by the dot-com peak in the early 2000s. From that point, the gap began widening, before stabilizing at roughly two percentage points at the end of the 2000s.

The more general stagnation of overall knowledge intensity implied by this plot is not in alignment with the trends of similar educational attainment measures. One reason may be that, while job counts by the age of firm are straightforward to tabulate using the underlying state agency data, educational attainment for a given worker is unknown and must be imputed by the Census Bureau. The imputation techniques are based on characteristics such as a worker’s wage level and industry⁶⁶ and can become inaccurate if not correctly adjusted over time. It is important to note that what matters for our purposes is that the differences in the young firm knowledge intensity among metropolitans and micropolitans are accurate, not the levels of the measure. If the differences are accurate, we can effectively compare areas’ performance in the young firm knowledge intensity. We can also analyze the impact of young firm knowledge intensity on future economic growth. In Appendix I, we provide strong evidence that the differences are, indeed, accurate.

FIGURE 2: NATIONAL KNOWLEDGE INTENSITY AT YOUNG AND OLD FIRMS FROM 1993 TO 2017
 PERCENT EMPLOYEES WITH BACHELOR’S DEGREES OR HIGHER BY AGE OF FIRM



METROPOLITAN TRENDS

Young Firm Employment Share in Metropolitan Areas

Topping the list is Madera, California, at 23.7 percent, making it 100 on the young firm share index. The Madera metro is dominated by agriculture and food processing and has a number of low-skilled industries. Further, it has many first-generation immigrants. Midland, Texas, which is the largest metro area in the Permian Basin, has benefitted from recent oil discoveries and rapid job gains and the attendant strong in-migration.⁶⁷ El Centro, California, is third as it is on the Mexican border east of San Diego. It has witnessed an expansion in alternative energy firms. Punta Gorda, Florida, fourth, has low housing costs relative to other Gulf Coast metros, attracting commuters. It has a large tourism industry, too.⁶⁸ Naples-Immokalee-Marco Island, Florida, was fifth with an index score of 73.1. Naples has seen rapid gains in tourism and retiree population growth, and job growth here has been double the national average.⁶⁹ All of these regions highlight the importance of young firms in growing economies, despite a concentrated presence of high-tech or other knowledge-intensive firms.

Provo, Utah, was sixth and has been one of the best in the country in job creation. Brigham Young University is creating more science, technology, engineering and mathematics (STEM) graduates who have an entrepreneurial predisposition. Strong job growth and STEM graduates that are becoming entrepreneurs bolster its position.⁷⁰ Closely behind is Cape Coral-Fort Myers, Florida, at seventh. It is adjacent to the Naples metro and is seen as a thriving startup scene.⁷¹ It has witnessed strong job gains with an expansion in tourism. St. George, Utah is eight and is home to Zion National Park. St. George has experienced job growth among the top five in the nation in recent years. Its travel and tourism industry are vibrant and has a strong entrepreneurial culture. Bakersfield, California, is ninth with a young firm share of employment of 18.2 percent. Bakersfield has vast oil deposits in

the Monterey Shale, a large agricultural sector and has experienced appreciable growth in warehousing, logistics and distribution, given its lower costs and favorable location just north of Los Angeles. At tenth, The Villages, Florida, is America's most rapidly growing retirement destination. Local entrepreneurs are exploiting the population-driven expansion in demand for services, not to mention the resources being brought to the region by retirees.⁷²

Three states, California, Florida and Texas, contain 32 of the top 50 metros on the share of employment that young firms represent. It isn't a coincidence that these three states have been among the national leaders in job creation since 2010. California had an impressive 15 metros in the top 50. Florida was home to 11 of the Top 50 and Texas contained six.

The Heartland had eight metros in the top 50 and 20 out of the top 100 in the nation. This is a disproportionately low share and highlights why much of the region has experienced job growth below the rest of the nation since the Great Recession ended. In addition to Midland, Texas, the Heartland has Victoria, Texas, at 20th. Located on the Gulf Coast, Victoria has a high dependence on oil and petrochemicals and is a distribution center. It has a young population and much of its employment base is attributable to high levels of entrepreneurship. Auburn-Opelika, Alabama, is 23rd, College Station-Bryan, Texas 26th and Austin-Round Rock, Texas, 27th. All three of these metros have major research universities that help infuse entrepreneurship into their local economies. Daphne-Fairhope-Foley, Alabama (31st); Laredo, Texas (34th); and McAllen-Edinburg-Mission, Texas (47th) are the last three Heartland metros among the top 50.

TABLE 1: TOP 50 METROS FOR YOUNG FIRM EMPLOYMENT SHARE**Heartland**

Rank	Metro Name	Index Value
1	Madera, CA	100
2	Midland, TX	82.606
3	El Centro, CA	81.339
4	Punta Gorda, FL	79.812
5	Naples-Immokalee-Marco Island, FL	73.088
6	Provo-Orem, UT	70.510
7	Cape Coral-Fort Myers, FL	70.105
8	St. George, UT	70.060
9	Bakersfield, CA	70.050
10	The Villages, FL	68.003
11	Port St. Lucie, FL	65.257
12	North Port-Sarasota-Bradenton, FL	64.929
13	Bend-Redmond, OR	63.697
14	Yuba City, CA	62.891
15	Wenatchee, WA	62.526
16	Prescott, AZ	61.598
17	Oxnard-Thousand Oaks-Ventura, CA	60.662
18	Hanford-Corcoran, CA	60.655
19	Visalia-Porterville, CA	60.333
20	Victoria, TX	59.879
21	Hilton Head Island-Bluffton-Beaufort, SC	59.865
22	Fresno, CA	59.669
23	Auburn-Opelika, AL	58.535
24	San Luis Obispo-Paso Robles-Arroyo Grande, CA	58.467
25	Santa Maria-Santa Barbara, CA	58.003





Rank	Metro Name	Index Value
26	College Station-Bryan, TX	57.453
27	Austin-Round Rock, TX	55.748
28	Miami-Fort Lauderdale-West Palm Beach, FL	55.537
29	Ocala, FL	55.424
30	Riverside-San Bernardino-Ontario, CA	54.672
31	Daphne-Fairhope-Foley, AL	54.460
32	Homosassa Springs, FL	54.347
33	Fort Collins, CO	54.002
34	Laredo, TX	53.797
35	Santa Cruz-Watsonville, CA	53.427
36	Grants Pass, OR	52.881
37	Los Angeles-Long Beach-Anaheim, CA	52.687
38	Santa Rosa, CA	52.578
39	Brunswick, GA	52.186
40	San Francisco-Oakland-Hayward, CA	52.156
41	Sebastian-Vero Beach, FL	52.102
42	Bremerton-Silverdale, WA	52.064
43	Boulder, CO	51.922
44	Greeley, CO	51.275
45	Flagstaff, AZ	51.185
46	Myrtle Beach-Conway-North Myrtle Beach, SC-NC	50.917
47	McAllen-Edinburg-Mission, TX	50.807
48	Crestview-Fort Walton Beach-Destin, FL	50.078
49	Coeur d'Alene, ID	49.868
50	Charlottesville, VA	49.605

Young Firm Knowledge Intensity in Metropolitan Areas

Table 2 shows the leading metros on the knowledge intensity index. Topping the list is San Jose-Sunnyvale-Santa Clara, California, home to Stanford University. A comprehensive study undertaken by Stanford concluded that alumni were responsible for 18,000 firms that were headquartered in California and accounted for annual worldwide sales of \$1.27 trillion.⁷³ A key example is Google, which created over 32,000 jobs due to search engine algorithms making it out of Stanford. The majority of those jobs are based in the San Jose metropolitan area.⁷⁴

The strength of the relationships between young firm knowledge intensity and university commercialization success is remarkable, almost eerie in some respects. It demonstrates the extent that universities play in knowledge-based entrepreneurship and the challenges that metropolitan areas without research universities engaged in commercialization face in fostering job creation.

San Francisco-Oakland-Haywood is second on young firm knowledge intensity and is next door to Stanford, and is home to highly ranked University of California, Berkeley and the University of California, San Francisco. Boston-Cambridge-Newton, Massachusetts, is fourth on young firm knowledge intensity, where area universities MIT and Harvard ranked 8th and 26th, respectively, are among the leaders in university commercialization. MIT performed a study of living alumni and found that they had started nearly 26,000 active firms and 6,900 of those firms were based in Massachusetts. These companies employ 3.3 million and are responsible for worldwide revenues of approximately \$2 trillion.⁷⁵ Other examples include Boulder, Colorado, that is sixth on young firm knowledge intensiveness and the University of Colorado, 35th on commercialization. New York-Newark-Jersey City is ninth on young firm knowledge intensity, while Columbia is second and New York University, 11th, on commercialization.

Other examples of university-metro pairs on young firm knowledge intensity include the 11th-ranked Ann Arbor, Michigan metro and the 16th ranked University of Michigan; the 16th

ranked Chicago-Napier-Elgin, Illinois metro and 23rd ranked Northwestern; the 17th-ranked Salt Lake City metro and the top-ranked University of Utah; 19th ranked Minneapolis-St. Paul-Bloomington metro and 14th ranked University of Minnesota; and the 25th-ranked Ithaca, New York metro and the 17th-ranked Cornell University.⁷⁶

Venture capital tends to go to high-tech startups with high growth potential, and the presence of such startups will also boost a metro's young firm knowledge intensity. Of the top eight metros for venture capital, only two finished outside the top ten in our young firm knowledge intensity index—Chicago was 16th and Los Angeles was 32nd.

San Jose-Sunnyvale-Santa Clara, California-Silicon Valley is first in young firm knowledge intensity with 39.6 percent of employees in young firms with bachelor's degrees or higher. San Jose's ecosystem of innovation and entrepreneurship propels its economy.⁷⁷ As mentioned, Stanford provides the core of Silicon Valley's high-quality university research and commercialization with a distinct caliber of entrepreneurial undergraduates, graduate students and faculty fueling its entrepreneurial ecosystem. In 2018, Silicon Valley had venture capital placements of \$19 billion, 17.1 percent of the U.S. total.

San Francisco-Oakland-Hayward, California, ranks second in knowledge intensity with 35.2 percent of employees at young firms with bachelor's degrees or above. San Francisco has the sixth-highest per capita income after adjusting for the cost of living differential, although the rapidly rising housing costs will change its position in the future. High-tech services, such as social media, mobile applications, cloud-based software and several digital media firms, are the source of its rapid growth.⁷⁸ At \$31 billion in 2018, venture capital placements accounted for 27.9 percent of the nation's total.

Trenton, New Jersey ranks third in young firm knowledge intensity, just slightly below San Francisco. Home to Princeton, it has the STEM talent to fuel a thriving technology startup scene. It has a high concentration of professional





and technical services and extensive biotech and IT firms. Boston-Cambridge-Newton, Massachusetts, fourth on young firm knowledge intensity, is home to world-class universities that attract companies and facilitate new business formation.⁷⁹ Bridgeport-Stamford-Norwalk, Connecticut, is fifth. The Bridgeport metro area is a leading global financial center with several leading hedge firms. Many leave these firms to embark upon establishing their enterprises. A high concentration of high-tech firms aids new formation in these fields.

Boulder, Colorado, comes in sixth on knowledge intensiveness among metros. While it is a smaller metro, Boulder has a collection of private R&D installations and national research labs. The University of Colorado-Boulder is an essential component of its knowledge-based entrepreneurial ecosystem with the scientists and engineers it creates.⁸⁰ This supported the metro area in having 33.2 percent of its employees at young firms with at least a bachelor's degree. Boulder created the fourth-most technology patents per capita from 2000 to 2015.⁸¹ Hartford-West Hartford, Connecticut, was seventh with an index score of 77.2, meaning it was 22.8 percent below the metro leader, San Jose. It has one of the highest concentrations of firms within the insurance industry. The metro has established a new insurance accelerator that is driving startup activity in this industry.⁸²

Washington-Arlington-Alexandria, DC-VA-MD-WV is eighth. The metro area is a major center for computer systems design and tech-related professional services and has numerous national institutes and labs. The New York-Newark-Jersey

City, NY-NJ-PA metro area, ninth in knowledge intensity of young firms, has a diverse set of high skilled industries and is the global capital of financial services. Seattle-Tacoma-Bellevue, Washington is tenth. Based on its ability to “advance science, invent new technologies and help drive the global economy,” the University of Washington was designated the most innovative public university in the world.”⁸³ Seattle provides strong support for entrepreneurs and has an extensive concentration of startups in software and other knowledge-intensive industries.

The Heartland has nine metros in the top 50 and 27 out of the top 100 on young firm knowledge intensity. The Heartland performs proportionately better on young firm knowledge intensity than on young firm share of employment. Still, this performance leaves the Heartland underachieving relative to the rest of the nation. Ann Arbor, Michigan, is the highest at 11th. The University of Michigan is an anchor research institution fostering a number of firms in IT and life sciences. Additionally, there has been the commercialization of autonomous driving vehicles and battery technology. Other Heartland metros in the top 50 for knowledge intensity include Chicago-Naperville-Elgin, IL-IN-WI at 16th; Nashville-Davidson-Murfreesboro-Franklin, Tennessee (18th); Minneapolis-St. Paul-Bloomington, Minnesota-Wisconsin (19th); Detroit-Warren-Dearborn, Michigan (28th); Des Moines-West Des Moines, Iowa (34th); Ames, Iowa (36th); Iowa City, Iowa (41st) and Madison, Wisconsin (47th).

TABLE 2: TOP 50 METROS FOR YOUNG FIRM KNOWLEDGE INTENSITY

Heartland

Rank	Metro Name	Index Value
1	San Jose-Sunnyvale-Santa Clara, CA	100
2	San Francisco-Oakland-Hayward, CA	87.037
3	Trenton, NJ	85.213
4	Boston-Cambridge-Newton, MA-NH	82.516
5	Bridgeport-Stamford-Norwalk, CT	80.996
6	Boulder, CO	79.094
7	Hartford-West Hartford-East Hartford, CT	77.236
8	Washington-Arlington-Alexandria, DC-VA-MD-WV	75.220
9	New York-Newark-Jersey City, NY-NJ-PA	75.145
10	Seattle-Tacoma-Bellevue, WA	71.432
11	Ann Arbor, MI	69.501
12	Urban Honolulu, HI	69.379
13	Manchester-Nashua, NH	67.693
14	Oxnard-Thousand Oaks-Ventura, CA	67.214
15	Durham-Chapel Hill, NC	65.384
16	Chicago-Naperville-Elgin, IL-IN-WI	65.205
17	Salt Lake City, UT	64.747
18	Nashville-Davidson-Murfreesboro-Franklin, TN	62.967
19	Minneapolis-St. Paul-Bloomington, MN-WI	62.945
20	Burlington-South Burlington, VT	62.368
21	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	62.179
22	Baltimore-Columbia-Towson, MD	61.349
23	Denver-Aurora-Lakewood, CO	61.019
24	Albany-Schenectady-Troy, NY	59.925
25	Ithaca, NY	59.431





Rank	Metro Name	Index Value
26	Portland-Vancouver-Hillsboro, OR-WA	59.407
27	Portland-South Portland, ME	58.924
28	Detroit-Warren-Dearborn, MI	58.817
29	Worcester, MA-CT	58.160
30	New Haven-Milford, CT	58.143
31	Atlanta-Sandy Springs-Roswell, GA	57.913
32	Los Angeles-Long Beach-Anaheim, CA	57.765
33	Kingston, NY	57.754
34	Des Moines-West Des Moines, IA	57.597
35	State College, PA	57.413
36	Ames, IA	57.342
37	San Diego-Carlsbad, CA	56.914
38	Logan, UT-ID	56.905
39	Raleigh, NC	56.779
40	Barnstable Town, MA	56.642
41	Iowa City, IA	56.435
42	Allentown-Bethlehem-Easton, PA-NJ	56.296
43	Kahului-Wailuku-Lahaina, HI	55.984
44	Provo-Orem, UT	55.459
45	Providence-Warwick, RI-MA	54.940
46	Santa Cruz-Watsonville, CA	54.624
47	Madison, WI	54.613
48	Sacramento-Roseville-Arden-Arcade, CA	54.460
49	Ogden-Clearfield, UT	53.517
50	Charlottesville, VA	53.451

Overall Young Firm Importance and Knowledge Intensiveness in Metropolitan Areas

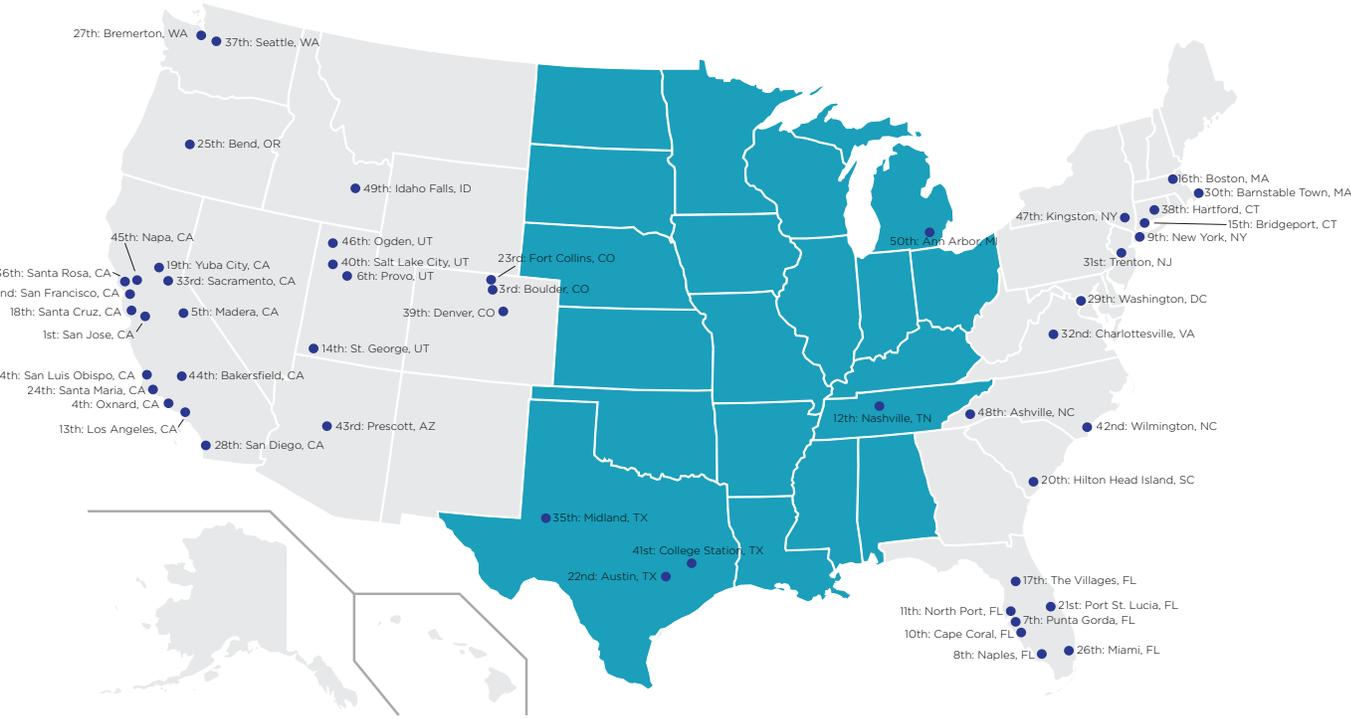
Not surprisingly, San Jose-Sunnyvale-Santa Clara, California, is first with a score of 100. San Francisco-Oakland-Hayward, California is a close second with an index score of 98.2, just 1.8 percentage points lower. The San Francisco metro area has a higher young firm share of employment than the San Jose metro. Boulder, Colorado, is third in this measure at 91.3. Oxnard-Thousand Oaks, California, has respectable scores on both components and is fourth overall. Madera, California is fifth overall, courtesy of its first place in young firm share of employment. Provo-Orem, Utah, is sixth with an index score of 86.6. Punta-Gorda, Florida is seventh, and Naples-Immokalee-Marco Island is eighth. The New York metro area is ninth, and Cape-Coral, Florida, is tenth. Figure 3 provides a map identifying the top 50 metropolitan areas by the overall index, while Figure 4 presents all metros with the respective quartile of the index indicated for each.

The Heartland had five metros among the top 50 and 14 out of the top 100, a disappointing

performance overall (see Figure 3). Nashville-Davidson-Murfreesboro, Tennessee, was 12th and the highest-ranking Heartland metro. It combined respectable scores of 57th on the young firm share of employment and 18th on knowledge intensity to warrant its position.

Vanderbilt University Medical Center is one of the largest medical and health care complexes in the nation.⁸⁴ Nashville has a strong small business support system, including Scale Nashville, which is a competitive six-month intensive training program aiding entrepreneurs. The Nashville metro is one of the true Heartland success stories.⁸⁵ Austin-Round Rock, Texas is 22nd in the composite measure. The University of Texas-Austin has been a significant contributor of talent to Austin for generations and provides a strong research and commercialization anchor. Ten firms were founded on its patents in 2016, and it generated \$17.6 million in licensing income.⁸⁶ Midland, Texas, was 35th, College Station-Bryan, Texas was 41st, and Ann Arbor, Michigan was 50th.

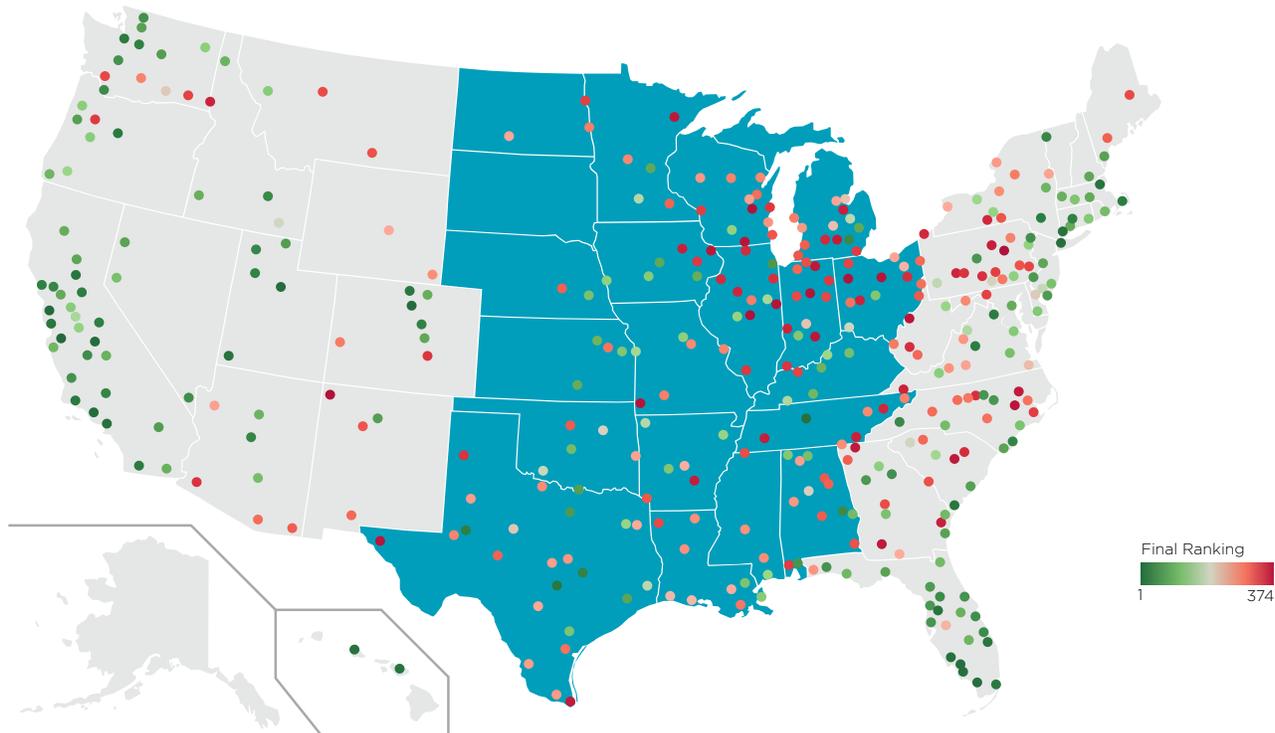
FIGURE 3: TOP 50 METROS FOR OVERALL YOUNG FIRM ACTIVITY



Note: Labels indicate the largest city in each metro.



FIGURE 4: METRO PERFORMANCE IN OVERALL YOUNG FIRM ACTIVITY



Looking at metropolitan rankings in the young firm knowledge intensity, it is not surprising to see some of the leaders in research and innovation. The local research and development environment and culture are essential to establishing new firms based upon transformative technologies. Metropolitans with indigenous R&D, and the entrepreneurial expertise to exploit it, have clear advantages in developing new firms and establishing dense, knowledge-intensive entrepreneurial ecosystems that endure into the future.⁸⁷ The leading entrepreneurial ecosystems are those with innovation systems operating in a collaborative environment with research, design, and production, interacting in a dynamic learning process.⁸⁸ Research universities that are not only proficient at creating intellectual property, but at commercializing it in startups, are essential elements in establishing these knowledge-intensive entrepreneurial ecosystems.⁸⁹

The critical role of research universities is also expressed by the degree to which they embed their graduates in the local ecosystem. Scientific and technical talent is essential for discovering

and converting innovations into viable products and services, resulting in new firm formation. The technical and scientific workforce of a metro creates its technological sophistication, innovation, and economic growth—not only for technology firms but for all young firms where innovation is an essential component.⁹⁰

Metropolitan entrepreneurial ecosystems with a dense concentration of STEM workers have an additional advantage: pooling workers and creating a labor force with essential industry-specific skills that can be infused into new firms. New firms formed within knowledge-intensive entrepreneurial ecosystems benefit from positive knowledge spillovers as well as agglomeration effects.⁹¹ Additionally, labor productivity tends to be higher in locations densely populated with human capital such as these. One important study concluded that doubling employment concentration boosted productivity by nearly 6 percent.⁹²

In metropolitan areas with high-velocity labor markets, STEM workers benefit from the opportunity to shift from one employer to another. New firms also benefit when there

is local technical talent that possesses the industry-specific skills they require, reducing the firms' search costs. The ease with which locations can assemble, circulate, and reassemble teams of highly skilled workers helps to foster new company formation and scale them.⁹³

A local high-velocity labor market can spur technology spillovers. Research breakthroughs within an entrepreneurial ecosystem can be transmitted through informal relationships maintained by ex-colleagues in a labor market network. This tacit knowledge interchange among scientists and technicians provides host regions with key advantages by

amplifying communications on the latest non-codified knowledge in their fields that can be reconfigured into new enterprises.

There is a clear relationship between the young firm knowledge intensity rankings and the locations of the top-performing universities in research commercialization. The Milken Institute ranks universities in technology transfer and commercialization in its Concept to Commercialization reports, and many of the top performers in the 2017 edition are located in our top-performing metros for young firm knowledge intensity.

MICROPOLITAN TRENDS

Young Firm Employment Share in Micropolitan Areas

The shale energy exploration boom has aided many of the top micropolitans on the young firm share of employment. Another common characteristic was many of these micro-economies were heavily tied to travel, tourism and recreation activities. These sectors typically have small firms, and local entrepreneurs play a major role in these activities and providing support services. In some sense, this is a form of "Main Street entrepreneurship." However, there can be a substantial portion of net new job creation from young firms engaged in these sectors.

Pecos, Texas, is the epicenter of the oil exploration boom occurring in the Permian Basin. Pecos has experienced the most rapid increase in population in the nation in recent years. Firms five-years-old or less represent 28.4 percent of private-sector employment in Pecos. The influx of petroleum labor into the area necessitated residing in "man camps," encampments of hastily built dormitories. In an effort to support entrepreneurship and diversify the economy, officials are planning to develop a small business incubator.⁹⁴ Big Spring, Texas, second on the young firm share of employment, has one of

the largest inland refineries in the United States and is a center for oil and gas exploration, processing and distribution.⁹⁵ Big Spring is an innovator for wind energy production in the central United States. The community college and high schools offer training programs for renewable energy-related jobs. The solar power industry is targeted for development.

At third, Uvalde, Texas, has indirectly benefitted from the oil and natural gas extraction boom in the Permian Basin. Oil-related companies are establishing offices in Uvalde, and workers are migrating to the area. Uvalde is diversifying its energy portfolio as one of the world's largest solar panel systems was installed.⁹⁶ Williston, North Dakota, fourth on the young firm employment share, is located in the center of the Bakken Basin and has seen rapid expansion in oil production. Williston has an advanced biofuel center researching new crop varieties for optimal biofuel production.⁹⁷ Andrews, Texas, at fifth, is in the Permian Basin and recorded a high rate of growth. However, the business community, civic leaders, and government agencies have been supporting a conducive environment for entrepreneurship.⁹⁸





Given its location in the Great Smoky Mountains, Cullowhee, North Carolina (sixth), has developed new firms in recreation equipment and supplies. The area is seeing expansion as entrepreneurs in tourism-related businesses are proliferating in the many small towns.⁹⁹ Heber, Utah, at seventh, is another area experiencing rapid expansion in tourism-related industries. Entrepreneurial support and mentoring are provided by its Small Business Development Center Utah Valley University campus and Business Resource Center. The Clearlake, California micropolitan area's (eighth on young firm share of employment) economy is closely tied to tourism and recreation as well. Ease of accessibility and popularity of its several lakes and adjacent recreational areas are the drivers.¹⁰⁰ Clewiston, Florida, was ninth. It is situated on Lake Okeechobee and is a nationally renowned sports fishing center and attracts avid fishing fans. Jackson, Wyoming-Idaho, is tenth. It is a "premier lifestyle-recreation destination that has used its stunning beauty to drive tourism, attract remote telecommuters and lure wealthy semi-retirees."¹⁰¹

Heartland micropolitan areas accounted for 17 out of the top 50 and 36 out of the top 100 in the United States on the young firm share of employment. To match their proportion of the national distribution of micropolitan areas, the Heartland would require 31 within the top 50 and 63 within the top 100. Other Heartland micros in the top 50 include Picayune, Mississippi, at 19th. Picayune has a number of firms supporting oil and gas exploration. Given its proximity to NASA's Stennis Space Center, the Picayune micropolitan area has targeted aerospace and aviation for further development.¹⁰² Fredericksburg, Texas, was 20th. Fredericksburg is a major wine-producing region and developed an extensive tourism industry with wine patrons visiting the area's vineyards. Other top 50 Heartland micros include Stephenville, Texas (26th); Stillwater, Oklahoma (32nd); Lamesa, Texas (34th); Bay City, Texas (38th); Ruston, Louisiana (40th); Elk City, Oklahoma (43rd); McAlester, Oklahoma, (44th); Paris, Texas (45th); Oxford, Mississippi (46th); and Branson, Missouri (49th).

TABLE 3: TOP 50 MICROS FOR YOUNG FIRM EMPLOYMENT SHARE

Heartland

Rank	Micro Name	Index Value
1	Pecos, TX	100
2	Big Spring, TX	83.708
3	Uvalde, TX	80.417
4	Williston, ND	79.646
5	Andrews, TX	77.963
6	Cullowhee, NC	75.404
7	Heber, UT	74.125
8	Clearlake, CA	73.029
9	Clewiston, FL	70.883
10	Jackson, WY-ID	66.985
11	Crescent City, CA	66.730
12	Wauchula, FL	65.684
13	Payson, AZ	65.520
14	Steamboat Springs, CO	64.623
15	Carlsbad-Artesia, NM	63.802
16	Safford, AZ	61.510
17	Seneca Falls, NY	61.415
18	Bozeman, MT	61.001
19	Picayune, MS	60.732
20	Fredericksburg, TX	59.797
21	Sheridan, WY	59.111
22	Brookings, OR	57.812
23	Key West, FL	57.558
24	Cedar City, UT	56.919
25	Ellensburg, WA	56.858





Rank	Micro Name	Index Value
26	Stephenville, TX	55.466
27	Prineville, OR	55.363
28	Shelton, WA	54.450
29	Oak Harbor, WA	54.179
30	Arcadia, FL	54.100
31	Pahrump, NV	53.678
32	Stillwater, OK	53.292
33	Georgetown, SC	52.809
34	Lamesa, TX	52.749
35	Sandpoint, ID	51.660
36	Taos, NM	51.611
37	Portales, NM	51.469
38	Bay City, TX	51.385
39	Gardnerville Ranchos, NV	51.255
40	Ruston, LA	50.361
41	Forest City, NC	50.118
42	Vernal, UT	49.973
43	Elk City, OK	49.917
44	McAlester, OK	49.768
45	Paris, TX	49.712
46	Oxford, MS	49.642
47	Milledgeville, GA	49.537
48	Durango, CO	49.502
49	Branson, MO	49.341
50	Ukiah, CA	49.222



Young Firm Knowledge Intensity in Micropolitan Areas

Among the top 50 micropolitans in young firm knowledge intensity, several are among the most popular resort communities in the U.S. This may be for two reasons: One is that entrepreneurs may desire to live in these beautiful places. The other is the density of high-wealth families in these areas results in the opportunity to organize outsized community angel investor funds and facilitate other support services for local entrepreneurs. The third-ranked Summit Park, Utah micro provides an example of the latter reason, with micro-based Park City Angels having made over 1,200 investments, mostly in Utah, since 2008.¹⁰³

Other micros have unique characteristics that have led to highly educated startup workforces. The top-ranked Los Alamos micro is likely the most unique. It was the secret home to atomic bomb development during World War II. Since the end of the Cold War, the area has transformed into a research hub for scientific fields ranging from supercomputing to medicine. Local firms that have spun out of the research labs may be few, but our data show them to be as technologically advanced as any startups in the country.

Not too dissimilar is the seventh-ranked Tullahoma-Manchester, Tennessee, micro. It is home to the Arnold Engineering Development Complex, a U.S. Air Force facility considered possibly the most advanced aerospace testing center in the world.¹⁰⁴

Top 25 micros Bozeman, Montana, and Oxford, Mississippi, benefit from the presence of major research universities—Montana State University and the University of Mississippi, respectively. These universities may not be as successful at commercialization and technology transfer as some metro-based schools, but they do not need to be to have a significant impact on the small-town economies where they are situated. In particular, Montana State has effectively created a photonics and optics cluster in Bozeman via university research spinoffs.¹⁰⁵

Los Alamos, New Mexico, has the highest percentage of employees of young firms with a bachelor's degree or higher at 29.8 percent in 2017. Second on the young firm knowledge intensity measure was Hudson, New York. This former industrial town has become a destination for tourists, and many New York City residents have purchased second homes in the community. Hudson has several restaurants, galleries and clothing boutiques.¹⁰⁶ Summit Park, Utah, is third on young firm knowledge intensity. Summit Park is one of the premier skiing destinations in the nation. Professional and technical services are one of the fastest-growing sectors. Summit County actively promotes entrepreneurship and offers support services to spur activity.¹⁰⁷

Vineyard Haven, Massachusetts (fourth), is a popular tourist destination and home to Martha's Vineyard. Tourists make their annual journey in the summer and many individuals who work in





the financial services industry vacation there. Torrington, Connecticut, is fifth and tourism is a big part of its economy. Its economic development strategy is heavily focused on supporting entrepreneurs. At sixth, Keene, New Hampshire, has a diversified economy that isn't overly reliant on any sector. Keene has invested in its downtown, and the Regional Consortium for Advanced Manufacturing supports a number of businesses through workforce training. Keene supports new businesses through the Hannah Grimes Center for Entrepreneurship by providing training and business incubation resources.¹⁰⁸

Tullahoma-Manchester, Tennessee, is seventh overall and first among Heartland communities, with 26.1 percent of employees at young firms with a bachelor's degree or above. The micropolitan area is the home of Arnold Air Force Base, and more importantly for economic development efforts, the Arnold Engineering Development Complex. These facilities are among the most extensive in the nation in testing aerodynamic and propulsion wind tunnels, rocket, and turbine engine test cells and other advanced systems. The micro area has extensive engineering talent and support firms for these activities.¹⁰⁹ Shelby, North Carolina, is eighth on young firm knowledge intensity. It has a community college, and the Small Business Center is actively engaged in promoting local entrepreneurs. Uptown Shelby works to revitalize its downtown.¹¹⁰

Concord, New Hampshire, is ninth. It has a community loan fund that assists entrepreneurs with loans, training and support resources to help establish themselves. The New Hampshire Small Business Development Center is a critical connector to business assistance in New Hampshire and programs offered through the university system, the State of New Hampshire, the U.S. Small Business Administration and the private sector. Concord economic development officials connect new firms into these resources.¹¹¹ Breckenridge, Colorado, is tenth and is a tourist destination. However, groups such as ELEVATE Breckenridge promote coworking space as an attractive location for remote workers and entrepreneurs. ELEVATE hosts entrepreneurial events like Startup Weekend.¹¹² Breckenridge is creating a model for entrepreneurial and remote working.

The Heartland had 17 micropolitans out of the top 50 and is home to 37 out of the top 100, substantially below its proportionate representation of micropolitans in the country. Other Heartland top performers include Jefferson, Georgia (12th); Frankfort, Kentucky (16th); Faribault-Northfield, Minnesota (17th); Marquette, Michigan (19th); Findlay, Ohio (20th); Fairfield, Iowa (23rd); and Oxford, Mississippi (25th).

TABLE 4: TOP 50 MICROS FOR YOUNG FIRM KNOWLEDGE INTENSITY

Heartland

Rank	Micro Name	Index Value
1	Los Alamos, NM	100
2	Hudson, NY	92.516
3	Summit Park, UT	89.960
4	Vineyard Haven, MA	89.003
5	Torrington, CT	85.454
6	Keene, NH	83.933
7	Tullahoma-Manchester, TN	83.104
8	Shelby, NC	82.818
9	Concord, NH	82.740
10	Breckenridge, CO	80.944
11	Kapaa, HI	79.182
12	Jefferson, GA	78.592
13	Barre, VT	78.199
14	Bennington, VT	78.071
15	Edwards, CO	77.573
16	Frankfort, KY	77.215
17	Faribault-Northfield, MN	76.345
18	Bozeman, MT	75.900
19	Marquette, MI	74.502
20	Findlay, OH	73.828
21	Heber, UT	73.790
22	Steamboat Springs, CO	73.473
23	Fairfield, IA	72.525
24	Brevard, NC	72.249
25	Oxford, MS	72.106





Rank	Micro Name	Index Value
26	Truckee-Grass Valley, CA	71.507
27	Oak Harbor, WA	71.321
28	Claremont-Lebanon, NH-VT	71.216
29	Newton, IA	71.015
30	Easton, MD	70.930
31	Jackson, WY-ID	70.889
32	Boone, IA	70.604
33	Hailey, ID	70.346
34	Winona, MN	69.580
35	Indiana, PA	69.229
36	Greenfield Town, MA	68.415
37	Palestine, TX	67.993
38	Glenwood Springs, CO	67.900
39	Austin, MN	67.396
40	Pullman, WA	67.373
41	Oneonta, NY	67.316
42	New Castle, PA	67.274
43	Taylorville, IL	67.234
44	Hilo, HI	66.931
45	Moscow, ID	66.906
46	Kearney, NE	66.871
47	Cullowhee, NC	66.647
48	Boone, NC	66.436
49	North Vernon, IN	65.547
50	Greensburg, IN	65.534

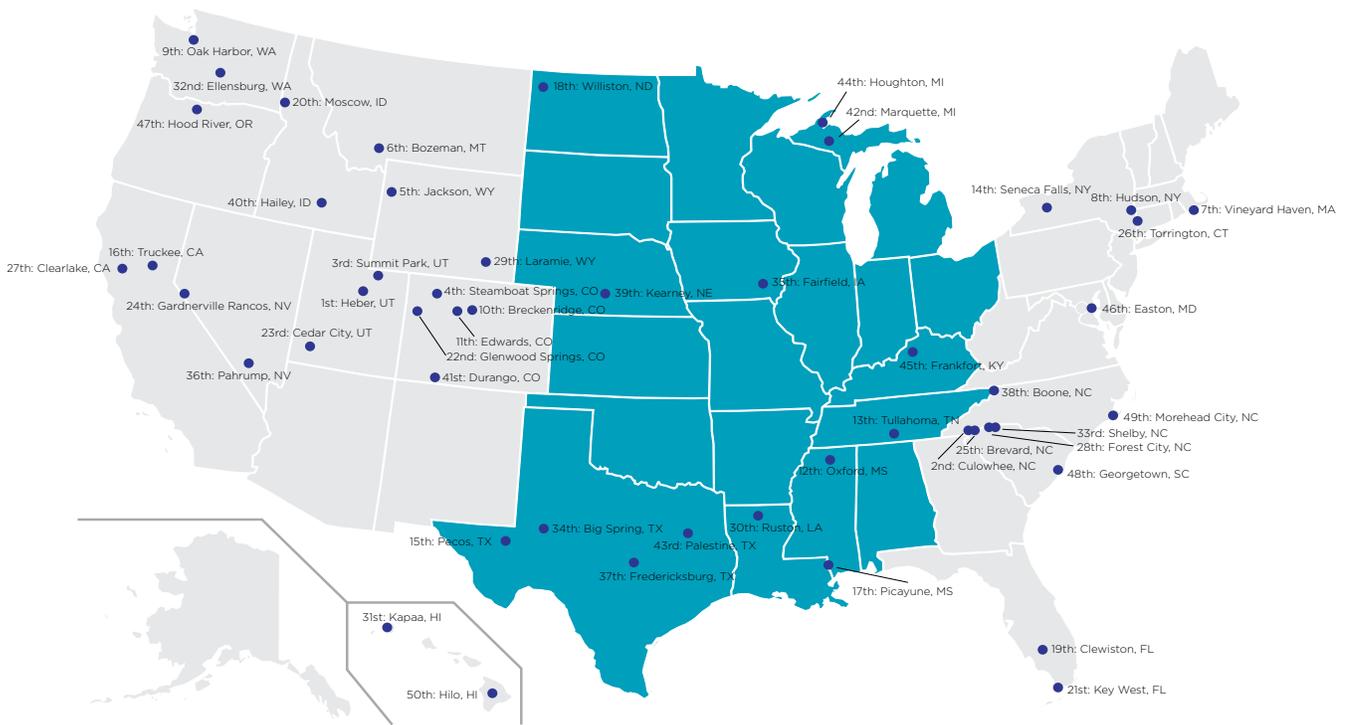
Overall Young Firm Importance and Knowledge Intensity in Micropolitan Areas

Heber, Utah, was able to combine its seventh score on young firm share of total employment and 21st position on young firm knowledge intensiveness to capture the top position among micropolitans. In short, the high level of engagement in starting new firms and with many of those in knowledge-intensive sectors results in the nation-leading ability to create and sustain jobs. Cullowhee, North Carolina, had an index score of 94.9 and was second. Summit Park, Utah, was third overall, primarily due to its strong performance on knowledge intensity and its stable position on the young firm share of employment. Steamboat Springs, Colorado, came in fourth without making it into the top 10 on either of the two components. Jackson, Wyoming-Idaho, was fifth. Bozeman, Montana, came in at sixth, followed by Vineyard Haven, Massachusetts, at seventh. Hudson, New York, was eighth, Oak Harbor, Washington, ninth and Breckenridge, Colorado was tenth. Figure 5 presents the top 50 micropolitan areas, while Figure 6 shows all micropolitans with the respective quartile of the index indicated for each.

The Heartland has 14 micropolitans among the top 50 and 30 out of the top 100. If the Heartland achieved its proportionate share, there would be 63 on the top 100 list. This performance illustrates one crucial component why Heartland micropolitans face difficulties in creating jobs for their residents. The reallocation of additional economic development efforts and resources must be the primary focus to build entrepreneurial capacity in Heartland communities. Oxford, Mississippi, is the highest-ranked Heartland micropolitan at 12th. Oxford demonstrates how the right ingredients, plan and the ability to execute creates a model other Heartland micropolitans can emulate to improve their economic performance and job creation. The University of Mississippi has engaged in academic entrepreneurship for many years, and these businesses create technology-based jobs.¹¹³ The University of Mississippi trains ample talent to put into these young firms. Other Heartland micropolitans in the top 20 include Tullahoma-Manchester, Tennessee (13th); Pecos, Texas (15th); Picayune, Mississippi (17th); and Williston, North Dakota, (18th).

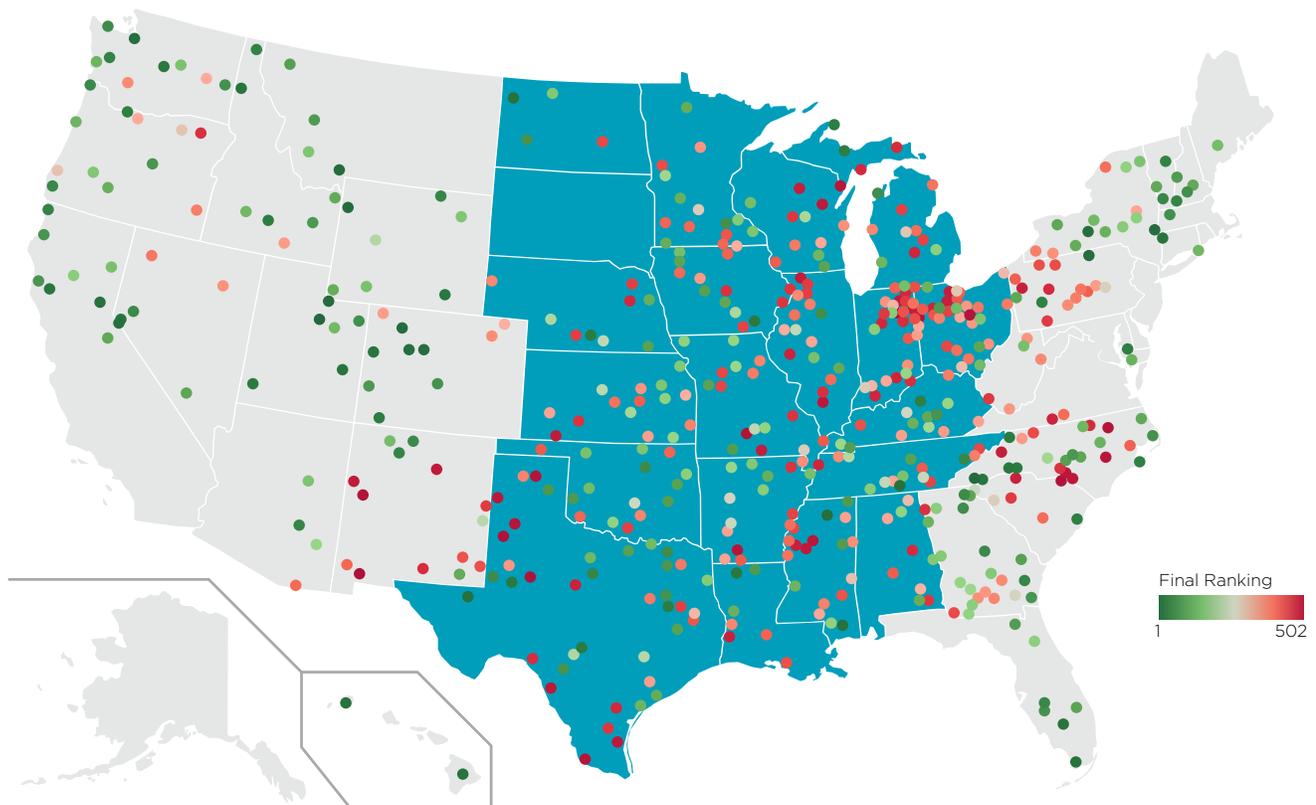


FIGURE 5: TOP 50 MICROS FOR OVERALL YOUNG FIRM ACTIVITY



Note: Labels indicate the largest city in each micro.

FIGURE 6: MICRO PERFORMANCE IN OVERALL YOUNG FIRM ACTIVITY





STATISTICAL ANALYSIS

STATISTICAL ANALYSIS

Data and Methods

Our objective is to use regression models to explain post-Great Recession (2010-2017) private employment growth in U.S. metros and micros using the 2010 levels of the young firm employment share and young firm knowledge intensity. The 2010-2017 private employment growth data are generated from the Census Bureau's LEHD-QWI dataset, the same dataset used to generate our entrepreneurship measures. Additional control variables are used to isolate the true relationships between the young firm employment share and young firm knowledge intensity and employment growth. The control variables in this study are categorized into four groups of variables. The first group contains only one variable: the 2010 mature firm knowledge intensity. This variable is computed similarly to the young firm knowledge intensity, except that it is the percent of employment at firms age six and older with a bachelor's degree or higher. We include this because the young firm knowledge intensity will likely be highly correlated with knowledge intensity at older firms, and knowledge intensity at older firms could be an important driver of future employment growth.

Economic and demographic characteristics and variables connected to the phenomena unique to the 2010-2017 growth period comprise the second category of explanatory variables and can be correlated with both of our variables of interest and future economic growth. The characteristic variables include the natural logarithm (natural log) of population and the natural log of a cost-of-living measure.^{114 115 116} A regional growth effect variable captures the magnitude of regional employment growth if the region's industries grew at the same rate as in the remainder of the state. This calculation is presented in Appendix I. The 2010 share of the total workforce employed in the management of companies and enterprises is included to control for the possibility of areas with large corporate headquarters

seeing economic gains while entrepreneurship measures are suppressed by startups' inability to compete with the corporations for workers.

We also control for recent economic phenomena that could be correlated with both the dependent variable and our explanatory variables of interest. Shale oil play and Permian Basin play dummy variables are an attempt to control for the fracking boom. The area's tourism share of total employment and the square of that variable attempt to control for the release of pent-up vacation demand and its impact on tourist destinations coming out of the Great Recession. 2010-2017 Retirement Age Population Share Growth—defined explicitly as the percentage-point change in the share of the population that are 65 and older from 2010 to 2017—and the square of that variable control for major growth in areas favored by retirees as the Baby Boomers retire.

The third set of control variables includes the measures capturing employment conditions leading up to our 2010-2017 sample period: January 2010 unemployment rate, employment growth from 2005 to 2009 and employment growth from 2009 to 2010. The January 2010 unemployment rate serves as a point-in-time measure capturing labor market conditions leading up to the beginning of our sample period. It controls for the possibility that an area added more jobs because of the high levels of unemployment resulting from previous economic shocks that left more room to grow. This could be connected to entrepreneurial activity if entrepreneurs were taking advantage of the surplus of workers by 2010, or if a shortage of job opportunities were creating entrepreneurship out of necessity. Similarly, 2005-2009 employment growth controls for the possibility that some areas experienced strong 2010-2017 growth because they experienced a significant decline in employment during the Great Recession and were gaining some of those jobs back during the recovery. To the

degree that declining employment corresponded with elevated firm mortality rates, replacement of lost firms following the recession could have inflated our entrepreneurship measures. Employment growth from 2009 to 2010 is added to control for the possibility that we are attributing an impact to our entrepreneurship measures that were the result of an initial post-recession recovery trend with which the entrepreneurship measures correlated.

The fourth set of control variables includes geographic control dummies indicating whether an area is located on the western coastline, on a Great Lake coastline, on the eastern coastline, in the Rocky Mountains, in any of the Pacific mountain ranges, in the Appalachian Mountains or near/adjacent to a national park.¹¹⁷ There is also a dummy indicating whether an area contains a public or private, non-profit college or university that offers advanced degrees and has total enrollment greater than 1,000. These variables control for geographic components of a metropolitan that are unchangeable and may attract or deter entrepreneurs and other workers.

In Appendix II, we thoroughly discuss multiple regression models we have produced to analyze the relationship between entrepreneurship measures and future employment growth in metropolitans and micropolitans. In this section, we provide an overview of our analysis process and the implications of our preferred models for metropolitans and micropolitans; our preferred models include the young firm employment share, young firm knowledge intensity and the four categories of control variables as independent variables explaining 2010-2017 private employment growth.¹¹⁸ All of our models are estimated using ordinary least squares (OLS). Below we discuss the findings from our preferred metropolitan and micropolitan regression models, and we follow this discussion with the implications of the two models. A more detailed discussion of the data sources and variable calculations are provided in Appendix I, while Appendix II contains more details about the analytical methodology.



KEY FINDINGS

Metropolitan Regions

We begin with the preferred metropolitan model. The complete results for our preferred models are summarized in Appendix II—Table A2. In this subsection, we will focus our discussion on the relationships for our variables of interest, namely young firm employment share and young firm knowledge intensity. For metropolitans, the coefficient on the 2010 young firm employment share is 0.537 and highly statistically significant.¹¹⁹ The coefficient implies that for every one-percentage-point increase in the share, (e.g., an increase in the share from 8 percent to 9 percent or 13 percent to 14 percent), we can expect the 2010-2017 employment growth to increase 0.537 percentage points. Given the young firm employment share has a standard deviation of 3.6 percentage points and the average 2010-

2017 employment growth is 12.6 percent, a 0.537 percentage point increase is sizable. If a metro has an average 2010-2017 employment growth, we could expect a one-standard-deviation increase in the young firm employment share to result in 15-percent faster employment growth.

The coefficient on the 2010 young firm knowledge intensity is 0.921 and also highly statistically significant; a percentage point change in the young firm knowledge intensity leads to roughly a percentage point change in future employment growth. Given the standard deviation of young firm knowledge intensity is 4.7 percentage points, the average-growing metro from 2010 to 2017 could expect 34-percent faster employment growth if its 2010 young firm knowledge intensity had been a standard deviation higher.

Micropolitan Regions

Next, we discuss the results for our preferred micropolitan model. The complete results for our preferred models are summarized in Appendix II—Table A3 for micropolitans.

The results associated with our variables of interest for micropolitans are comparable to those of metropolitans. The coefficient for the young firm employment share is 0.597 and statistically significant; the share has a standard deviation of 3.9 percentage points. Then, the average micro for 2010-2017 employment growth (7.6 percent) could expect 31-percent faster growth if its young firm employment share had been a standard deviation higher.

The 2010 young firm knowledge intensity has a statistically significant coefficient in the micro

model of 0.745 and a standard deviation of 3.2 percentage points. This implies that the average-growing micropolitan from 2010 to 2017 would have also had 31-percent higher growth if its young firm knowledge intensity had been a standard deviation higher.

While the quantitative results are detailed above, the qualitative results are as follows: From 2010 to 2017, metropolitans and micropolitans that started with stronger entrepreneurial ecosystems, as measured by the share of total employment at firms age five years or less and by the share of employment at those young firms with a bachelor's degree or higher, saw notably higher employment growth.



DISCUSSION &
POLICY IMPLICATIONS

Our research looks at the distribution of young firms across the United States and the role that young firms and their knowledge intensity play in explaining geographic variation in job growth. We find the young firm share of total private sector employment and the knowledge intensity of young firms, as measures of the extent and sophistication of the local entrepreneurial ecosystem, demonstrate a high level of efficacy in explaining job growth across metropolitan and micropolitan areas between 2010 and 2017.

Our analysis provides considerable evidence of the key roles that entrepreneurs, and the ecosystems in which they operate and help spawn, play in community vitality as measured by job growth. This is important for economic development officials or any groups, including elected officials, whose mission is to foster job creation and economic growth in their communities and states.

These findings suggest there may be a misallocation of development resources, especially directed at incentives toward recruiting firms from other locations,¹²⁰ rather than assisting budding entrepreneurs and providing additional support services for them in the process of scaling up their firms.

Local officials often say that there is a lack of compelling empirical evidence available to practitioners demonstrating that communities building these multi-dimensional entrepreneurial ecosystems consistently perform better than those relying more heavily on recruitment. Our analysis helps fill this gap. Our findings provide considerable evidence that young firms act to increase the rate of job creation for communities over the long term. Additionally, the results reveal that young firms are responsible for job growth, not small firms. Small firms can be older, having reached a plateau, and still be viable entities. However, older small firms are unlikely to be important job generators for communities. Entrepreneurship is vital for economic growth and is an excellent equalizer by creating opportunities for minorities, women and other underrepresented groups to reduce income and wealth disparities.¹²¹

A more balanced portfolio approach that includes recruiting, retention and entrepreneurial support is necessary for the Heartland and beyond. Some officials responsible for local economic development have been aware of these changing dynamics and have focused more resources on providing support services for entrepreneurs and in seeding and encouraging connector organizations. Nevertheless, most metrics evaluating the performance of economic development officials tend to be tied to the number of jobs associated with attracting a large plant or firm from another geography. Some use the pejorative term “smokestack chasing” to describe this form of recruitment. This is partly related to the election cycle. Elected officials know that a major relocation announcement with a large number of jobs associated with it will grab headlines in the newspaper or other media outlets. Elected officials believe this will help convince voters that they are delivering on their promise to create jobs for the community. Catering to election cycles creates an incentive to focus on short-term recruitment. Organic entrepreneurial-based economic development requires a long-term, patient and focused approach.

Implications for the Heartland

A troubling finding in our analysis is how the Heartland lags in young firm formation and other measures of entrepreneurial vitality. A large share of Heartland metropolitans and micropolitans lag behind those in the rest of the country in establishing a vibrant young firm and entrepreneurial environment. The Heartland has only five of the top 50 metros on the overall young firm index while claiming 30 of the bottom 50 in the nation. The Heartland contains 30 of the top 100 micropolitans, and also 74 of the bottom micropolitans in the nation.

There are multiple causes for the subpar rate of job creation in the Heartland besides low engagement in entrepreneurial activities (lower educational attainment and less emphasis placed upon innovation tied to research and development among them). However, no other single factor can claim a higher explanatory power.

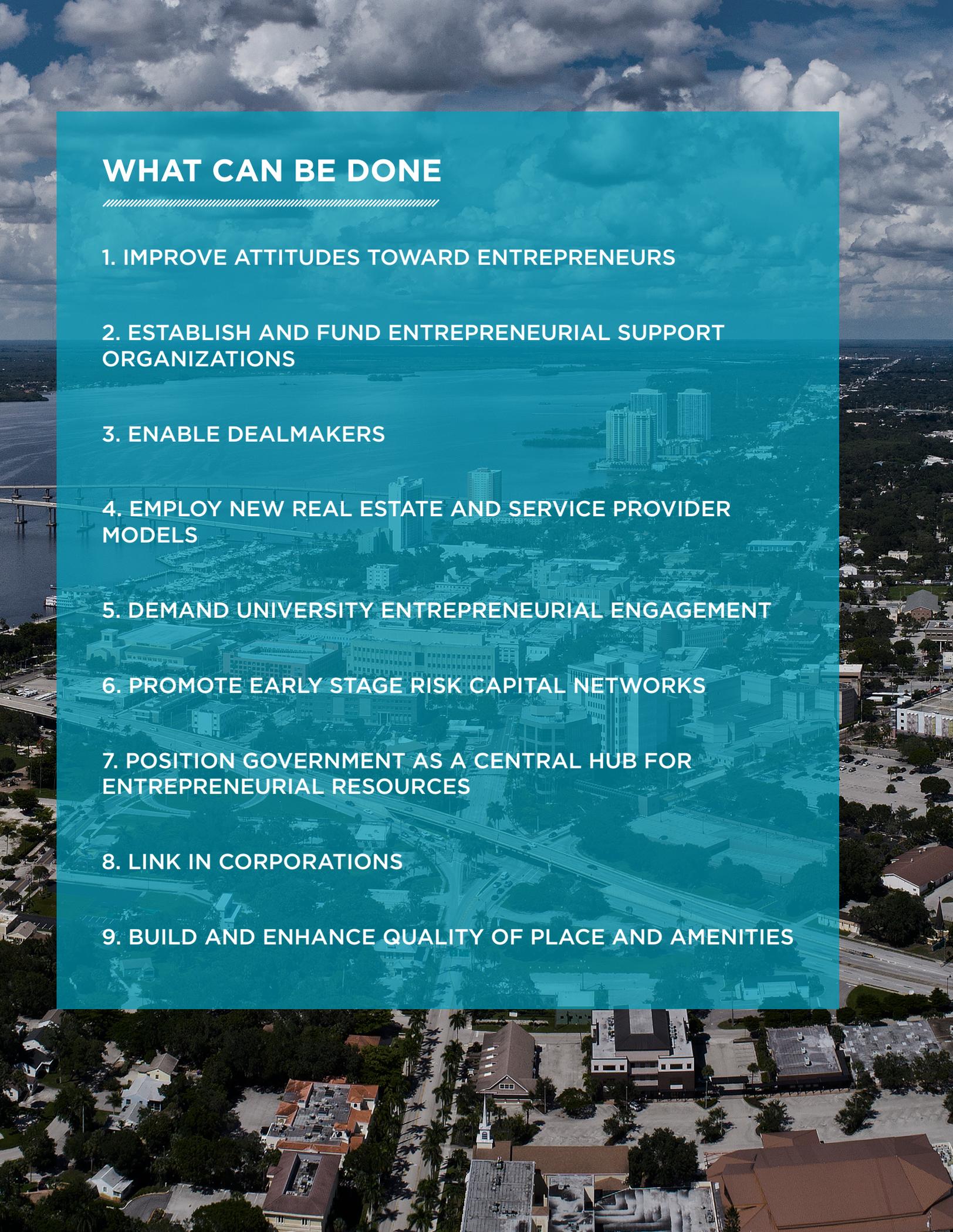
Many Heartland micropolitan areas are heavily tied to one or two large manufacturing firms. A substantial amount of economic development resources is devoted towards retaining as much employment as possible to minimize the dislocations to their communities as international competition and automation decimate their anchor companies. There is a legacy associated with the mass production era that inhibits or lowers the extent of the entrepreneurial culture in these communities.¹²² Most of the support services in Heartland communities are tied to these large firms, further exacerbating the downward economic spiral. Since 2014, crop prices have fallen, harming farming incomes

and the communities tied to agriculture. Many factors are responsible for the Heartland's lower rate of job creation. However, a renewed emphasis on self-determination by focusing more on building entrepreneurial awareness and capacity must be a major part of future economic development efforts in the Heartland.

Many communities are attempting to find their economic development recipe for combining recruitment, retention and entrepreneurial support. Retention and entrepreneurial support efforts are not mutually exclusive activities. Places that create a supportive environment that allows established business entities to thrive will also be attractive to young, entrepreneurial firms that are attempting to grow quickly. Encouraging evidence that shows how economic development professionals are incorporating entrepreneurship into their strategies is found in a survey conducted in 2016 by the International Economic Development Council, the world's most prestigious professional organization for economic developers. Nearly 50 percent of survey respondents indicated that they expanded activities in support of entrepreneurs. Further, they reported that their organizations had formally adopted strategies to include higher priority on entrepreneurship and scaling up young firms by almost 40 percent of respondents.¹²³ However, the profession and many communities are late to embrace the necessity of entrepreneurial-based economic development fully.



WHAT CAN BE DONE

An aerial photograph of a city, likely Tampa, Florida, is shown with a semi-transparent teal overlay. The overlay contains a list of nine strategies for supporting entrepreneurs. The background shows a mix of urban buildings, a large body of water, and a bridge.

1. IMPROVE ATTITUDES TOWARD ENTREPRENEURS

2. ESTABLISH AND FUND ENTREPRENEURIAL SUPPORT ORGANIZATIONS

3. ENABLE DEALMAKERS

4. EMPLOY NEW REAL ESTATE AND SERVICE PROVIDER MODELS

5. DEMAND UNIVERSITY ENTREPRENEURIAL ENGAGEMENT

6. PROMOTE EARLY STAGE RISK CAPITAL NETWORKS

7. POSITION GOVERNMENT AS A CENTRAL HUB FOR ENTREPRENEURIAL RESOURCES

8. LINK IN CORPORATIONS

9. BUILD AND ENHANCE QUALITY OF PLACE AND AMENITIES

What Can Be Done

So, where do Heartland and other communities that are lagging in entrepreneurial acumen begin? First, they must recognize that a sustained long-term commitment is critical to turning more economic development emphasis towards supporting and nurturing entrepreneurs. We might call this building an entrepreneurial infrastructure that emboldens, embraces and sustains the components that can form into a thriving entrepreneurial ecosystem. In other words, a community must create the correct pre-conditions in which entrepreneurs desire to innovate. You cannot expect to find a kit on how to build the next Silicon Valley (this would be impossible) or even the Boston-Cambridge model. It will not work in your community. It is better to understand what you have in your community and intertwine the components to create a network of interconnections that make it easier for entrepreneurs to start, find customers, access resources and capital as well as attract a talented workforce.¹²⁴ A community must determine what it does best by focusing on current resources and to fill in as many gaps as possible.

Improve Attitudes Toward Entrepreneurs

An area that needs more emphasis, especially in the Heartland, is creating positive attitudes towards entrepreneurial activities. Entrepreneurs are not held in as high esteem in most communities as corporate managers.¹²⁵ Most entrepreneurs are busy establishing and building their businesses and don't have as much time to devote to civic engagement, although some are highly engaged. Public schools do not provide students with sufficient exposure to coursework on the basics of entrepreneurship. Government, non-government organizations and professional business organizations need to develop policies that educate citizens on the importance of entrepreneurship and generate a favorable impression of entrepreneurs.

There should be concerted policies to share the stories of entrepreneurial role models and mitigate the negative connotations associated with business failure.¹²⁶ For example, many venture capitalists are leery of funding an entrepreneur who has not experienced a business setback. Venture capitalists feel that entrepreneurs learn essential lessons from what did not work. The social status of entrepreneurs must be elevated. This may be accomplished through events and media promotion to celebrate entrepreneurs as well as instill an entrepreneurial spirit in the community. Efforts to create a more thorough entrepreneurial infrastructure will be frustrated by a lack of appreciation of why entrepreneurial activities are critical to community vibrancy.

Establish and Fund Entrepreneurial Support Organizations

Establishing and providing resources to entrepreneurial support organizations, whether they are called networks, connectors, enablers or ecosystem builders are a necessary part of the process to create the social capital required for success. High levels of social capital build trust among ecosystem participants.

The ESHIP Entrepreneurial Playbook 3.0 provides a reasonable explanation for how social capital aids in developing the entrepreneurial infrastructure: "An ecosystem culture that is rich in social capital—the networks, norms and social trust that facilitate coordination and cooperation for mutual benefit—is like rocket fuel for entrepreneurial growth. An ecosystem will struggle without a culture of collaboration, cooperation, and trust that inspires people to move quickly, help each other, and be open to novel ideas."¹²⁷

This is mostly about the "soft infrastructure" for facilitating the connections between entrepreneurial ecosystem participants. Connections enable collaborations, which can lead to more substantive, and productive exchanges of ideas and information and new firms.



An entire new field of ecosystem builders is forming to enhance the connections among entrepreneurs, service providers, universities, community colleges, research institutes, larger businesses, early-stage investors, government agencies, philanthropy and foundations and talent/workforce development at all levels within the community.¹²⁸ The more intertwined these participants become the greater the networking opportunities and impactful outcomes.

Enable Dealmakers

A particular form of social capital and connectors in entrepreneurial ecosystems has been isolated for its growing importance—“dealmakers.” Not necessarily dealmakers that facilitate individual financial transactions, but those individuals that engage as insiders within entrepreneurial networks through forming and scaling new ventures. You must either create your own or import them from other places. But they must be part of the community for a period before being profoundly impactful. These dealmakers could be a patent attorney, an angel investor, a real estate developer, a serial entrepreneur or many other members of the ecosystem. The more substantive connections facilitated by these dealmakers leads to higher rates of new firm formation. In most cases, multiple serial dealmakers bring people together that don’t realize they should be interacting. Empirical research has provided strong evidence that dealmakers are highly correlated with new firm births and scaling in locations across the country.¹²⁹

Employ New Real Estate and Service Provider Models

In addition to soft infrastructure, “hard” infrastructure is still necessary. Economists call these necessary, but not sufficient conditions. Physical spaces such as incubators and accelerators (which can be programs without a physical presence) can ease the process of establishing firms and facilitating their growth.¹³⁰ These spaces can provide soft services to reduce the friction associated with startup and scaleup. Accelerators provide fixed-term, cohort-based programs with some offering seed investment, mentorships, educational components and connections. Some culminate in a public pitch or demo day. Real estate professionals that aid this process can reap the rewards as some firms mature to become mid-sized companies that require more space. Many of these private sector-led accelerator initiatives don’t rely upon rental income but typically operate on an equity-based competitive model with a defined progression through the program.¹³¹ TechStars, Plug and Play, Y Combinator and AngelPad are examples. Other service providers need to explore alternative revenue models like taking a form of equity in new firms rather than charging them their standard hourly rates.

Demand University Entrepreneurial Engagement

As discussed earlier, research universities are integral components of knowledge-based entrepreneurial ecosystems. Unless they are fully engaged in commercializing their research, providing entrepreneurial education and adjusting curriculum to the requirements of local businesses, universities are an unrealized asset for economic development in their communities. Companies formed on intellectual property from universities can make up a large proportion of a community’s high growth enterprises. Communities must do a better job of engaging and exploiting their research universities.

Most communities with research universities have an understanding of the economic development potential of the human capital they create. However, not enough communities fully comprehend the importance of entrepreneurship in retaining a higher share of the graduates created in their geography, especially STEM graduates, which are crucial to knowledge-intensive young firms. Universities must offer entrepreneurial education as part of their curriculum and provide program support for students and faculty.¹³² Communities must insist that universities see entrepreneurial ecosystem involvement as a critical component of their missions.¹³³

Most Heartland universities are not as engaged in their ecosystems to the degree that thriving tech-hubs located outside the region have experienced. Research demonstrates that there is a

causative association between historical science- and engineer-based entrepreneurship and current engagement in startup activities in innovative industries where universities initiated this process. This is a form of persistent knowledge-based entrepreneurship that becomes part of the culture and is long-enduring.¹³⁴ Communities with federal research labs and other research facilities must be incorporated as members of the ecosystem.

Promote Early Stage Risk Capital Networks

One of the most significant challenges to building the entrepreneurial infrastructure in a community is to create an early-stage capital financing network. Most banks are not going to engage at the earliest stages of business formation as collateral is required for their intermediary financing operations. A major obstacle for many communities is providing sufficient deal flow to diversity risk and create a broad portfolio of enterprises under management. Venture capital placements are trending toward larger, later-stage deals—thus widening the gap in early-stage capital. There has been a concerted effort in the public sector to address this perceived market failure in the area of venture capital. Most of these have a limited effect.¹³⁵ Regional venture capital funds have formed through a hybrid approach of bringing private funds, many times matched by public funds, but managed by private resources.¹³⁶

Access to venture capital is not as essential in many communities to jump-start their financing networks as VCs tend to invest at later stages. That doesn't mean that venture capital and the network associations tied to it are not important—they are, and more awareness of investment opportunities in the Heartland and other non-traditional regions is necessary. Organizations such as Rise of the Rest and Steve Case's broader initiatives are raising awareness of potential arbitrage opportunities.

A more productive effort would be to focus on encouraging business angel investment to provide startup capital and smart money management oversight. Angels are looking to invest locally. More public sector funding and underwriting of operating costs for business angel networks can allow them to act as "dating agencies" and educate accredited investors on the opportunities. Transformation entrepreneurs are the ones most likely to obtain access to these forms of risk capital. As local angel investor groups experience success in generating financial returns, it will attract the attention of venture capitalists and perhaps permit regional pools to form.

Additionally, other sources of capital expansion for entrepreneurs are emerging. These include collateralized loan obligations, which can spread risk into secondary markets. Crowdfunding, peer-to-peer lending and invoiced-based finance are other forms gaining traction.¹³⁷ A continuum of funding is required from startup to scaleup phase.

Position Government as a Central Hub for Entrepreneurial Resources

The government can play an active role in the entrepreneurial infrastructure. However, it can frustrate entrepreneurs as the government moves at glacial speed as opposed to an entrepreneurial speed. Government agencies can act as a central hub and facilitate access to resources available to entrepreneurs. Since entrepreneurs already have to engage government for corporate registration, sales tax permits and licensing, governments at all levels can capitalize on this engagement by providing additional services to startups, such as connections with other service providers or sources of financial capital, expedient and effective customer service and policies supportive of firm formation (this could be something as simple as a step-by-step guide to registering a business in your community with contact information for each office/agency involved).



Government officials are humans that respond to incentives or the lack of incentives. Few government officials are incentivized to support entrepreneurs. If the government provided incentives to their staff to resolve issues confronting entrepreneurs more quickly, more jobs and new forms of tax revenue could be generated.¹³⁸ While many factors can influence tax revenues, job creation can raise demand for housing, raising housing prices, and thereby increase the property tax base of the community; it can also raise sales tax collections by increasing household consumption. Impacting tax collections could be part of the evaluation metrics for government officials.

Link in Corporations

Corporate engagement is critical to a successful entrepreneurial ecosystem and can be considered part of the infrastructure supporting them. By supporting new firms that provide services and input to their businesses, corporations can gain an advantage against their competitors. Further, they may be able to acquire a firm as it matures and provide new avenues for revenue growth. Startups might generate new management talent that can move to locally established businesses and energize corporate ranks. Corporations might create spinoffs that would be impossible to incubate within their organizations.

Build and Enhance Quality of Place and Amenities

As human capital is becoming more fundamental to economic performance and vitality, quality of place is crucial to attracting and retaining the talent to fuel young-firm growth. Quality-of-place (arts, entertainment, recreational amenities, other lifestyle amenities and cultural attributes, health care access and quality, good K-12 education, transportation mobility, crime rates, air quality, along with climatic conditions and other geographical characteristics) increasingly affects location decisions of talent and capital providers. As our analysis of the leading entrepreneurial ecosystems in micropolitan communities demonstrated, beautiful places rich with amenities attract the desired human capital.¹³⁹

A growing body of research provides an empirical basis for the role of arts and culture in promoting the prosperity of place. The presence of arts improves the image of a region and assists in making a stronger case for attraction and in fostering denser entrepreneurial ecosystems.¹⁴⁰ Coauthor and urbanist Richard Florida has taken the role of arts to new heights with his “creativity index” and making each city feel that, whatever its shortcomings, it has the potential to make itself more attractive to entrepreneurial activity. Another facet of Florida’s argument is that diversity cultivates a community that welcomes new people and new ideas, which then can create ‘new combinations’ from the community’s existing resources.

Communities must take a holistic approach to building entrepreneurial ecosystems. The components described above are not isolated, but jointly determined. It is the ability to connect and engage these elements as efficiently as possible to maximize job creation. Women and underrepresented racial and ethnic groups must be embraced within entrepreneurial ecosystems to exploit opportunities in communities fully. Demographers like to say that “demography is destiny.” Young firms and the entrepreneurial ecosystems that spawned and nurtured them determine the economic destiny of communities.



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115 For metropolitan models, we also include the square of the natural log of the cost-of-living measure to properly control for cost of living. The inclusion of a square term is unnecessary for the micropolitan models. We discuss how we determine proper controls later in this section and in Appendix II.

116 Because of the characteristics of natural logarithms, using the natural log of a variable can allow for the possibility of a nonlinear relationship between two variables. By a nonlinear relationship, we mean that the impact from an increase in one variable on another variable depends on the initial level of the impacting variable.

117 For metropolitan, properly controlling for proximity to a national park results in a dummy indicating whether there is a national park within 50 miles. For micropolitans, properly controlling for proximity to a national park results in a dummy indicating whether a national park is adjacent to, or overlaps with, a given micropolitan area. We discuss how we determine proper controls later in this section and in Appendix II.

118 When considering the appropriate specification for a given model, we focus on two key things. Most importantly, we focus on how much of an impact a certain specification has on our coefficients of interest. A greater impact could indicate that a certain specification is removing more bias than an alternative specification. The secondary component is how model fit is impacted. If we are trying to determine whether to also include the square of a given independent variable, and models with and without it have different but comparably sized impacts on our coefficients of interest, we will keep the squared term if it improves how well our model fits the data. This is because the improved model fit is an indicator that the more complex specification better captures the real-world relationships between variables.

119 We define "highly statistically significant" using the common benchmark of a p-value less than 0.01. A p-value is the probability that a coefficient value could occur, under an assumption that the true coefficient value is zero. The smaller the p-value, the more confidently we can reject this assumption. We adjust standard errors and, thus, p-values to be robust to errors clustered by the state of the metropolitan or micropolitan's largest city. When a micropolitan is positioned in more than one state, we use the state containing the largest city in the micropolitan.

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APPENDIX I—DATA DESCRIPTIONS AND SOURCES

Generation of Young Firm Employment Share and Young Firm Knowledge Intensity

LEHD-QWI data for metropolitans and micropolitans are specifically available at the metropolitan and micropolitan state-subset level. Metropolitan and micropolitan area definitions are from the Office of Management and Budget's (OMB) Bulletin Number 18-03. For example, data for the Fayetteville-Springdale-Rogers, Arkansas-Missouri metropolitan area are reported separately for the Arkansas portion and the Missouri portion. To generate annual young firm employment share and young firm knowledge intensity values at the overall metropolitan and micropolitan level, we aggregate all state-subset employment measures to the metropolitan and micropolitan level within each quarter, using the aggregated quarterly measures to calculate quarterly values for our metrics, and average the quarterly values across the year to generate annual average values.

One complexity of the LEHD-QWI dataset is that, because the underlying microdata is so expansive, the Census Bureau intentionally adds noise to observations to prevent individual firms from being identified in the data. In effect, the fewer firms there are underlying a total employment or average wage value, the greater the likelihood of highly distortionary noise. The Census Bureau indicates when a value has been "significantly distorted," but does not define the term to prevent analysts from using the definition to estimate true values better. To deal with this issue, we place a limit on the number of "significantly distorted" values that can be present in the data underlying a metric; if the number of "significantly distorted" values exceeds our limit, we set the metric value to missing.

In our regression analysis, we drop any metropolitan or micropolitan's annual young firm employment share value in which any state subset has a quarter where more than 1/4 of the underlying data is denoted as statistically distorted. The cut-off is 1/3 for the young firm knowledge intensity. These cut-offs are selected as a balance between data accuracy assurance and sample size preservation. We tested regression models with less restrictive and more restrictive cut-offs: Less restrictive cut-offs—to 1/2 for the young firm employment share and 5/9 for the young firm knowledge intensity—still produce statistically significant coefficients for our two variables of interest. However, the coefficients on the young firm employment share in the micropolitan models are roughly 0.1 lower than in our results presented above. In essence, all other coefficients on our variables of interest are approximately the same. We are unable to disentangle whether this is the result of including additional micropolitans or the result of highly distorted data.

Additionally, sample size gains are only roughly one percent in the metropolitan models and five percent in the micropolitan models. More restrictive cut-offs—to 0 for the young firm employment share and 2/9 for the young firm knowledge intensity—tend to increase coefficient size for our two variables of interest but come with notable sample size reductions. For example, a more data-restrictive version of micropolitan Model 5 increases the coefficients on the young firm employment share and the young firm knowledge intensity approximately 0.5, but 41 percent of the sample is lost. By construct, sample size reductions resulting from more restrictive cut-offs will result in sample selection bias due to smaller areas needing greater levels of noise to protect the fewer firms. We find our selected cut-offs to strike a balance between data accuracy and sample selection bias concerns.

For the young firm employment share values presented for individual metropolitans and micropolitans, we use the same rule as the one applied in the regression analysis. For the young firm knowledge intensity, we provide individual metropolitan and micropolitan values if no more than 5/9 of each state subset's underlying data values in each of the quarters are "significantly distorted." Although the cut-off adjustment does not significantly increase the number of values we can present, we do this to increase the share of our readers whose communities have values for both metrics.





Accuracy of the Levels of the Young Firm Knowledge Intensity

As mentioned in the text, the levels of the young firm knowledge intensity do not align with levels of similar variables. However, what matters for our purposes is that the relative differences across metros and micros are accurate. The young firm knowledge intensity is an effectively unique measure, so we cannot test the accuracy of the relative differences by comparing our measure with another. Fortunately, knowledge intensity across all firms—both young and mature firms—have comparable measures. Thus, we generate the knowledge intensity at all private firms from the LEHD-QWI dataset for metros and micros and compare it to the commonly cited percentage of the 25-and-older population with a bachelor’s degree or higher from the Census Bureau’s American Community Survey. For the 372 metropolitans in which we have data for both variables, there is a correlation coefficient of 0.79 for the private-sector worker knowledge intensity and the population measure in 2010—the year of data we use in later regressions. The correlation coefficient is 0.72 for micropolitans, but we are limited to using only 114 micropolitans due to limitations of the American Community Survey data. Given this data limitation, we also estimate the correlation between the 2010 knowledge intensity and a five-year (2006-2010) measure of the percentage of the 25-and-older population with a bachelor’s degree or higher for 492 micropolitans and obtain a coefficient of 0.67. These are strong correlations regardless of the fact that we are comparing private-sector workers to the entire population. Thus, we believe the LEHD-QWI-based knowledge intensity data effectively capture educational attainment differences across metropolitans and across micropolitans.

Generation of Young Firm Employment Share, Young Firm Knowledge Intensity and Overall Indices

Indices are provided for metropolitans’ and micropolitans’ performance in the 2017 young firm employment share and 2017 young firm knowledge intensity, resulting in two indices for each area type. Given that all four indices are generated via an identical procedure, we will consider an individual metropolitan and the young firm employment share index to characterize the process. This metropolitan’s performance in the young firm employment share is the difference in percentage the metropolitan’s young firm employment share is from the worst metropolitan young firm employment share to the best. That is, if the metropolitan’s young firm employment share is 15 percent, while the worst performer has a value of 5 percent and the best performer has a value of 25 percent, the metropolitan’s index value will be 50. By construct, the best and worst performers will have index values of 0 and 100, respectively.

From the young firm employment share and young firm knowledge intensity indices, we generate an overall index for each of metropolitans and micropolitans. Specifically, we average each area’s young firm employment share and young firm knowledge intensity index values and apply the same procedure as above to these averaged values.

Generation of Exogenous State-Level Regional Growth Effect

In our regression analysis, we use a regional growth counterfactual, the regional growth effect, to control for how quickly we could have expected employment to grow from 2010 to 2017. Because growth and industry success tend to vary across the U.S., we decided to use state-level regional growth effects to create a counter-factual growth rate for each metropolitan and micropolitan. A major issue in using a state-level regional growth effect is that metropolitans, and even some micropolitans, play sizable roles in determining how quickly state-level industry employment grows. Therefore, our procedure is as follows for a given metropolitan or micropolitan:

1. Obtain LEHD-QWI 2010 and 2017 data on the metropolitan or micropolitan’s state-subset employment at the three-digit NAICS industry level, averaged across each of the two years.

2. Obtain LEHD-QWI 2010 and 2017 data on corresponding state-level employment at the three-digit NAICS industry level, averaged across each of the two years.
3. In each year and for each industry, subtract the metropolitan or micropolitan's state-subset employment from the overall state employment to obtain employment in the rest of the state in a given industry.
4. Calculate the rest of the state's 2010-2017 employment growth for each industry.
5. Apply that growth rate to the corresponding industry employment in the 2010 state subset of the metropolitan or micropolitan.
6. Separately sum up all of the actual 2010 industry employment levels and resulting counterfactual 2017 industry employment levels for the metropolitan or micropolitan.
7. Calculate a counterfactual growth rate from 2010-2017 using the two overall values, which is then based on how quickly industry employment grew in the rest of a metropolitan or micropolitan's state subset's corresponding state.

This technique allows us to estimate the impact of the young firm employment share and young firm knowledge intensity, while controlling for possible confounding factors such as industry composition in 2010 and broader industry growth trends.

Because the data underlying the regional growth effect are fine subsets of state, metropolitan and micropolitan employment levels, many underlying values are noted to be significantly distorted. Removing these values from consideration would distort the implied industry composition of metropolitans and micropolitans. Further, the high number of underlying values used to estimate these counterfactual growth rates increases the likelihood of the random data distortions balancing out. Therefore, we use all non-missing values available for the regional growth effect calculations, regardless of the infused noise level.

Due to our formulation of this metric, we are unable to include the Washington, D.C. and Providence, Rhode Island metropolitans in regressions—there is no metropolitan-exclusive portion of the District of Columbia, and the non-Providence metro portion of Rhode Island is very small.

Generation of Other LEHD-QWI-Based Variables

Mature firm knowledge intensity is generated identically to the young firm knowledge intensity metric discussed in the first section of this appendix, except that the metric is based on employment at firms age six years or older. The “significantly distorted” underlying values cut-off is also the same as the young firm knowledge intensity regression analysis cut-off— $1/3$.

2010-2017 private employment growth, the dependent variable in the micropolitan regressions, is generated from LEHD-QWI overall private employment measures. We first calculate the 2010 and 2017 private employment growth levels. As with other LEHD-QWI-based measures, the data for these levels are aggregated up from quarterly values of the state subsets of micropolitan areas to quarterly values for the entire micropolitan area, and then to annual averages of the quarterly values for the entire micropolitan area. If the quarterly overall private employment value is noted to be “significantly distorted” for any state subset of a micropolitan, the annual overall private employment value is set to missing. We then calculate 2010-2017 private employment growth for all micropolitans where there are non-missing values in both years. 2005-2009 private employment growth and 2009-2010 private employment growth, which are used as controls in the micropolitan regressions, are generated through an identical technique.

The management of companies and enterprise employment share and the tourism employment share are generated from the same industry data used to calculate the regional growth effects discussed above. We aggregate industry employment level data to the metropolitan or micropolitan annual average, in the same manner we do with other variables, sum employment





across multiple related industries in the case of the tourism employment share and divide by annual average employment in the metropolitan or micropolitan in the given year. Because the data underlying these shares are fine subsets of employment levels, many underlying data values are noted to be “significantly distorted.” However, due to these being control variables and not variables we will interpret, and due to the number of observations that would be lost by dropping metropolitans and micropolitans with high shares of underlying data values that are “significantly distorted,” we choose to use all underlying data regardless of distortion level.

Additional Variables

As mentioned in the text, we use several non-LEHD-QWI variables in our regression analysis. Their source definitions and summary statistics are provided in Table A1, along with brief descriptions and summary statistics for the LEHD-QWI variables.

TABLE A1: VARIABLE DESCRIPTIONS

Variable	Source	Definition	Geography	Mean	SD	Min	Max	Count
2010-2017 Private Employment Growth	CB, LEHD-QWI	Overall area private employment growth from 2010 to 2017	Metros	12.6	9.2	-12.8	45.7	364
			Micros	7.6	11.8	-23.7	89.1	480
2010 Young Firm Employment Share	CB, LEHD-QWI; Authors' Calculations	Percentage of total area private workforce employed at young firms (open five years or less) in 2010	Metros	12.4	3.6	6.1	25.7	364
			Micros	12.4	3.9	4.3	28.4	480
2010 Young Firm Knowledge Intensity	CB, LEHD-QWI; Authors' Calculations	Percentage of total young firm employees who held a bachelor's degree or higher in 2010	Metros	21.8	4.7	8.9	47.1	364
			Micros	17.6	3.2	9.6	32.4	480
2010 Mature Firm Knowledge Intensity	CB, LEHD-QWI; Authors' Calculations	Percentage of total mature firm (open more than five years) employees who held a bachelor's degree or higher in 2010	Metros	23.4	5.3	11.5	46.1	364
			Micros	18.3	3.3	9.5	29.7	480
2005-2009 Private Employment Growth	CB, LEHD-QWI	Overall area private employment growth from 2005 to 2009	Metros	-2.7	6.4	-44.2	15.0	364
			Micros	-3.6	8.4	-31.6	39.6	480
2009-2010 Private Employment Growth	CB, LEHD-QWI	Overall area private employment growth from 2005 to 2009	Metros	-1.0	1.6	-7.4	5.8	364
			Micros	-1.2	3.1	-11.7	21.3	480
January 2010 Unemployment Rate	BLS	Unemployment rate as of January 2010	Metros	9.9	2.8	3.9	28.3	364
			Micros	10.3	2.9	2.7	18.7	480
2010-2017 Regional Growth Effect	CB, LEHD-QWI; Authors' Calculations	2010-2017 employment growth that the area would have experienced had each of its industries (3-digit NAICS codes) grown at the same rate the industry grew in the rest of the state; for an area lying in more than one state, the area is divided into subsections by state, and industry growth rates applied correspond to the subsection's state	Metros	12.8	6.6	-3.2	77.7	364
			Micros	11.3	5.5	-5.7	40.5	480
2010 Population	CB	Area population in 2010; thousands of people	Metros	680.6	1576.9	55.0	19595.0	364
			Micros	52.3	27.6	13.8	218.4	480



TABLE A1: VARIABLE DESCRIPTIONS (CONT.)

Variable	Source	Definition	Geography	Mean	SD	Min	Max	Count
2010 Personal Income Price Parity Index	BEA	Price parity index indicating the ratio of an area's cost of living to the US metro average; US average=100	Metros	94.3	7.4	76.6	122.2	364
2010 State Nonmetro Personal Income Price Parity Index	BEA	State-level nonmetro price parity index for the state that the area's largest economic hub is located in, with the index indicating the ratio of the state nonmetro cost of living to the US nonmetro average; US average=100	Micros	87.4	4.6	82.3	102.7	480
Shale Oil Play Dummy	EIA	Dummy indicating whether an area is at least partially within the borders of the non-Permian Basin major shale oil plays	Metros	0.02	0.2	0	1	364
			Micros	0.02	0.1	0	1	480
Permian Basin Play Dummy	EIA	Dummy indicating whether an area is at least partially within the borders of the Permian Basin shale oil plays	Metros	0.01	0.1	0	1	364
			Micros	0.01	0.1	0	1	480
2010 Management of Companies and Enterprises Employment Share	CB, LEHD-QWI	Percent of total workforce employed in the management of companies and enterprises industry (NAICS code 551)	Metros	1.3	1.4	0	11.8	364
			Micros	0.6	1.0	0	7.9	480
2010 Tourism Employment Share	CB, LEHD-QWI	Percent of total workforce employed in the tourism-centric industries (NAICS codes 712, 713, and 721)	Metros	2.9	2.8	0.6	29.1	364
			Micros	3.1	3.9	0	26.3	480
2010-2017 Retirement Age Population Share Growth	CB	Percentage-point change in the percent of the population age 65 and above from 2010 to 2017	Metros	2.8	0.9	-0.7	7.9	364
			Micros	2.7	1.3	-5.0	8.1	480
West Coast Dummy	ESRI	Dummy indicating whether an area is directly on the West Coast	Metros	0.1	0.3	0	1	364
			Micros	0.03	0.2	0	1	480

TABLE A1: VARIABLE DESCRIPTIONS (CONT.)

Variable	Source	Definition	Geography	Mean	SD	Min	Max	Count
East Coast Dummy	ESRI	Dummy indicating whether an area is directly on the East Coast, including the Gulf of Mexico	Metros	0.2	0.4	0	1	364
			Micros	0.04	0.2	0	1	480
Great Lakes Dummy	ESRI	Dummy indicating whether an area is directly on a Great Lakes coast	Metros	0.1	0.3	0	1	364
			Micros	0.04	0.2	0	1	480
Rocky Mountain Dummy	ESRI	Dummy indicating whether an area lies at least partially within the Rocky Mountain range	Metros	0.1	0.2	0	1	364
			Micros	0.1	0.3	0	1	480
Appalachian Mountain Dummy	ESRI	Dummy indicating whether an area lies at least partially within the Appalachian Mountain range	Metros	0.2	0.4	0	1	364
			Micros	0.2	0.4	0	1	480
Pacific Ranges Dummy	ESRI	Dummy indicating whether an area lies at least partially within one of the Pacific mountain ranges	Metros	0.1	0.3	0	1	364
			Micros	0.1	0.2	0	1	480
Near National Park Dummy	NPS via ESRI	Dummy indicating whether an area is within 50 miles of a top-ten national park for 2010 visitor count	Metros	0.1	0.3	0	1	364
National Park Dummy	NPS via ESRI	Dummy indicating whether an area is adjacent to or partially within a top-ten national park for 2010 visitor count	Micros	0.02	0.1	0	1	480
University Dummy	USGS, ScienceBase	Dummy indicating whether an area has a public or private, non-profit college or university with enrollment of at least 1,000, and advanced degrees offered	Metros	0.6	0.5	0	1	364
			Micros	0.1	0.3	0	1	480

Notes: CB=U.S. Census Bureau; BLS=Bureau of Labor Statistics; BEA=Bureau of Economic Analysis; EIA=Energy Information Administration; NPS=National Park Service; USGS=U.S. Geological Survey



APPENDIX II—REGRESSION ANALYSIS

This appendix serves as a more detailed discussion of our employment growth regression analysis. While we only discuss results for our preferred models in the text, here we provide results for six different regression models for metropolitans (Table A2) and micropolitans (Table A3). The regression models take the general form presented in Equation 1:

$$1. \text{EmpGrow}_j = \beta_0 + \beta_1 \text{YF}_j + \beta_2 \text{YFKI}_j + \beta_3 \text{MF}_j + \beta_4 \text{ED}_j + \beta_5 \text{PE}_j + \beta_6 \text{GEO}_j + \epsilon_j$$

Where j represents the metropolitan or micropolitan region, β_0 through β_6 are parameters to be estimated, ϵ is an identically and independently distributed error term, and

EmpGrow = private employment growth, 2010-2017

YF = young firm employment share

YFKI = young firm knowledge intensity

MF = mature firm knowledge intensity

ED = economic and demographic control variables

PE = prior employment variables

GEO = geographic indicator variables.

In the results tables, we report coefficients' statistical significance using the standard symbols *, ** and ***, which indicate significance at the 0.10, 0.05 and 0.01 levels. These significance levels are the likelihood of an estimated coefficient's value occurring when the coefficient's true value is zero. A significance level of 0.10 would indicate that there is a less than 10 percent chance of such an occurrence. In general, a coefficient value with a significance level at or below 0.10 is considered statistically significant. By that, we mean that we can reject the possibility of the true coefficient being zero. The probability is specifically based on the coefficient's t-statistic, which is reported in parentheses below the coefficient value. The t-statistic tells us the number of standard errors—estimated standard deviations for the coefficient—the coefficient value is from zero, and, thus, provides explicit information about the likelihood of the estimated value when the true value is zero.

The standard errors used to generate t-statistics are adjusted to be robust to possible clustering of model residuals within a state. That is, it is possible that employment growth for the metropolitans or micropolitans in a given state may not be independent of each other because the areas are economically and regulatorily connected. We, therefore, adjust our standard errors so that we are more conservative in determining statistical significance for coefficients. T-statistics indicate the number of standard errors (estimated standard deviations of the coefficient) the coefficient is from zero, with a coefficient of zero implying no employment growth impact for the variable corresponding to the coefficient.

In each table, we successively add the sets of control variables discussed in the main text and indicated in Equation 1. We proceed from a model with no controls (Model 1) to a model with all controls discussed in the text (Model 5). One key point is that, for both area types, the coefficients on our two variables of interest are relatively stable across the first five models and are particularly stable from Model 3 to Model 5. This tells us that the implied impacts of our entrepreneurship variables on future employment growth are relatively robust to the inclusion of variables that we hypothesized might diminish the impacts.

Focusing on Model 1, the R^2 value for each area type is noteworthy. Growth rates are difficult to predict, and, thus, R^2 values for models trying to predict them are generally very low— R^2 tells us the share of all variation in our dependent variable we can explain with our independent variables.

Thus, an R^2 value of 0.07 for the micropolitan Model 1 is respectable, and an R^2 value of 0.25 for the metropolitan Model 1 is remarkable. It should be noted that neither R^2 nor the adjusted R^2 we report, which penalizes normal R^2 for adding additional independent variables, is a perfect measure for analyzing model performance, and both metrics become less telling beyond Model 1.

We have yet to discuss Model 6 for each area type. This model adds geographic dummies for US Census divisions, with a value of one if a metropolitan or micropolitan's largest city falls within the given division, and zero otherwise. Because it is mathematically impossible to include dummies for all divisions, due to a phenomenon called perfect multicollinearity, we exclude the New England division.

Model 6 can be seen as the most conservative estimate we provide in this report. However, the coefficients on our variables of interest are still relatively stable from Model 5 to Model 6. We consider Model 5 to be our preferred model because the divisions may control for relationships we do not want them to. In particular, if most or all of the states in a given division have policies that boost entrepreneurship and, therefore, future employment growth, including the division dummies will control for an impact we are explicitly trying to measure in our coefficients of interest. For this same reason, we do not consider any state dummies, which would control for any state-level entrepreneurship-friendly policies. There is a concern that state-level industrial composition and economic trends could bias our results, but these should be sufficiently controlled for by our regional growth effect variable.

A Robustness Check for Our Dependent Variable

As a test of the validity of our results, we used nonfarm employment data from the Census Bureau Establishments Survey—these data are commonly cited in reports and news articles—to create an alternative dependent variable for the metropolitan models. Results with this dependent variable are comparable to those found using our standard dependent variable. The coefficients for the young firm employment share are nearly identical across all six models. The coefficients on the young firm knowledge intensity are also very similar for Model 1. However, for Models 2-6, the young firm knowledge intensity coefficients using the alternative dependent variable are roughly two-thirds the size of the coefficients using our standard dependent variable. The most likely explanation for this is that the private employment-derived young firm knowledge intensity is more directly related to future private employment growth than future overall employment growth; the latter internalizing public sector employment growth. The alternative results will be made available upon request.

Missing Observations and Alternative Specifications

Regarding missing observations, 19 of the 383 US metros and 70 of the 550 US micros did not have sufficient data to be included in our most rigorous regressions—Models 4-6. Many areas are excluded due to LEHD-QWI data limitations discussed in Appendix I. Areas at least partially lying in Alaska, Massachusetts, or South Dakota could not be used because these states did not report data underlying LEHD-QWI to the Census Bureau for at least one of the following years needed to create regression variables: 2005, 2009, 2010 and 2017. Additionally, the construction of the regional growth effect variable necessitates that the Providence, Rhode Island metro and the DC metro be removed from the regression analysis; the specific reason for this is discussed in Appendix I.

Several other model specifications were considered but not reported. These include models using the natural logs of our two variables of interest instead of their levels, a model adding the interaction between our two variables of interest, models adding the square of our two variables of interest and models where the young firm employment share is separated into a startup share (share of firms less than two years old) and the share of private employment held



in firms age two to five. None of these specifications substantively improved model fit, including only the levels of the young firm employment share and the young firm knowledge intensity.

We also considered including measures of patent activity as control variables. Still, they had effectively no impact on the coefficients of the young firm employment share and young firm knowledge intensity, and several observations were lost due to missing patent measure values. For the control variables, several alternative specifications were considered to obtain parametrizations that best control for phenomena that may influence the relationship between our variables of interest and dependent variables. We considered the square of control variables when logical to do so and tried multiple definitions for proximity variables such as the national park and shale play dummies.

TABLE A2: METRO REGRESSION RESULTS

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
2010 Young Firm Employment Share	1.107*** (5.47)	1.057*** (5.95)	0.627*** (3.85)	0.648*** (3.65)	0.537*** (2.70)	0.457** (2.11)
2010 Young Firm Knowledge Intensity	0.547*** (5.40)	0.899*** (3.92)	0.977*** (4.79)	0.879*** (4.25)	0.921*** (4.40)	0.935*** (4.61)
2010 Mature Firm Knowledge Intensity		-0.349* (-1.72)	-0.517*** (-2.89)	-0.298* (-1.70)	-0.306* (-1.78)	-0.348* (-1.81)
2010-2017 Regional Growth Effect			0.417*** (3.54)	0.366*** (4.22)	0.345*** (3.93)	0.314*** (4.62)
ln(2010 Population)			1.577*** (4.41)	1.322*** (3.24)	1.571*** (3.78)	1.264*** (2.84)
ln(2010 Personal Income Price Parity Index)			1099.4*** (3.48)	1259.9*** (3.79)	1261.5*** (3.97)	1473.1*** (4.99)
ln2(2010 Personal Income Price Parity Index)			-121.2*** (-3.55)	-139.0*** (-3.86)	-139.5*** (-4.03)	-161.2*** (-4.98)
Shale Oil Play Dummy			4.600*** (3.19)	6.706*** (4.48)	5.577** (2.62)	5.817** (2.60)
Permian Basin Play Dummy			3.506** (2.38)	2.803 (1.53)	2.664 (1.40)	2.502 (1.40)
2010 Management of Companies and Enterprises Employment Share			0.457* (1.72)	0.397 (1.51)	0.363 (1.43)	0.454* (1.82)
2010 Tourism Employment Share			1.203*** (2.89)	1.542*** (4.14)	1.567*** (4.33)	1.496*** (3.92)
(2010 Tourism Employment Share) ²			-0.0478*** (-2.88)	-0.0614*** (-4.14)	-0.0623*** (-4.44)	-0.0585*** (-4.05)
2010-2017 Retirement Age Population Share Growth			-3.888*** (-4.61)	-7.150*** (-4.32)	-7.241*** (-4.33)	-7.338*** (-4.23)
(2010-2017 Retirement Age Population Share Growth) ²			0.328*** (5.33)	0.677*** (3.24)	0.696*** (3.40)	0.705*** (3.29)
January 2010 Unemployment Rate				0.309** (2.18)	0.204 (1.42)	0.234 (1.43)

TABLE A2: METRO REGRESSION RESULTS (CONT.)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
2005-2009 Private Employment Growth				-0.262** (-2.65)	-0.272*** (-2.73)	-0.286*** (-2.83)
2009-2010 Private Employment Growth				0.269 (0.85)	0.385 (1.25)	0.427 (1.32)
West Coast Dummy					-0.971 (-0.36)	-2.425 (-0.92)
Great Lakes Dummy					-1.955 (-1.22)	-0.634 (-0.51)
East Coast Dummy					-0.666 (-0.70)	-0.135 (-0.13)
Rocky Mountain Dummy					-1.311 (-0.74)	-1.572 (-0.51)
Pacific Ranges Dummy					2.001 (0.59)	-1.476 (-0.50)
Appalachian Mountain Dummy					-1.287 (-1.14)	0.559 (0.52)
Near National Park Dummy					2.931** (2.35)	2.224* (1.93)
University Dummy					-0.519 (-0.79)	-0.440 (-0.66)
Pacific Division						7.388 (1.58)
Mountain Division						3.705 (0.98)
West North Central Division						3.963 (1.36)
West South Central Division						3.353 (1.06)
East South Central Division						5.016* (1.82)
East North Central Division						2.331 (0.85)
Southern Atlantic Division						3.294 (1.29)
Mid Atlantic Division						-2.324 (-0.96)
Constant	-13.01*** (-3.48)	-11.88*** (-3.32)	-2505.8*** (-3.48)	-2867.1*** (-3.75)	-2863.8*** (-3.93)	-3375.9*** (-5.02)
Number of Observations	371	371	371	364	364	364
Adjusted R ²	0.245	0.250	0.440	0.475	0.480	0.494
BIC	2612.5	2614.9	2560.6	2504.4	2540.1	2562.5
t-statistics in parentheses						
* p<0.10; ** p<0.05; *** p<0.01						



TABLE A3: MICRO REGRESSION RESULTS

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
2010 Young Firm Employment Share	0.693*** (3.86)	0.691*** (3.90)	0.501*** (3.03)	0.624*** (3.65)	0.597*** (3.39)	0.714*** (4.65)
2010 Young Firm Knowledge Intensity	0.482* (1.80)	0.731* (1.93)	0.776*** (2.82)	0.753*** (2.74)	0.745*** (2.73)	0.629** (2.22)
2010 Mature Firm Knowledge Intensity		-0.311 (-1.38)	0.0457 (0.19)	0.208 (0.97)	0.200 (0.87)	0.170 (0.78)
2010-2017 Regional Growth Effect			0.734*** (8.57)	0.654*** (8.77)	0.684*** (9.82)	0.721*** (10.26)
ln(2010 Population)			2.527** (2.19)	1.814 (1.38)	1.972 (1.45)	1.367 (1.00)
ln(2010 State Nonmetro Personal Income Price Parity Index)			-38.02*** (-3.44)	-24.29** (-2.42)	-30.77*** (-2.83)	-59.04*** (-3.00)
Shale Oil Play Dummy			2.645 (0.97)	3.589 (1.38)	3.347 (1.30)	4.684* (1.70)
Permian Basin Play Dummy			21.07*** (4.27)	20.48*** (4.76)	20.76*** (4.64)	21.15*** (4.77)
2010 Management of Companies and Enterprises Employment Share			-0.948** (-2.38)	-0.977** (-2.54)	-0.988** (-2.59)	-0.800* (-1.85)
2010 Tourism Employment Share			-0.155 (-0.44)	-0.0988 (-0.28)	-0.0802 (-0.23)	-0.0421 (-0.12)
(2010 Tourism Employment Share) ²			0.0141 (0.95)	0.0124 (0.84)	0.00792 (0.59)	0.00792 (0.58)
2010-2017 Retirement Age Population Share Growth			-2.868*** (-2.80)	-4.219*** (-4.25)	-3.956*** (-4.01)	-3.885*** (-4.22)
(2010-2017 Retirement Age Population Share Growth) ²			0.283* (1.93)	0.347** (2.44)	0.360** (2.57)	0.364*** (2.81)
January 2010 Unemployment Rate				0.281 (1.52)	0.232 (1.24)	-0.276 (-1.45)
2005-2009 Private Employment Growth				-0.238*** (-2.97)	-0.226*** (-2.70)	-0.215** (-2.36)
2009-2010 Private Employment Growth				0.161 (0.71)	0.200 (0.88)	0.106 (0.46)
West Coast Dummy					-3.797 (-0.94)	-6.658* (-1.93)
Great Lakes Dummy					-1.176 (-0.68)	-1.802 (-0.97)
East Coast Dummy					-4.860*** (-2.71)	-5.020*** (-2.73)
Rocky Mountain Dummy					1.296 (0.72)	1.539 (0.82)
Pacific Ranges Dummy					1.425 (0.42)	-1.953 (-0.45)

TABLE A3: MICRO REGRESSION RESULTS (CONT.)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Appalachian Mountain Dummy					0.101 (0.11)	0.624 (0.39)
National Park Dummy					6.636 (1.42)	7.055 (1.55)
University Dummy					-0.569 (-0.34)	-0.954 (-0.59)
Pacific Division						3.746 (0.85)
Mountain Division						-4.921 (-1.32)
West North Central Division						-8.669* (-1.79)
West South Central Division						-7.823 (-1.67)
East South Central Division						-4.340 (-1.01)
East North Central Division						-2.111 (-0.47)
South Atlantic Division						-3.682 (-0.83)
Middle Atlantic Division						-4.147 (-1.50)
Constant	-9.473* (-1.88)	-8.124* (-1.71)	144.5*** (2.96)	82.11* (1.87)	110.6** (2.30)	249.3*** (2.78)
Number of Observations	486	485	485	480	480	480
Adjusted R ²	0.073	0.075	0.293	0.321	0.324	0.341
BIC	3753.2	3750.8	3671.7	3634.5	3673.1	3702.0
t-statistics in parentheses * p<0.10; ** p<0.05; *** p<0.01						



APPENDIX III—METROPOLITAN RANKINGS TABLE

Heartland

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
1	San Jose-Sunnyvale-Santa Clara, CA	94	1
2	San Francisco-Oakland-Hayward, CA	40	2
3	Boulder, CO	43	6
4	Oxnard-Thousand Oaks-Ventura, CA	17	14
5	Madera, CA	1	338
6	Provo-Orem, UT	6	44
7	Punta Gorda, FL	4	141
8	Naples-Immokalee-Marco Island, FL	5	80
9	New York-Newark-Jersey City, NY-NJ-PA	93	9
10	Cape Coral-Fort Myers, FL	7	121
11	North Port-Sarasota-Bradenton, FL	12	95
12	Nashville-Davidson-Murfreesboro-Franklin, TN	57	18
13	Los Angeles-Long Beach-Anaheim, CA	37	32
14	St. George, UT	8	180
15	Bridgeport-Stamford-Norwalk, CT	175	5
16	Boston-Cambridge-Newton, MA-NH	200	4
17	The Villages, FL	10	163
18	Santa Cruz-Watsonville, CA	35	46
19	Yuba City, CA	14	126
20	Hilton Head Island-Bluffton-Beaufort, SC	21	88
21	Port St. Lucie, FL	11	152
22	Austin-Round Rock, TX	27	57
23	Fort Collins, CO	33	53
24	Santa Maria-Santa Barbara, CA	25	83
25	Bend-Redmond, OR	13	158
26	Miami-Fort Lauderdale-West Palm Beach, FL	28	82
27	Bremerton-Silverdale, WA	42	59
28	San Diego-Carlsbad, CA	64	37
29	Washington-Arlington-Alexandria, DC-VA-MD-WV	185	8
30	Barnstable Town, MA	65	40
31	Trenton, NJ	289	3
32	Charlottesville, VA	50	50
33	Sacramento-Roseville-Arden-Arcade, CA	58	48
34	San Luis Obispo-Paso Robles-Arroyo Grande, CA	24	138

METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
35	Midland, TX	2	363
36	Santa Rosa, CA	38	81
37	Seattle-Tacoma-Bellevue, WA	172	10
38	Hartford-West Hartford-East Hartford, CT	239	7
39	Denver-Aurora-Lakewood, CO	110	23
40	Salt Lake City, UT	143	17
41	College Station-Bryan, TX	26	184
42	Wilmington, NC	52	90
43	Prescott, AZ	16	244
44	Bakersfield, CA	9	346
45	Napa, CA	51	109
46	Ogden-Clearfield, UT	82	49
47	Kingston, NY	120	33
48	Asheville, NC	70	71
49	Idaho Falls, ID	61	103
50	Ann Arbor, MI	224	11
51	Auburn-Opelika, AL	23	241
52	Portland-Vancouver-Hillsboro, OR-WA	135	26
53	Sebastian-Vero Beach, FL	41	161
54	Ocala, FL	29	216
55	Fresno, CA	22	287
56	Las Vegas-Henderson-Paradise, NV	63	120
57	Palm Bay-Melbourne-Titusville, FL	71	91
58	Urban Honolulu, HI	243	12
59	East Stroudsburg, PA	62	132
60	Bellingham, WA	101	60
61	Athens-Clarke County, GA	87	69
62	Olympia-Tumwater, WA	77	79
63	Hanford-Corcoran, CA	18	311
64	Deltona-Daytona Beach-Ormond Beach, FL	60	145
65	Crestview-Fort Walton Beach-Destin, FL	48	170
66	Durham-Chapel Hill, NC	220	15
67	Daphne-Fairhope-Foley, AL	31	233
68	Tampa-St. Petersburg-Clearwater, FL	95	75
69	Raleigh, NC	142	39
70	State College, PA	147	35





METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
71	Homosassa Springs, FL	32	238
72	Atlanta-Sandy Springs-Roswell, GA	152	31
73	Chicago-Naperville-Elgin, IL-IN-WI	229	16
74	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	199	21
75	Dallas-Fort Worth-Arlington, TX	117	62
76	Ocean City, NJ	92	89
77	Gainesville, FL	85	97
78	Riverside-San Bernardino-Ontario, CA	30	277
79	Logan, UT-ID	154	38
80	Wenatchee, WA	15	349
81	Santa Fe, NM	55	197
82	Sherman-Denison, TX	54	198
83	Corvallis, OR	80	116
84	Charleston-North Charleston, SC	79	127
85	Mount Vernon-Anacortes, WA	69	153
86	Burlington-South Burlington, VT	225	20
87	Brunswick, GA	39	255
88	Tallahassee, FL	91	119
89	Myrtle Beach-Conway-North Myrtle Beach, SC-NC	46	246
90	Reno, NV	132	63
91	Kahului-Wailuku-Lahaina, HI	166	43
92	Houston-The Woodlands-Sugar Land, TX	104	112
93	Chico, CA	66	189
94	Portland-South Portland, ME	207	27
95	Manchester-Nashua, NH	301	13
96	Ames, IA	192	36
97	Colorado Springs, CO	121	94
98	Minneapolis-St. Paul-Bloomington, MN-WI	253	19
99	Detroit-Warren-Dearborn, MI	214	28
100	Worcester, MA-CT	208	29
101	Vallejo-Fairfield, CA	112	117
102	New Haven-Milford, CT	211	30
103	Wichita, KS	76	162
104	Baltimore-Columbia-Towson, MD	249	22
105	Redding, CA	53	260
106	Iowa City, IA	206	41

METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
107	Greeley, CO	44	305
108	Boise City, ID	97	155
109	Orlando-Kissimmee-Sanford, FL	126	104
110	Pittsfield, MA	156	66
111	El Centro, CA	3	374
112	Visalia-Porterville, CA	19	361
113	Coeur d'Alene, ID	49	306
114	Elizabethtown-Fort Knox, KY	84	188
115	Flagstaff, AZ	45	323
116	Manhattan, KS	119	144
117	Sebring, FL	56	297
118	Albany-Schenectady-Troy, NY	270	24
119	Grants Pass, OR	36	342
120	Salinas, CA	67	270
121	Bowling Green, KY	136	131
122	Panama City, FL	74	247
123	Savannah, GA	109	181
124	Columbus, GA-AL	115	172
125	Jacksonville, FL	149	110
126	Oklahoma City, OK	116	174
127	Providence-Warwick, RI-MA	238	45
128	Charlotte-Concord-Gastonia, NC-SC	195	67
129	Phoenix-Mesa-Scottsdale, AZ	148	123
130	Lexington-Fayette, KY	226	51
131	Richmond, VA	213	58
132	Huntsville, AL	161	99
133	Carson City, NV	145	133
134	Atlantic City-Hammonton, NJ	151	114
135	Lincoln, NE	217	61
136	Warner Robins, GA	83	249
137	Jacksonville, NC	68	302
138	Victoria, TX	20	364
139	Hammond, LA	73	292
140	Springfield, MA	186	86
141	Hot Springs, AR	90	250
142	Lawrence, KS	173	102





METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
143	Columbus, OH	245	52
144	Bloomington, IN	168	111
145	Florence-Muscle Shoals, AL	118	210
146	Norwich-New London, CT	251	54
147	Salisbury, MD-DE	133	173
148	California-Lexington Park, MD	244	56
149	New Orleans-Metairie, LA	122	211
150	Des Moines-West Des Moines, IA	307	34
151	Stockton-Lodi, CA	158	146
152	Missoula, MT	100	272
153	Eugene, OR	127	201
154	Salem, OR	102	273
155	Blacksburg-Christiansburg-Radford, VA	215	87
156	Spokane-Spokane Valley, WA	160	148
157	Gainesville, GA	138	185
158	Columbia, MO	170	137
159	Omaha-Council Bluffs, NE-IA	204	108
160	Lancaster, PA	196	115
161	Allentown-Bethlehem-Easton, PA-NJ	305	42
162	Madison, WI	290	47
163	Merced, CA	72	332
164	Springfield, IL	106	286
165	Ithaca, NY	335	25
166	Jonesboro, AR	125	225
167	Tyler, TX	111	282
168	Morgantown, WV	153	178
169	Gulfport-Biloxi-Pascagoula, MS	114	285
170	Medford, OR	108	291
171	Louisville/Jefferson County, KY-IN	235	93
172	Rochester, NY	265	68
173	Columbia, SC	190	147
174	Kansas City, MO-KS	230	106
175	Champaign-Urbana, IL	269	73
176	Modesto, CA	144	214
177	Clarksville, TN-KY	124	265
178	Harrisonburg, VA	146	217

METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
179	Mankato-North Mankato, MN	286	64
180	Fayetteville-Springdale-Rogers, AR-MO	231	113
181	Beaumont-Port Arthur, TX	99	326
182	Flint, MI	169	179
183	Pittsburgh, PA	292	65
184	Vineland-Bridgeton, NJ	201	156
185	Lawton, OK	81	340
186	Cincinnati, OH-KY-IN	277	77
187	Pocatello, ID	130	275
188	Greenville-Anderson-Mauldin, SC	232	134
189	Harrisburg-Carlisle, PA	298	70
190	Tulsa, OK	163	205
191	Birmingham-Hoover, AL	240	129
192	Dover, DE	176	199
193	Kennewick-Richland, WA	157	222
194	Abilene, TX	88	343
195	Indianapolis-Carmel-Anderson, IN	300	76
196	Bay City, MI	187	193
197	Lansing-East Lansing, MI	281	85
198	Virginia Beach-Norfolk-Newport News, VA-NC	212	168
199	Lake Charles, LA	123	313
200	Lafayette, LA	150	252
201	Lakeland-Winter Haven, FL	171	209
202	Akron, OH	279	92
203	Little Rock-North Little Rock-Conway, AR	218	167
204	Baton Rouge, LA	131	298
205	Valdosta, GA	129	308
206	Buffalo-Cheektowaga-Niagara Falls, NY	276	100
207	Longview, TX	103	345
208	Casper, WY	89	352
209	San Antonio-New Braunfels, TX	107	341
210	Bismarck, ND	167	223
211	Midland, MI	234	157
212	Cleveland-Elyria, OH	308	78
213	Lynchburg, VA	219	175
214	Fort Smith, AR-OK	164	235





METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
215	Glens Falls, NY	184	218
216	Lake Havasu City-Kingman, AZ	98	353
217	Oshkosh-Neenah, WI	285	107
218	Decatur, AL	141	309
219	Killeen-Temple, TX	134	322
220	Laredo, TX	34	371
221	Lubbock, TX	96	356
222	McAllen-Edinburg-Mission, TX	47	368
223	Watertown-Fort Drum, NY	177	240
224	Grand Rapids-Wyoming, MI	280	122
225	Eau Claire, WI	241	166
226	Tuscaloosa, AL	139	321
227	Waco, TX	140	320
228	Staunton-Waynesboro, VA	197	224
229	Pensacola-Ferry Pass-Brent, FL	216	206
230	Milwaukee-Waukesha-West Allis, WI	259	154
231	Roanoke, VA	330	74
232	Jackson, MS	188	239
233	Alexandria, LA	181	258
234	Monroe, LA	174	266
235	Hattiesburg, MS	180	263
236	Cheyenne, WY	202	230
237	Syracuse, NY	311	105
238	Chattanooga, TN-GA	272	150
239	Wichita Falls, TX	137	337
240	Knoxville, TN	299	130
241	Jefferson City, MO	236	196
242	Green Bay, WI	295	136
243	Cumberland, MD-WV	189	259
244	St. Cloud, MN	360	55
245	St. Louis, MO-IL	264	165
246	Odessa, TX	59	369
247	Wausau, WI	291	142
248	Yakima, WA	105	359
249	Johnson City, TN	203	264
250	Scranton-Wilkes-Barre-Hazleton, PA	313	124

METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
251	Springfield, MO	205	269
252	Muskegon, MI	183	295
253	Fargo, ND-MN	258	187
254	Bloomington, IL	356	72
255	Utica-Rome, NY	341	84
256	Grand Junction, CO	165	315
257	Huntington-Ashland, WV-KY-OH	227	243
258	Gettysburg, PA	222	253
259	Houma-Thibodaux, LA	178	312
260	Greensboro-High Point, NC	322	128
261	Topeka, KS	271	186
262	Dayton, OH	346	96
263	Greenville, NC	194	301
264	Corpus Christi, TX	113	362
265	Fayetteville, NC	210	283
266	Weirton-Steubenville, WV-OH	254	212
267	Appleton, WI	315	140
268	Tucson, AZ	209	289
269	Winston-Salem, NC	267	204
270	Hickory-Lenoir-Morganton, NC	252	226
271	Youngstown-Warren-Boardman, OH-PA	242	245
272	Las Cruces, NM	78	367
273	Michigan City-La Porte, IN	294	182
274	Beckley, WV	237	268
275	Spartanburg, SC	262	221
276	Rochester, MN	338	125
277	San Angelo, TX	86	366
278	Anniston-Oxford-Jacksonville, AL	233	276
279	Grand Island, NE	182	333
280	Lewiston-Auburn, ME	316	159
281	Kalamazoo-Portage, MI	337	135
282	Rome, GA	350	118
283	Sierra Vista-Douglas, AZ	128	360
284	Montgomery, AL	248	261
285	Enid, OK	223	307
286	Wheeling, WV-OH	275	220





METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
287	Gadsden, AL	198	331
288	Texarkana, TX-AR	162	350
289	Niles-Benton Harbor, MI	273	229
290	Albuquerque, NM	191	336
291	Racine, WI	228	310
292	Binghamton, NY	321	169
293	Reading, PA	336	151
294	Dothan, AL	263	256
295	Billings, MT	247	284
296	Augusta-Richmond County, GA-SC	283	227
297	South Bend-Mishawaka, IN-MI	328	164
298	Macon-Bibb County, GA	296	215
299	Memphis, TN-MS-AR	256	281
300	Great Falls, MT	179	347
301	Lafayette-West Lafayette, IN	368	98
302	Bangor, ME	266	271
303	Shreveport-Bossier City, LA	221	329
304	Muncie, IN	327	171
305	Longview, WA	255	288
306	Toledo, OH	352	149
307	York-Hanover, PA	331	177
308	Owensboro, KY	314	207
309	Walla Walla, WA	274	279
310	Hagerstown-Martinsburg, MD-WV	363	139
311	Grand Forks, ND-MN	278	280
312	Lebanon, PA	324	200
313	La Crosse-Onalaska, WI-MN	372	101
314	New Bern, NC	309	232
315	Mobile, AL	297	262
316	Monroe, MI	329	202
317	Albany, OR	246	325
318	Fort Wayne, IN	347	183
319	Cedar Rapids, IA	366	143
320	Carbondale-Marion, IL	310	251
321	Sheboygan, WI	340	191
322	Pueblo, CO	193	357

METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
323	Evansville, IN-KY	345	190
324	Amarillo, TX	250	328
325	Altoona, PA	306	257
326	Yuma, AZ	75	373
327	Chambersburg-Waynesboro, PA	293	290
328	Burlington, NC	323	231
329	Kankakee, IL	288	299
330	Charleston, WV	333	219
331	Canton-Massillon, OH	325	234
332	Florence, SC	282	314
333	Rockford, IL	344	213
334	Davenport-Moline-Rock Island, IA-IL	348	208
335	Battle Creek, MI	355	194
336	Erie, PA	351	203
337	Elmira, NY	361	176
338	Morristown, TN	287	319
339	Johnstown, PA	317	278
340	Peoria, IL	332	248
341	Terre Haute, IN	342	236
342	Springfield, OH	257	344
343	Lewiston, ID-WA	268	339
344	Kingsport-Bristol-Bristol, TN-VA	334	254
345	Cleveland, TN	303	317
346	Waterloo-Cedar Falls, IA	367	192
347	Hinesville, GA	260	348
348	Saginaw, MI	357	237
349	Williamsport, PA	343	274
350	Jackson, TN	326	304
351	Pine Bluff, AR	318	327
352	Jackson, MI	359	267
353	Rocky Mount, NC	312	334
354	Brownsville-Harlingen, TX	155	370
355	Dalton, GA	364	242
356	Albany, GA	349	294
357	Sumter, SC	284	355
358	Elkhart-Goshen, IN	320	335





METROPOLITAN RANKINGS TABLE (CONT.)

Overall Rank	Metro Name	Young Firm Employment Share Rank	Young Firm Knowledge Intensity Rank
359	Duluth, MN-WI	353	300
360	Columbus, IN	373	195
361	Dubuque, IA	376	160
362	Parkersburg-Vienna, WV	302	354
363	Goldsboro, NC	354	316
364	El Paso, TX	159	372
365	Mansfield, OH	339	330
366	Janesville-Beloit, WI	362	303
367	Danville, IL	369	296
368	Joplin, MO	319	358
369	Kokomo, IN	374	228
370	Fond du Lac, WI	371	318
371	Lima, OH	370	324
372	Decatur, IL	358	351
373	Farmington, NM	304	365
374	Bloomsburg-Berwick, PA	375	293
	Winchester, VA-WV	261	
	St. Joseph, MO-KS	365	

