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Innovation and Entrepreneurship Indicators

Robert Sadowski

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Prepared by:
Robert Sadowski
The Center for Economic Development
Maxine Goodman Levin College of Urban Affairs
Cleveland State University

as part of:
**The CSU Presidential Initiative
for Economic Development**

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INNOVATION AND ENTREPRENEURSHIP INDICATORS

**Center for
Economic
Development**

2121 Euclid Avenue Cleveland, Ohio 44115
<http://urban.csuohio.edu>

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EXECUTIVE SUMMARY

INTRODUCTION

- This work is an update to the *Regional Economic Indicators: Business and Innovation Climate* report that was issued in August 2004. Although many of the same economic indicators are used in the analyses, there is a major difference between the two reports. The August 2004 release had a broad focus on the overall business climate in 36 comparable metro areas. The result was a single index—business and innovation climate. In this report, we focus almost exclusively on innovation and entrepreneurship, each with its own index.

AN OVERVIEW OF INNOVATION AND ENTREPRENEURSHIP

- Innovation and entrepreneurship are critical to the economic development of any metro area. The entire U.S. economy has been fundamentally changed by technology and global market access. Today, a region's ability to grow is tied directly to its capacity to generate new marketable ideas (innovation), rapidly commercialize those ideas (entrepreneurship), and adjust competitive offerings to rapidly changing market conditions.
- Innovation and entrepreneurship are integrally related. In fact, many researchers see innovation as the cornerstone of entrepreneurship. According to a study released by Advanced Research Technologies, innovation without entrepreneurship generally yields minimal local economic impact. Innovations are highly portable, whereas entrepreneurship is place-based. Entrepreneurship enhances the regional economic impact of investments in innovation. Whether they are building new firms or reinventing existing ones, entrepreneurs apply new ideas to products and services to capture locally the economic benefits of innovation.
- Data used in this report covers the time period from 2000 through 2004. During this five-year period, the country experienced a recession and expansion. According to the National Bureau of Economic Research (NBER), a peak in business activity occurred in the U.S. economy in March 2001. A peak marks the end of an expansion and the beginning of a recession. The expansion lasted exactly 10 years, from March 1991 to March 2001, the longest in NBER's chronology and included the famous dot.com boom of the late 1990s. Although the national recession lasted only eight months, ending in November 2001, some regions of the country, especially the manufacturing-heavy Midwest, were much slower to recover.
- Austin, Denver, San Diego, and Seattle ranked among the top five comparable metro areas in both innovation and entrepreneurship. Rounding out the top five innovative regions was Minneapolis. In entrepreneurship, Jacksonville also placed in the top five. Collectively, these metro areas reported about 40 percent of activity in each of the respective innovation and entrepreneurship indicators.

INNOVATION AND ENTREPRENEURSHIP IN THE CLEVELAND METRO AREA

- The Cleveland metro area ranked much higher in innovation (10th) than entrepreneurship (23rd) among the 36 comparable metro regions. This comes as no surprise to many observers considering the region's reputation as one that is strong in research but lacking the entrepreneurial spirit, at least during the past few decades. Regardless of its reputation, pockets of entrepreneurial activity already exist and are growing in the region. In fact, concentrated efforts by Case Western Reserve University, Cleveland State University, The University of Akron, NASA Glenn Research Center, and intermediaries such as NorTech, JumpStart, BioEnterprise, and the Ohio Aerospace Institute in the area of technology commercialization are strengthening local entrepreneurship. However, the results are not yet evident in the data.
- Cleveland would have ranked even higher in innovation were it not for two things: 1) High-tech employment share—Cleveland ranked 23rd in this indicator. Regardless of the year used in the scoring or if the score was computed across time, the Cleveland area reports a low ranking in high-tech employment share. 2) We were unable to include NASA Glenn's external research budget under the R&D funding indicator. Of the \$233 million spent by Glenn in Northeast Ohio during fiscal year 2004, 55 percent was awarded to private sector companies and academic institutions for scientific research and development.
- Boosting Cleveland's standing as an innovative region are the SBIR/STTR awards. These awards cover the innovation spectrum from proof-of-concept through prototype development, all the way to the point of technology transfer. Cleveland ranked 6th in award activity in 2003. When rankings are based on award activity between 2000 and 2003, Cleveland maintains its 6th place position.
- Cleveland ranked 5th out of 36 comparable metropolitan areas in both the number of NIH awards (3,011) and total award value (\$1.034 billion) from 2001 through 2004. In fact, Cleveland-area institutions secured more awards than their counterparts in Minneapolis during this time period. Minneapolis-area institutions received 2,681 awards valued at \$949 million. Generally speaking, a very small number of institutions are the dominant NIH award recipients in each metro area. For example, during 2004 researchers at Case Western Reserve University and the Cleveland Clinic accounted for 90 percent of award recipients and 82 percent of total award value locally.
- Cleveland ranked 8th in patent activity (patents awarded and number of inventors) in 2004. The local region was ahead of Pittsburgh and Columbus (placing 9th and 16th, respectively), but fell behind Cincinnati, which ranked 7th. Looking across all comparable metro areas, a steady upward trend in patent activity was seen between 2000 and 2003 followed by a drop in 2004—five percent in the number of patents granted and 3.4 percent in the number of inventors. The Cleveland metro area did not follow the national trend. The local region reached its peak in patent activity in 2001 followed by a gradual downward trend through 2004.
- One contributing factor to Cleveland's low ranking in entrepreneurship may be a lack of early stage capital for entrepreneurs. According to the NorTech Early Stage Capital

Task Force, “as a result of insufficient pre-seed and seed capital, many quality investment opportunities remain unfunded or funded at lower levels than required to accelerate growth, leading to the appearance of a region that is lacking in innovative new ideas, when quite the opposite is actually the case. Good ideas are dying locally (or in some cases moving elsewhere) due to a lack of adequate local funding sources.”

INNOVATION AND ENTREPRENEURSHIP IN NORTHEAST OHIO

- Although a limited number of initial public offerings (IPOs) were reported across all 36 comparable metros areas between 2000 and 2004 (total of 159), IPO activity in Northeast Ohio (Akron, Canton, Cleveland, and Youngstown) was almost nonexistent. During this five-year period, only two companies went public across the entire region. This compares with five in Pittsburgh and two each in Cincinnati and Columbus.
- Even though Akron’s economy was 33rd among the 36 comparable regions (by 2002 gross metropolitan product), it ranked 23rd in the innovation index. Among the innovation indicators, Akron placed 17th in high-tech employment share, 18th in patent activity, 24th in SBIR/STTR awards, and 29th in R&D funding. Like Cleveland, Akron did poorly in the entrepreneurship index, ranking 34th. Canton placed 35th in both innovation and entrepreneurship. Youngstown ranked 36th as an innovative place, but was 31st in entrepreneurship. This is due to its being ranked 29th in new firm births.

BUSINESS COSTS

- The Cleveland metro area is a high-cost place to do business, ranking 31st in 2004. Comparable metro areas with higher business costs include Buffalo, Minneapolis, Riverside, Sacramento, and San Diego. Energy costs that are 25 percent above the U.S. average are the primary reason for Cleveland’s ranking. This is especially troublesome for a manufacturer whose production process is heavily dependent on natural gas or electricity. Akron and Youngstown are tied for 27th place in the energy index whereas Canton ranked 5th. In addition, Ohio is known as a high-tax state. Cincinnati, Akron, Columbus, and Cleveland rank 30th through 33rd, respectively, in the tax sub-index.

INTRODUCTION

This report is the latest in a series that is produced by the Center for Economic Development (Center) at Cleveland State University's Maxine Goodman Levin College of Urban Affairs as part of its regional economic indicators project. It is an update to the *Regional Economic Indicators: Business and Innovation Climate* report that was issued in August 2004. The project's objective is to provide a comprehensive benchmarking, using indices, of Greater Cleveland's economy against other metropolitan areas across the nation.¹ To achieve this objective, the Center analyzed a wide-ranging set of economic indicators in several themes to construct a broad-based economic profile of the region. This allows for an objective and unbiased determination of areas of economic performance in which Cleveland and northeast Ohio lead or lag regions that are considered comparable. This report focuses on economic indicators associated with innovation, entrepreneurship, and business costs. Other benchmarking reports that have been released include: *Regional Economic Indicators: Human Capital and Workforce* (February 2006), *Regional Economic Indicators: Affordability and Quality of Life* (May 2005), and *Traditional Regional Economic Indicators* (February 2005).²

In each of these reports, the geographic unit examined is a metropolitan area. The research team chose not to compare northeast Ohio's metro areas to the largest areas in the country, but to identify a set of comparable areas based on several criteria. To be included, the area had to be similar in size to the Cleveland area in terms of population and/or labor force. The area also had to meet at least one of the three following criteria: similar industry structure, located in the midwestern states, or reported as a high-growth region in terms of labor force by the Bureau of Labor Statistics. Appendix D provides more details related to the selection criteria. Thirty-two metropolitan areas across the U.S. were identified as being comparable with the Cleveland area. In addition, three smaller metro areas in northeast Ohio (Akron, Canton, and Youngstown) that did not meet these criteria were included because they are part of the northeast Ohio region. As a result, they were not expected to rank highly in the innovation and entrepreneurship indices. In total, 36 metro areas are included in the description and rankings in this report.

The economic indicators that comprise the innovation and entrepreneurship theme include Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) awards, high-tech employment share, research and development funding, utility

¹ An index is simply a summary measure based on a large number of variables.

² Copies of these reports can be found at the Center's website: <http://urban.csuohio.edu/economicdevelopment/>

patents, venture capital, initial public offerings, and new firm births. These indicators provide different ways of capturing a region's propensity to conduct research, transfer basic research to development and commercialization, innovate, promote entrepreneurship, and develop and sustain a technology-based economy.

Although it was not used in the index calculations, business costs are included in this report because they are a very important measure of regional business climate. Companies located in a lower business-cost region are more competitive than those in a higher-cost region if all other factors are equal between the two regions. The result being that an entrepreneur may find it more attractive to set up shop in a lower-cost metro area.

This report includes five sections. Following this introduction, the second section presents an overview of innovation and entrepreneurship and provides a framework for the remainder of the study. Sections three and four are the core of the report. Here we put forward the innovation (section three) and entrepreneurship (section four) indices for the 36 comparable metropolitan areas and provide in-depth analyses of the associated economic indicators. The final section discusses the business cost indicator.

OVERVIEW OF INNOVATION AND ENTREPRENEURSHIP: ITS IMPORTANCE TO A REGION

In the previous section, we stated that this report is an update of the *Business and Innovation Climate* report that was issued in August 2004. Although many of the same economic indicators are used in the analyses, there is a major difference between the two reports. The August 2004 release had a broad focus on the overall business climate in 36 comparable metro areas. The result was a single index—business and innovation climate. In this report, we focus almost exclusively on innovation and entrepreneurship, each with its own index.

The report's structure was changed because innovation and entrepreneurship are so critical to the economic development of any metro area. The entire U.S. economy has been fundamentally changed by technology and global market access. Today, a metro region's ability to grow is tied directly to its capacity to generate new marketable ideas (innovation), rapidly commercialize those ideas (entrepreneurship), and adjust competitive offerings to rapidly changing market conditions.

Innovation and entrepreneurship are integrally related. In fact, many researchers see innovation as the cornerstone of entrepreneurship. According to a study released by Advanced Research Technologies, innovation without entrepreneurship generally yields minimal local economic impact.³ The study's authors argue that innovations are highly portable, whereas entrepreneurship is place-based. Entrepreneurship enhances the regional economic impact of investments in innovation. Whether they are building new firms or reinventing existing ones, entrepreneurs, through the application of new ideas to products and services, capture locally the economic benefits of innovation.

Innovation and entrepreneurship help keep industries vibrant, thereby maintaining the economic health and competitiveness of a metro area.⁴ As new ideas begin to take shape (innovation), they increasingly generate interest and activity. As the ideas mature, entrepreneurs form new companies with products and services based on the ideas. As the ideas gain recognition in the broader marketplace, existing companies reconfigure their businesses to capitalize on the emerging trends. These high-growth "clusters" of dynamic

³ Advanced Research Technologies, LLC, Powell, OH, and FINTEL, LLC, Madison, WI. (2005). *The innovation-entrepreneurship nexus: A national assessment of entrepreneurship and regional economic growth and development*.

⁴ Cleveland State University, I-Open, and The Cerulean Group, Cleveland, OH. (2005). *Transforming our regional economy: Action Plan 2006*.

companies represent the engine that moves an old regional economy into a new one. As each cluster grows, some companies emerge as the dominant ones, anchoring the cluster. Eventually, a network of support businesses emerges around those companies that anchor a cluster. As the cluster enters the mainstream marketplace, it becomes an important contributor to a region's employment and revenue base.

Looking at the indicator data, we observe that the business cycle has a much greater effect on entrepreneurial activity than innovation across the 36 comparable metro areas. Data used in this report covers the time period from 2000 through 2004. During this five-year period, the U.S. experienced a recession and expansion. According to the National Bureau of Economic Research (NBER), a peak in business activity occurred in the U.S. economy in March 2001. A peak marks the end of an expansion and the beginning of a recession. The expansion lasted exactly 10 years, from March 1991 to March 2001, the longest in NBER's chronology and included the famous dot.com boom of the late 1990s. Although the national recession lasted only eight months, ending in November 2001, some regions of the country, especially the manufacturing-heavy Midwest, were much slower to recover.

Out of the four innovation indicators—SBIR/STTR awards, high-tech employment share, IPOs, and patents—only SBIR awards showed effects of the recession. Here award activity showed a slight decline between 2000 and 2001 followed by a significant increase in 2002. This is in sharp contrast to the entrepreneurship indicators—venture capital, IPOs, and firm births. Venture capital investment dropped precipitously across all comparable regions following the dot.com collapse that began in late 2000. It did not rebound until 2004. Similarly, IPOs saw a sharp decline between 2000 and 2001 and did not bounce back until 2004. Finally, only five of the 36 comparable metro areas showed a positive change in new firm births between 1998/99 and 2001/02.

INNOVATION INDEX

Innovation is the formation and exploitation of new ideas—incorporating new technologies, design, and best practices that will, over time, help businesses compete effectively in the global environment. The innovation index aggregates key variables for each of the 36 comparable metropolitan areas into a single metric. This provides a simple way to benchmark the Cleveland area (and other metro areas in Northeast Ohio) against regions across the U.S. The index is comprised of four indicators, each with one or more variables. Table 1 lists the indicators, associated variables, and the time period covered by the analysis.

Table 1. Innovation Indicators and Variables

Indicator	Variables	Time Period
SBIR & STTR Awards	Number of Awards	2000-2003
	Number of Companies Receiving Awards	
	Total Award Value	
High-Tech Employment	Employment Share	2000-2004
Research & Development Funding	Number of NIH Awards	2001-2004
	Total NIH Award Value	2000-2003
	University R&D Expenditures	
Utility Patents	Patents Granted	2000-2004
	Number of Inventors	

Constructing the innovation index is a two-step process. First, a sub-index is calculated for each indicator; second, the sub-indices are combined to create the overall index for each metro area together with its associated ranking. Appendix C provides additional details. The aggregated (overall) index and each of the sub-indices have a range from 1.00 (worst) to 10.00 (best). Only data from the latest available year were used in the calculations.

Table 2 shows the overall index and ranking for each of the 36 comparable metro areas. It also provides rankings by metro area for each of the four innovation indicators. Table C-1 in Appendix C includes the sub-indices values for each indicator. The top five metro areas for innovation in order of rank are San Diego, Seattle, Minneapolis, Austin, and Denver.

Table 2. Innovation Index

Metropolitan Statistical Area	Innovation Index		Innovation Indicator Rankings			
	Index	Rank	SBIR/STTR Awards	Hi-Tech Employment	R&D Funding	Patents
Akron, OH	2.32	23	24	17	29	18
Austin, TX	5.93	4	5	1	14	3
Buffalo, NY	2.49	20	18	25	16	19
Canton, OH	1.13	35	34(tied)	35	36	29
Charlotte, NC	1.99	28	31	21	33	24
Cincinnati, OH	3.66	9	12	14	10	7
Cleveland, OH	3.63	10	6	23	7	8
Columbus, OH	3.43	13	9	13	8	16
Denver, CO	4.57	5	3	3	12	11
Grand Rapids, MI	1.97	29	34(tied)	19	34	27
Greensboro, NC	1.73	33	33	29	31	31
Indianapolis, IN	2.63	15	21	18	22	14
Jacksonville, FL	1.91	30	28	22	32	34
Kansas City, MO	2.60	16	27	10	26	20
Las Vegas, NV	1.33	34	26	34	30	30
Louisville, KY	1.99	27	29	28	24	26
Memphis, TN	1.81	32	32	31	21	32
Milwaukee, WI	3.00	14	23	9	17	12
Minneapolis, MN	6.51	3	4	4	5	1
Nashville, TN	2.52	19	22	30	6	28
Oklahoma City, OK	2.19	26	25	20	19	35
Orlando, FL	2.30	25	10	26	28	21
Phoenix, AZ	3.51	12	11	16	23	6
Pittsburgh, PA	4.25	7	7	15	3	9
Portland, OR	4.55	6	8	7	11	4
Providence, RI	2.33	22	19	32	13	13
Richmond, VA	2.54	18	30	11	20	25
Riverside, CA	1.85	31	13	33	25	17
Sacramento, CA	3.63	11	14	6	9	15
San Antonio, TX	2.38	21	20	24	15	23
San Diego, CA	9.07	1	1	5	1	2
Seattle, WA	7.32	2	2	2	2	5
St. Louis, MO	4.00	8	16	12	4	10
Tampa, FL	2.31	24	17	27	18	22
Virginia Beach, VA	2.60	17	15	8	27	33
Youngstown, OH	1.00	36	34(tied)	36	35	36

Index values for Kansas City and Virginia Beach are the same at the two-decimal place level. However, at the three-decimal place level the associated rank order is correct.

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

The Cleveland metro area ranked 10th overall. Keeping the local region from rising higher in rank was the high-tech employment share indicator, in which Cleveland placed 23rd—in comparison, Akron was 17th. Regardless of the year for which data was used in the scoring or if the score was computed for the time period 2000-2004, the Cleveland area reports a low ranking in high-tech employment share.

In sharp contrast, Cleveland ranked very well in SBIR/STTR awards (6th), research and development funding (7th), and patents (8th). Especially encouraging is the SBIR/STTR award indicator. These awards cover the innovation spectrum from proof-of-concept through prototype development all the way to the point of technology transfer. Although the number six ranking only reflects awards in 2003, Cleveland placed consistently high across time. In fact, if the indicator ranking were based on the four-year period from 2000 through 2003, Cleveland would maintain 6th place.

Cleveland ranked 7th in R&D funding despite our inability to include NASA Glenn's external research budget and local R&D expenditures allocated by the private sector. Unfortunately, data for private-sector R&D initiatives is not available at the metropolitan level. Of the \$233 million spent by Glenn in Northeast Ohio during fiscal year 2004, 55 percent was awarded to private sector companies and academic institutions for scientific research and development. Major local companies with R&D facilities in the region include Ferro Corporation, Lubrizol, and Sherwin Williams. The natural progression of R&D work is the receipt of patents. Cleveland did very well, ranking 8th not only in 2004 but also during the time period from 2000 through 2004.

The following sections provide detailed analyses of the four innovation indicators. Specifically, we will discuss each indicator, explain why it is a useful metric, and highlight important findings for select metropolitan statistical areas (MSAs). Indicator data tables for all 36 comparable metro areas are found in Appendix B.

SBIR & STTR AWARDS

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are federal government initiatives designed to stimulate technological innovation and provide opportunities for small businesses. Their purpose is to support private-sector R&D through set-aside funding earmarked for promising technologies that are not yet commercially viable.

The SBIR program provides competitive grants in two phases to innovators and researchers seeking to conduct proof-of-concept research for technical merit (Phase I) and feasibility and prototype development (Phase II). SBIR program solicitations are issued by 11 federal agencies.⁵ The STTR program is a similar, but much smaller, initiative aimed at partnerships between small businesses and nonprofit research institutions, including universities, to advance technology transfer. Five federal agencies reserve a portion of their R&D budgets for STTR grants. In 2004, federal agencies allocated \$2 billion for SBIR awards and \$200 million for STTR awards.

SBIR and STTR awards are often used as a proxy for technological innovation and serve as an important source of financing for innovators. For many start-up companies, they constitute the initial revenue stream and can make the difference between “go” and “no-go” decisions. Program participants can leverage the credibility associated with the award and the experimental data developed through their research to attract strategic partners and outside capital.

Across the 36 comparable metropolitan areas, SBIR/STTR award activity showed a slight decline between 2000 and 2001 followed by a significant increase in 2002 and a small increase in activity between 2002 and 2003. Summarizing across this four-year period, the Cleveland metro area ranked 6th in three categories: number of awards (206), number of firms receiving awards (103), and total award value (\$55.9 million). Cleveland’s overall SBIR/STTR indicator ranking (6th) was ahead of Pittsburgh (7th), Columbus (9th), and Cincinnati (12th). The highest-ranking metro areas were San Diego, Seattle, Denver, Minneapolis, and Austin.

Looking exclusively at SBIR Phase II awards in 2003, Cleveland ranked fifth out of 36 comparable metro areas in total award monies that were used for feasibility and prototype development. Following is a breakdown, by industry, of the \$14.1 million in Phase II monies awarded to Cleveland-area companies in 2003:

⁵ Participating agencies include the Departments of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Homeland Security, Transportation, the Environmental Protection Agency, NASA, and the National Science Foundation.

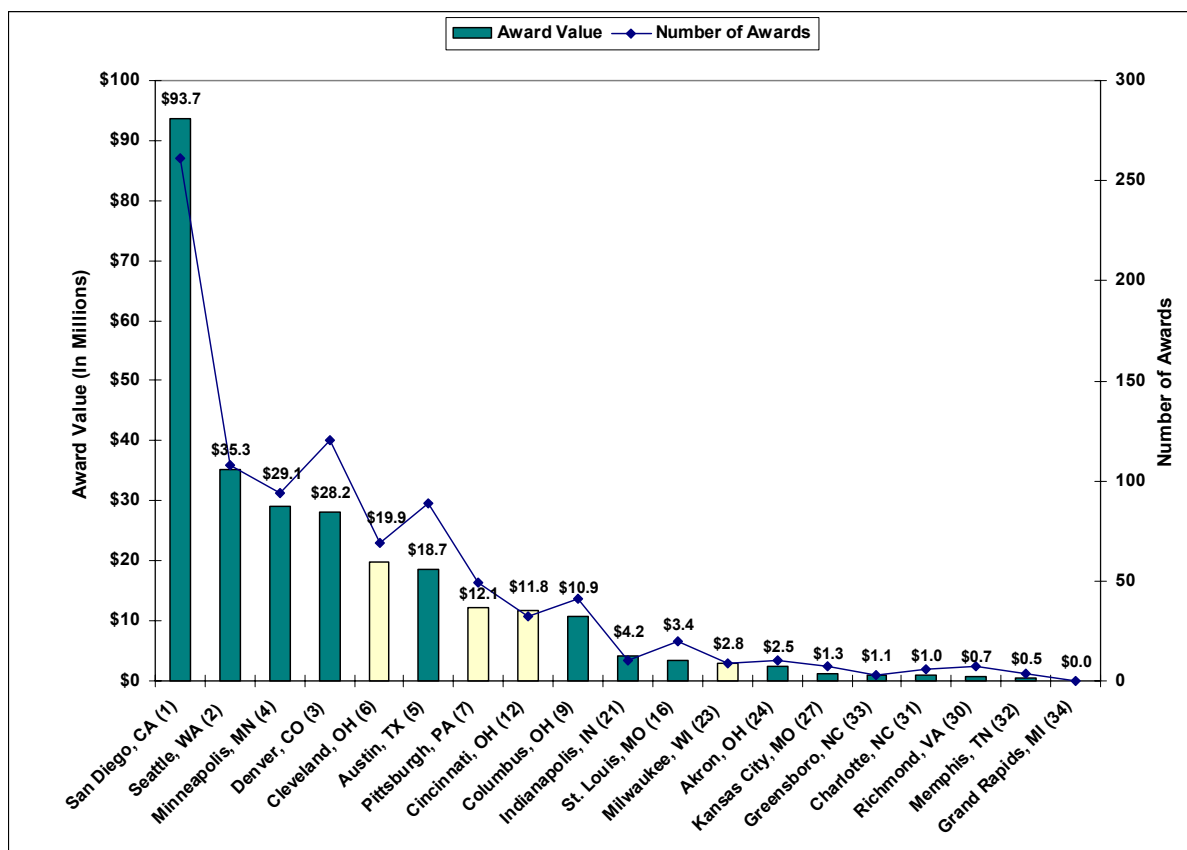
- Medical devices - \$5.5 million (39 percent)
- Engineering services and computing - \$5.2 million (37 percent)
- Advanced materials - \$2.1 million (15 percent)
- Biopharmaceuticals - \$1.3 million (9 percent)

In 2003, Cleveland area companies received three STTR awards totaling \$618,000. This value represents a 3.1 percent share of all SBIR/STTR monies awarded to local companies. STTR award activity in the Cleveland area was less than in neighboring regions. In 2003, Columbus-area companies received seven STTR awards totaling \$1.6 million (14.9 percent share) while companies in Greater Pittsburgh received nine awards amounting to \$1.3 million (11.2 percent share). Out of 36 comparable metro areas, Cleveland ranked 9th in STTR award value in 2003. Akron's overall SBIR/STTR indicator ranking was 23rd based on data from 2000 to 2003. This ranking is significant considering the size of the Akron economy relative to metro areas that reported a lower ranking—Milwaukee (25), Charlotte (30), and Kansas City (31). Two companies in the Akron region each received a \$750,000 SBIR Phase II award in 2003. One company conducts optics research and the other engages in polymer testing and manufacturing.

Looking at Table B-2 (Appendix B), we see very little change in rankings among the top 10 metro areas between 2002 and 2003. In contrast, the lower-ranked metro areas showed a significant change in rankings during this one-year period. In fact, nine of these regions experienced a rank shift of four or more places. However, no observable pattern exists. Geography does not play a role as the affected regions are scattered across the U.S. Data in Table B-1 shows that in some regions the number of awards changed significantly while the total award value was stable. Conversely, in other metro areas, the number of awards and firms remained stable while a substantial change in total award value was seen.

Table B-1 in Appendix B lists SBIR/STTR award data by year and collectively for each comparable metro area. Table B-2 shows the corresponding metro area award rankings by year for 2002 and 2003 in addition to an overall ranking for the period of 2000 through 2003. Figure 1, shown below, compares SBIR/STTR award value and number of awards for selected MSAs in 2003. The Cleveland region received 69 awards totaling nearly \$20 million, which far exceeded the number and value of awards received in Cincinnati, Columbus, or Pittsburgh. The 10 awards captured in the Akron region totaled \$2.5 million. The average value of awards received in the Cleveland area (\$288,500) was similar to the average value across all 36 comparable regions (\$285,200).

Figure 1. SBIR/STTR Award Value and Number of Awards for Selected MSAs, 2003



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh.

The number in parentheses adjacent to the metro area name indicates its 2003 ranking among the 36 comparable regions.

The number above the bar indicates the total value of SBIR/STTR awards given to recipients in the respective metropolitan area during 2003.

Data Source: United States Small Business Administration, <http://tech-net.sba.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

HIGH-TECH EMPLOYMENT

High-tech workers are essential to the creation of wealth in a metropolitan area. They do more than simply apply technical know-how to firm-specific objectives. Rather, they channel new information to generate new knowledge. Knowledge generation can take the form of incremental innovation in processes as well as radical innovation that propels a business into new products and endeavors.

Which occupations constitute the high-tech workforce? One guiding principal in answering this question states that high-tech workers typically utilize new technologies in

performing their work such that the results change the ways in which people live and work. Personnel in these occupations typically require in-depth knowledge of the theories and principals of science, engineering, and mathematics, which is generally acquired through specialized post-high school education in some field of technology. Daniel Hecker's identification of high-tech occupations is gaining broad-based support.⁶ It includes engineers, life and physical scientists, mathematical specialists, engineering and science technicians, computer specialists, and engineering, scientific, and computer managers. These occupation categories served as the basis for data gathering reported on here.⁷

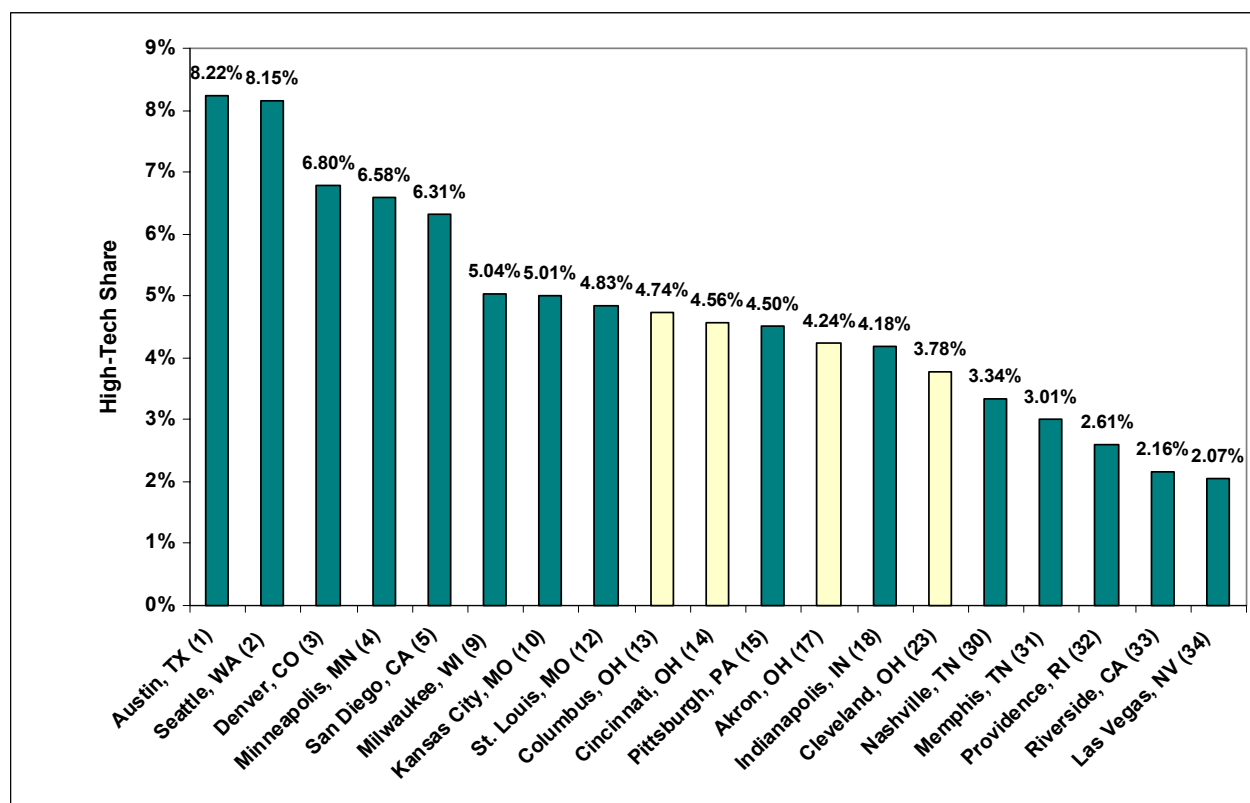
Metro areas with the largest average share of high-tech employment between 2000 and 2004 were Seattle (8.3 percent), Austin (7.9 percent), Denver (6.7 percent), San Diego (5.9 percent), and Minneapolis (5.8 percent). The Cleveland metro area's average high-tech employment share of 3.5 percent over the same four-year period resulted in a ranking of 23 out of 36 comparable metro areas. Cleveland's share is about half that of the top three metro areas. In addition, the Cleveland area reported a decrease in high-tech employment share from 2001 through 2003 with a small increase in 2004. However, its 3.8 percent share in 2004 was the highest recorded over the five-year period. In comparison, Akron reported a larger high-tech share (4.2 percent) than Cleveland in 2004, and it ranked 25th with an average share of 3.4 percent for the period from 2000 through 2004.

Table B-3 in Appendix B lists the high-tech employment share and average share for all comparable metropolitan areas between 2000 and 2004. Table B-4 presents high-tech employment rankings for 2003 and 2004 in addition to an average ranking for years 2000 through 2004. Figure 2, shows the high-tech employment share for selected MSAs in 2004. Cleveland ranks 23rd, lagging slightly behind Columbus, Cincinnati, Pittsburgh, Akron, and several other Midwestern regions.

⁶ Hecker, Daniel. "High Technology Employment: A Broader View," *Monthly Labor Review*. June 1999, pp. 19-28.

⁷ Only a few comments related to high-tech employment are presented in this report for two reasons. First, the workforce share that is considered high-tech has traditionally been very small, typically less than eight percent. The result being that only a very slight variation in high-tech employment share is observed across time within any of the 36 comparable metropolitan areas. Second, the Bureau of Labor Statistics changed its methodology for estimating employment by occupation in 2002. The result being that year-to-year comparisons are unreliable. Economists at the Federal Reserve Bank of Cleveland recommend that analysts average occupation data over a three-year period to create a sufficiently large data set that will provide accurate estimates at a fine geographic level.

Figure 2. High-Tech Employment Share for Selected MSAs, 2004



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh.

The number in parentheses adjacent to the metro area name indicates its 2004 ranking among the 36 comparable regions.

The number above the bar indicates the share of high-tech employment in the respective metropolitan area during 2004.

Data Source: U.S. Department of Labor, Bureau of Labor Statistics, <http://www.bls.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

RESEARCH AND DEVELOPMENT FUNDING

Research and development (R&D) funding is a key driver of economic growth in metropolitan areas. One of the results of R&D is product innovation that enhances the industry's knowledge base and the marketplace as a whole. Metropolitan areas with academic institutions that perform large amounts of R&D are more able to attract and grow technology-based companies. The R&D infrastructure of a region is critical to building a technology-based economy with newly emerging industry clusters and sustaining the vibrancy of existing clusters.

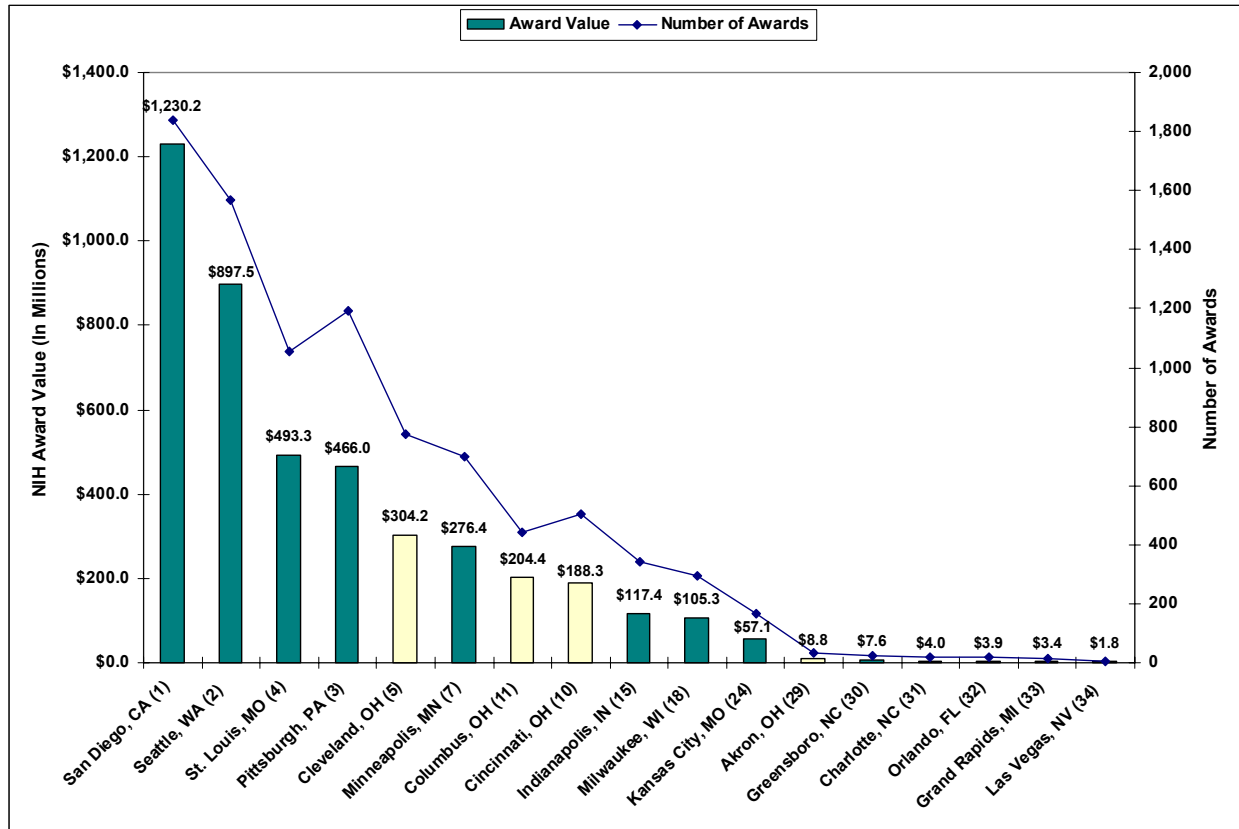
Two sources of R&D funding are reported in this study: 1) awards presented by the National Institutes of Health (NIH) to colleges and universities, independent hospitals, medical schools, and research institutes, and 2) university-related R&D expenditures from all sources as

reported in the Survey of Research and Development Expenditures at Universities and Colleges conducted by the National Science Foundation (NSF). Data collected by the NSF may include some NIH grants awarded to universities. Data for private-sector R&D initiatives is not available at the metropolitan level.

Cleveland ranked fifth out of 36 comparable metropolitan areas in both the number of NIH awards (3,011) and total award value (\$1.034 billion) from 2001 through 2004. In fact, Cleveland area institutions secured more awards than their counterparts in Minneapolis during this time period. Minneapolis area institutions received 2,681 awards valued at \$949 million. The highest-ranking comparable metro areas were San Diego (6,777 awards, \$3.7 billion), Seattle (5,936 awards, \$3.0 billion), Pittsburgh (4,268 awards, \$1.6 billion), and St. Louis (4,062 awards, \$1.6 billion). These top ranking metro areas all reported a gradual increase in the number of awards and award value from 2001 through 2004. Generally speaking, a very small number of institutions are the dominant award recipients in each metro area. For example, during 2004 researchers at Case Western Reserve University and the Cleveland Clinic accounted for 90 percent of award recipients and 82 percent of total award value in the Cleveland metro area. This fact may help explain why there is almost no variation in metro area rankings between 2003 and 2004 or for the time period between 2001 and 2004.

Table B-5 in Appendix B lists NIH award data by year and collectively for each comparable metro area from 2001 through 2004. Table B-6 shows award rankings by metropolitan area for 2003 and 2004 and an overall ranking for the period from 2001 through 2004. Figure 3 shows a comparison of total NIH award value and the number of awards for selected MSAs in 2004. The Cleveland region ranked 5th that year, well ahead of Columbus and Cincinnati, but slightly behind Pittsburgh. With a ranking of 29, Akron placed higher than several larger metropolitan areas.

Figure 3. NIH Award Value and Number of Awards for Selected MSAs, 2004



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh.

The number in parentheses adjacent to the metro area name indicates its 2004 ranking among the 36 comparable regions.

The number above the bar indicates the total value of NIH awards given to researchers in the respective metropolitan area during 2004.

Data Source: National Institutes of Health, <http://www.nih.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

Four Cleveland area-colleges and universities averaged \$229 million annually in R&D expenditures for the period from 2000 through 2003.⁸ During this time period, the Cleveland metro area ranked 10th in total R&D expenditures (\$916.5 million) by academic institutions among the 36 comparable metropolitan regions (Table B-8, Appendix B). The top five metro areas included San Diego (\$2.5 billion), Seattle (\$2.4 billion), Pittsburgh (\$2.1 billion), Minneapolis (\$1.9 billion), and St. Louis (\$1.9 billion). An upward trend was reported in R&D spending across all 36 metro areas, averaging 34 percent from 2000 through 2003. In

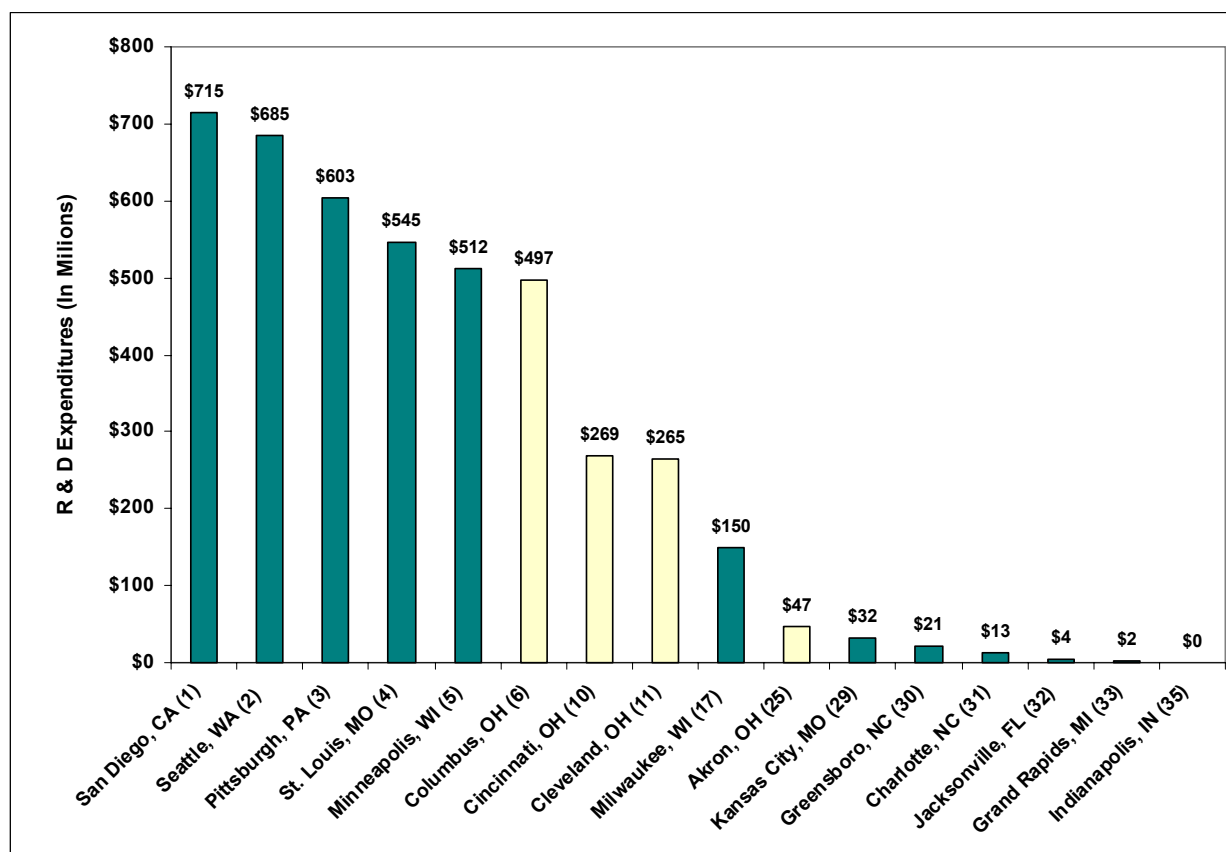
⁸ Colleges and universities in the Cleveland metro area reporting R&D expenditures include Case Western Reserve University, Cleveland State University, John Carroll University, and Oberlin College.

comparison, R&D spending in Cleveland increased by 29 percent. Between 2002 and 2003, all comparable metro areas showed a small increase in R&D expenditures averaging 10.2 percent that resulted in minor ranking variations.

Table B-7 in Appendix B summarizes university R&D expenditures for all comparable metropolitan areas between 2000 and 2003. Table B-8 lists expenditure rankings by metro area for 2002 and 2003. In addition, overall rankings covering the period from 2000 through 2003 are also given. Figure 4 presents a comparison of university R&D expenditures for selected MSAs in 2003. The Cleveland region ranked 11th that year. While Akron ranked 25th. The Cleveland ranking is high, given that its primary research university is considerably smaller than those in many of the comparable metro areas.⁹

⁹ It should be noted that the manner in which NSF reports university expenditures strongly impacts the regional rankings. In many cases, NSF reports expenditures for university systems, rather than the campuses that comprise the system. In such cases it appears that all expenditures flow from the flagship campus or the location of the system's administrative offices, although a portion of the research dollars are expended by campuses in other metro areas. In this analysis, we are aware that this leads to an underreporting of university research expenditures in the Denver, Indianapolis, and Memphis metropolitan areas. Other metro areas may be affected as well.

Figure 4. University R&D Expenditures for Selected MSAs, 2003



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh.

The number in parentheses adjacent to the metro area name indicates its 2003 ranking among the 36 comparable regions.

The number above the bar indicates the total monies expended for research and development by universities in the respective metropolitan area during 2003.

Data Source: National Science Foundation, <http://caspar.nsf.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

PATENTS

The majority of patents granted by the U.S. Patent and Trademark Office (USPTO) are utility patents.¹⁰ A patent recognizes the viability of a research discovery and sets the stage for possible commercialization. The number of patents issued serves as a proxy for the level of research and innovation in a metropolitan area. A large number of patents indicate the potential for significant product innovation activity and an entrepreneurial environment. The capacity of firms to develop new products and processes determines their competitive advantage and ability to pay higher wages.

In this analysis, we look at both the number of utility patents granted and the number of inventors associated with those patents.¹¹ The top five comparable metro areas for patent activity from 2000 through 2004 are Minneapolis, San Diego, Austin, Portland, and Seattle.¹² Cleveland ranked eighth, ahead of Pittsburgh and Columbus (ninth and 16th, respectively), but behind Cincinnati which ranked seventh.

Looking across all comparable metro areas, we see a steady upward trend in patent activity between 2000 and 2003 (see Table B-9, Appendix B) followed by a drop in 2004—five percent in the number of patents granted and 3.4 percent in the number of inventors. According to the U.S. Patent and Trade Office (USPTO), “a decline in the metropolitan statistical area patent count during this period (2004) doesn’t seem unreasonable. Please note that this decline may be due to administrative reasons at PTO rather than due to an actual decline in inventiveness since patent applications have continued to increase in recent years.” The Cleveland metro area did not follow the national trend. The local region reached its peak in patent activity in 2001 followed by a gradual downward trend reaching a low point in 2004.

Little change is seen in patent activity rankings (see Table B-10, Appendix B) between 2003 and 2004. In fact, only five of the 36 comparable metro areas reported a rank change of more than two places—Canton, Greensboro, Louisville, Nashville, and Virginia Beach. The biggest rank shift was found in Virginia Beach which slipped from 28th to 33rd place.

¹⁰A utility patent is granted to anyone who invents or discovers any new, useful, and non-obvious process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof.

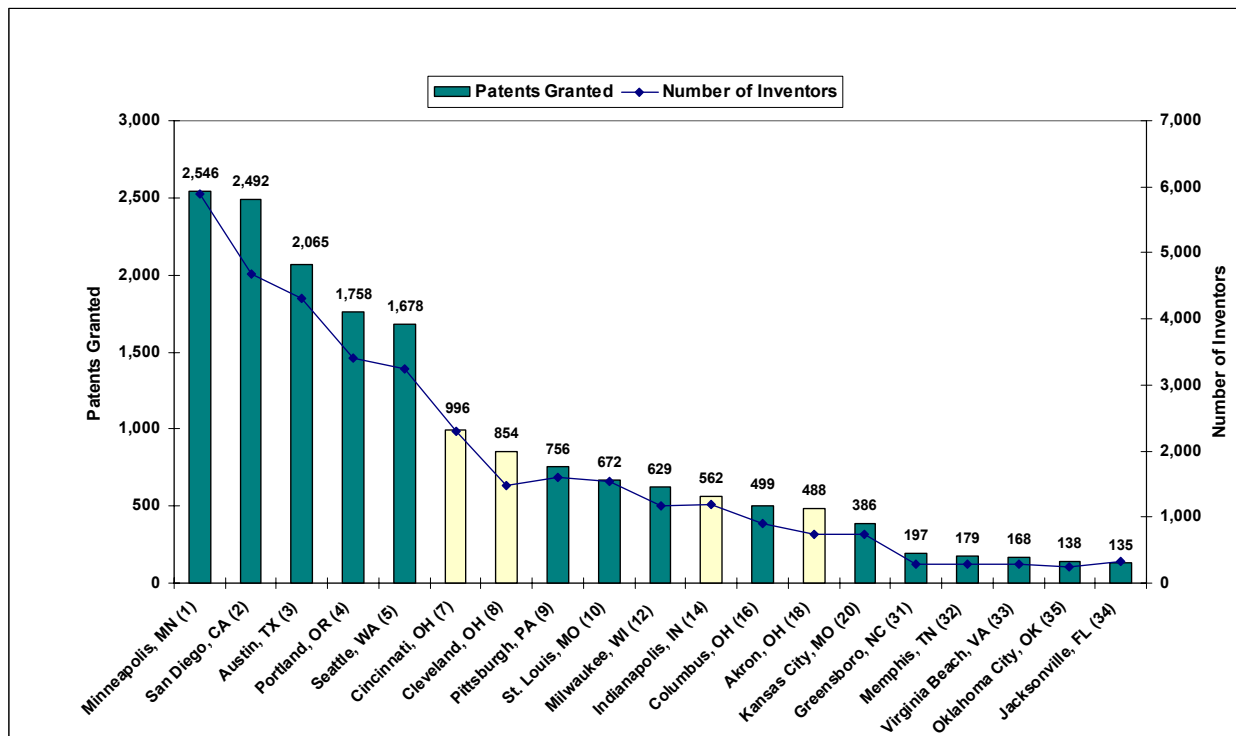
¹¹In this section, whenever the discussion focuses on number of patents and number of inventors simultaneously, we use the term patent activity.

¹²There is no uniform methodology found in the literature for assigning patent statistics to a metropolitan area. The protocol used in this study is best described by an example. Assume Patent # 111111 was granted in September 2004. The patent had six inventors associated with it. Three were from Cleveland and one each were from Columbus, Buffalo, and Toronto, Canada. The Cleveland, Columbus, and Buffalo metro areas were each credited one patent. However, the Cleveland metro area was credited with three inventors whereas the Columbus and Buffalo metro areas were credited with one inventor each. None of the metro areas received credit for the inventor residing in Toronto, Canada.

Another way of measuring regional innovation or, more specifically, how productive a metro area is in establishing the viability of its R&D efforts is to analyze the ratio of patents granted to number of employees in the metro area. The Federal Reserve Bank of San Francisco (FRBSF) used this measure in a study that examined the relationship between dollars spent on R&D and patents granted.¹³ According to the FRBSF, patents are thought of as the fruition of R&D spending and as measures of technological progress. For this analysis, we also ranked metro areas using patents granted per 1,000 employees and found the results closely follow the rankings for patent activity as shown in Table B-10.

Figure 5 shows patent activity for selected metro areas in 2004. Cleveland ranked 8th, lagging just behind Cincinnati, but placing ahead of Pittsburgh and Columbus. Akron ranked 18th, comparing favorably with much larger metro areas.

Figure 5. Utility Patents Granted and Number of Inventors for Selected MSAs, 2004



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh.

The number in parentheses adjacent to the metro area name indicates its 2004 ranking among the 36 comparable regions.

The number above the bar indicates the number of patents granted in the respective metro area during 2004.

Data Source: United States Patent and Trade Office, <http://www.uspto.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

¹³ Wilson, D. (2003). *Are we running out of new ideas? A look at patents and R&D*. Federal Reserve Bank of San Francisco Economic Letter, Number 2003-26.

ENTREPRENEURSHIP INDEX

An entrepreneur is a person who effectively and efficiently commercializes innovations.¹⁴ These innovations can take on several forms including the introduction of a new product, service, or standard of quality, the introduction of a novel method of production, or the opening of a new market. Innovation is the cornerstone of entrepreneurship as opposed to the mere setting up of another new enterprise without implementing changes or adding improvements to the products and services provided and/or its business processes.

The entrepreneurship index aggregates key variables for each of the 36 comparable metropolitan areas into a single metric. This provides a simple way to benchmark the Cleveland area (and other metro areas in Northeast Ohio) against regions across the U.S. The index is comprised of three indicators, each with one or more variables. Table 3 lists the indicators, associated variables, and the time period covered by the analysis.

Table 3. Entrepreneurship Indicators and Variables

Indicator	Variables	Time Period
Venture Capital	Number of Deals Number of Companies Awarded VC Monies Total Investment	2000-2004
Initial Public Offerings	IPOs per Year	2000-2004
New Firm Births	New Firm Births per 1,000 Labor Force Change in New Firm Births	1998-2002

Constructing the entrepreneurship index is a two-step process. First, a sub-index is calculated for each indicator; second, the sub-indices are combined to create the overall index for each metro area together with its associated ranking. Appendix C provides additional details. The aggregated (overall) index and each of the sub-indices have a range from 1.00 (worst) to 10.00 (best). Only data from the latest available year were used in the calculations.

Table 4 shows the overall index and ranking for each of the 36 comparable metro areas. It also provides rankings by metro area for each of the three entrepreneurship indicators. Table C-2 in Appendix C includes the sub-indices values for each indicator. The top five metro areas

¹⁴NorTech Early Stage Capital Task Force (September 2005). Towards a self-sustaining venture capital continuum in Northeast Ohio. [Electronic version]. www.nortech.org.

for entrepreneurship in order of rank are San Diego, Seattle, Denver, Austin, and Jacksonville. The first four of these metro areas are among the leading five regions in innovation.

Table 4. Entrepreneurship Index

Metropolitan Statistical Area	Entrepreneurship Index		Entrepreneurship Indicator Rankings		
	Index	Overall Rank	Venture Capital	Initial Public Offering	Firm Births
Akron, OH	1.38	34	30	26(tied)	32
Austin, TX	4.77	4	3	3(tied)	25
Buffalo, NY	2.97	18	19	26(tied)	11
Canton, OH	1.37	35	35	26(tied)	31
Charlotte, NC	1.85	29	10	26(tied)	28
Cincinnati, OH	1.82	30	12	14(tied)	33
Cleveland, OH	2.60	23	16	14(tied)	21
Columbus, OH	1.92	28	24	8(tied)	34
Denver, CO	5.96	3	5	3(tied)	2
Grand Rapids, MI	3.27	16	33	26(tied)	6
Greensboro, NC	1.46	32	29	26(tied)	30
Indianapolis, IN	3.46	13	21	8(tied)	12
Jacksonville, FL	4.29	5	27	8(tied)	3
Kansas City, MO	2.85	21	9	14(tied)	19
Las Vegas, NV	3.66	10	15	6(tied)	14
Louisville, KY	1.40	33	23	14(tied)	36
Memphis, TN	1.30	36	31	14(tied)	35
Milwaukee, WI	2.08	27	26	14(tied)	26
Minneapolis, MN	4.18	7	4	3(tied)	24
Nashville, TN	3.18	17	8	14(tied)	17
Oklahoma City, OK	2.93	20	28	26(tied)	10
Orlando, FL	4.22	6	17	26(tied)	1
Phoenix, AZ	2.97	19	13	8(tied)	20
Pittsburgh, PA	2.82	22	6	8(tied)	27
Portland, OR	3.65	11	7	8(tied)	16
Providence, RI	2.27	26	14	26(tied)	23
Richmond, VA	3.29	15	34	14(tied)	8
Riverside, CA	2.37	25	32	26(tied)	18
Sacramento, CA	3.57	12	22	14(tied)	7
San Antonio, TX	3.42	14	20	14(tied)	9
San Diego, CA	9.31	1	1	1	5
Seattle, WA	6.66	2	2	2	15
St. Louis, MO	3.75	9	11	6(tied)	13
Tampa, FL	3.84	8	18	14(tied)	4
Virginia Beach, VA	2.42	24	25	14(tied)	22
Youngstown, OH	1.52	31	36	26(tied)	29

Index values for Buffalo and Phoenix are the same at the two-decimal place level. However, at the three-decimal place level the associated rank order is correct.
 Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Cleveland ranked 23rd overall in entrepreneurship. This comes as no surprise to many observers considering the region's reputation as one that is strong in research but lacking the entrepreneurial spirit, at least during the past few decades. Regardless of its reputation, pockets of entrepreneurial activity already exist and are growing in the region. In fact, concentrated efforts by Case Western Reserve University, Cleveland State University, The University of Akron, NASA Glenn Research Center, and intermediaries such as NorTech, JumpStart, BioEnterprise, and the Ohio Aerospace Institute in the area of technology commercialization are strengthening local entrepreneurship. However, the results are not yet evident in the data.

Among the entrepreneurship indicators, Cleveland's strength may lie in venture capital (VC). Out of the 36 comparable metro areas, Cleveland was strong in deal flow and number of companies receiving VC monies than in total investment. This can be viewed as a positive because the wide distribution of VC monies indicates strong entrepreneurial activity. Looking at the time period from 2000 through 2004, Cleveland ranked 11th in the number of deals, 12th in the number of companies receiving VC monies, but 18th in total VC investment.

Cleveland's lowest ranking was in firm births (21st). At issue with this indicator is the time frame for which data was collected—the end of the economic expansion seen in the 1990s to immediately after the end of the 2001 recession. (A discussion related to the effect of the business cycle on the firm birth indicator can be found in the section titled Firm Births.)

As expected, the other Northeast Ohio metro areas (Akron, Canton, and Youngstown) reported lower entrepreneurship rankings than Cleveland—34th, 35th, and 31st, respectively. These regions traditionally score lower because they have much smaller economies than the other comparable metro areas. Youngstown's rank of 31 can be attributed to the effect of the business cycle on the firm birth indicator, which will be discussed later in this report.

The following sections provide detailed analyses of the three entrepreneurial indicators. Specifically, we will discuss each indicator, explain why it is a useful metric, and highlight important findings for select metro areas. Entrepreneurship data tables for all 36 comparable metropolitan areas are found in Appendix B.

VENTURE CAPITAL

Venture capital (VC) is money invested in new and unproven businesses that helps stimulate growth at the critical early stages of a company's development. Many of these new businesses require large amounts of external financing for an extended period before they can tap traditional debt or equity markets. The majority of venture investments are follow-on funding that investors place in business sectors where they expect rapid growth.¹⁵

Venture capitalists have a history of funding new technologies that are risky investments but are expected to achieve above-average returns. They become involved as board members and management advisors, suggesting strategic partnerships and helping to refine business plans. Venture capitalists look for high rates of return over a multi-year period with an exit strategy culminating in a targeted liquidity event such as an initial public offering or a merger or acquisition by an established firm.

VC activity is an excellent way to gauge investors' confidence in the innovative thinking and entrepreneurial infrastructure found within a region. Those regions with high concentrations of venture capital are seen as having a robust entrepreneurial climate.

Venture capital investing dropped precipitously across all comparable regions following the dot.com collapse that began in late 2000, reaching a low point in 2003. In 2000, 1,681 deals valued at \$19.3 billion were reported. In sharp contrast, only 719 deals valued at \$4.2 billion were seen in 2003. VC activity rebounded slightly in 2004 with 748 deals valued at \$5.9 billion. The top five comparable metro areas between 2000 and 2004 were San Diego, Seattle, Austin, Denver, and Minneapolis.

In the Cleveland metro area, 27 deals valued at \$316 million were reported in 2000, decreasing yearly to 13 deals valued at \$20 million in 2004. Out of the 36 metro areas, Cleveland ranked 15th in total VC investment in 2000 but fell to 27th place by 2004. Cleveland ranked 13th in overall VC activity between 2000 and 2004 when taking into account deal flow, the number of businesses in which VC monies were invested, and the total value of the investments.

Between 2003 and 2004, deal flow and the number of companies receiving VC monies showed only a small increase—four percent and eight percent, respectively—across the 36 metro areas. In contrast, the monies invested by venture capitalists increased by over 41 percent, or \$1.7 billion. However, over 75 percent of these investments were made in only four metro areas—Austin, Las Vegas, San Diego, and Seattle.

¹⁵ Follow-on funding refers to monies the entrepreneur taps into after exhausting his/her own financial resources and pre-seed and seed financing.

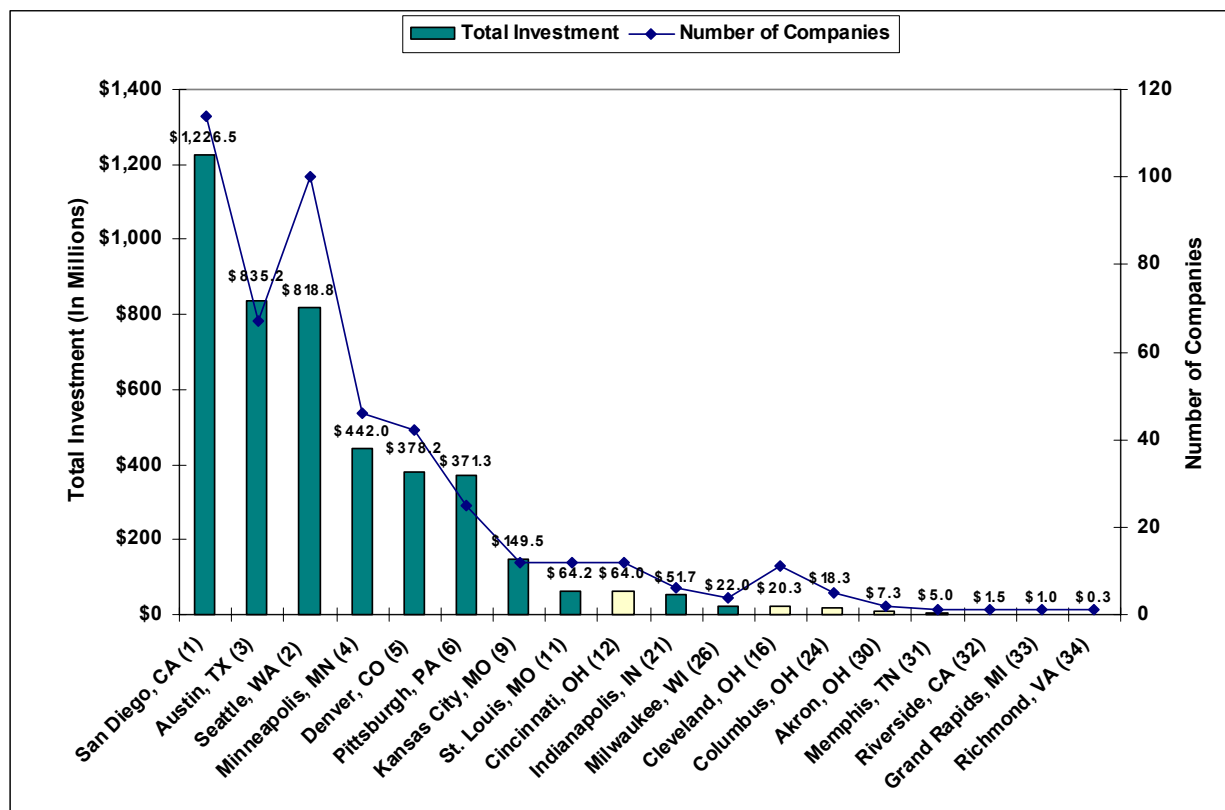
Many observers believe that venture capitalists are more attracted to Pittsburgh-based start-ups than those in Cleveland. Data reported by Thomson Financial confirms this thinking. Between 2000 and 2004, venture capitalists invested \$2.3 billion (225 deals) in the Pittsburgh metro area compared to \$498 million (95 deals) in Cleveland. In fact, Pittsburgh ranked number six in overall VC activity between 2000 and 2004. This suggests that in Pittsburgh there may be more entrepreneurs ready to commercialize their innovations than found in Cleveland. According to David Morgenthaler, Morgenthaler Ventures, “VC follows innovations, it does not create them.”¹⁶ Alternatively, there may be a larger pool of pre-seed and seed capital available to Pittsburgh entrepreneurs than exists in Cleveland. According to the NorTech Early Stage Capital Task Force, “as a result of insufficient pre-seed and seed capital, many quality investment opportunities remain unfunded or funded at lower levels than required to accelerate growth, leading to the appearance of a region that is lacking in innovative new ideas, when quite the opposite is actually the case. Good ideas are dying locally (or in some cases moving elsewhere) due to a lack of adequate local funding sources.”¹⁷

Table B-11 in Appendix B summarizes VC activity by year and collectively for all comparable metropolitan areas between 2000 and 2004. Table B-12 shows VC rankings by metro area for 2003 and 2004. It also lists overall rankings for the time period 2000 through 2004. Figure 6 compares VC investment and the number of companies in which monies were invested for selected MSAs in 2004. Cleveland ranked 16th, and the chart illustrates the large disparity in VC investment within the selected metro areas. Venture capitalists are clearly drawn to high growth areas, although Pittsburgh also fares well in attracting investment.

¹⁶ David T. Morgenthaler’s speech to Cuyahoga County Commissioners Blue Ribbon Economic Development Task Force, July 27, 2004.

¹⁷ NorTech Early Stage Capital Task Force (September 2005). Towards a self-sustaining venture capital continuum in Northeast Ohio. [Electronic version]. www.nortech.org.

Figure 6. Venture Capital Investment and Number of Companies for Selected MSAs, 2004



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh. The number in parentheses adjacent to the metro area name indicates its 2004 ranking among the 36 comparable regions.

The number above the bar indicates total venture capital monies invested in the respective metropolitan area during 2004.

Data Source: Thomson Financial Venture Economics

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

INITIAL PUBLIC OFFERING

An initial public offering (IPO) is the sale or distribution of a company's stock to the public for the first time. It indicates strong growth in the company and allows that firm to access public capital markets that provide leverage and accelerate growth. An IPO is a liquidity event for an entrepreneur and early investors, such as venture capitalists. Some of the proceeds from going public are returned to early investors while other proceeds are reinvested in new ideas and opportunities within the firm. IPOs are an important measure of the regional entrepreneurial climate because they indicate the degree to which a region is producing companies that investors regard as durable (i.e., having long-term and significant growth potential).

Calendar year 2004 saw more activity in the IPO market within the 36 comparable metro areas than in the preceding four years. In fact, more companies went public in 2004 than in the previous three years combined—59 vs. 53, respectively. Of the 242 companies that went public across the U.S. in 2004, 24 percent are headquartered in metro areas included in this study. The total market value of these 59 companies at the end of 2004 was \$59.3 billion or 23 percent of the market value of all companies that went public in 2004.

Focusing on the regions included in this study, the majority of IPO activity is limited to a small number of metro areas. Between 2000 and 2004, almost 60 percent of the companies that went public were found in only six of 36 metro areas—San Diego, Seattle, Denver, Minneapolis, Phoenix, and Austin. The Northeast Ohio region (Akron, Canton, Cleveland, and Youngstown) saw only two companies go public between 2000 and 2004.¹⁸

Following is an industry distribution for the 59 IPOs issued in 2004:

- Healthcare - 14 companies
- Real estate investment trusts -10 companies
- Consumer cyclicals - 9 companies
- Technology - 7 companies
- Financial - 7 companies
- Capital goods - 4 companies
- Consumer staples - 4 companies
- Energy - 2 companies
- Communications - 1 company
- Transportation - 1 company

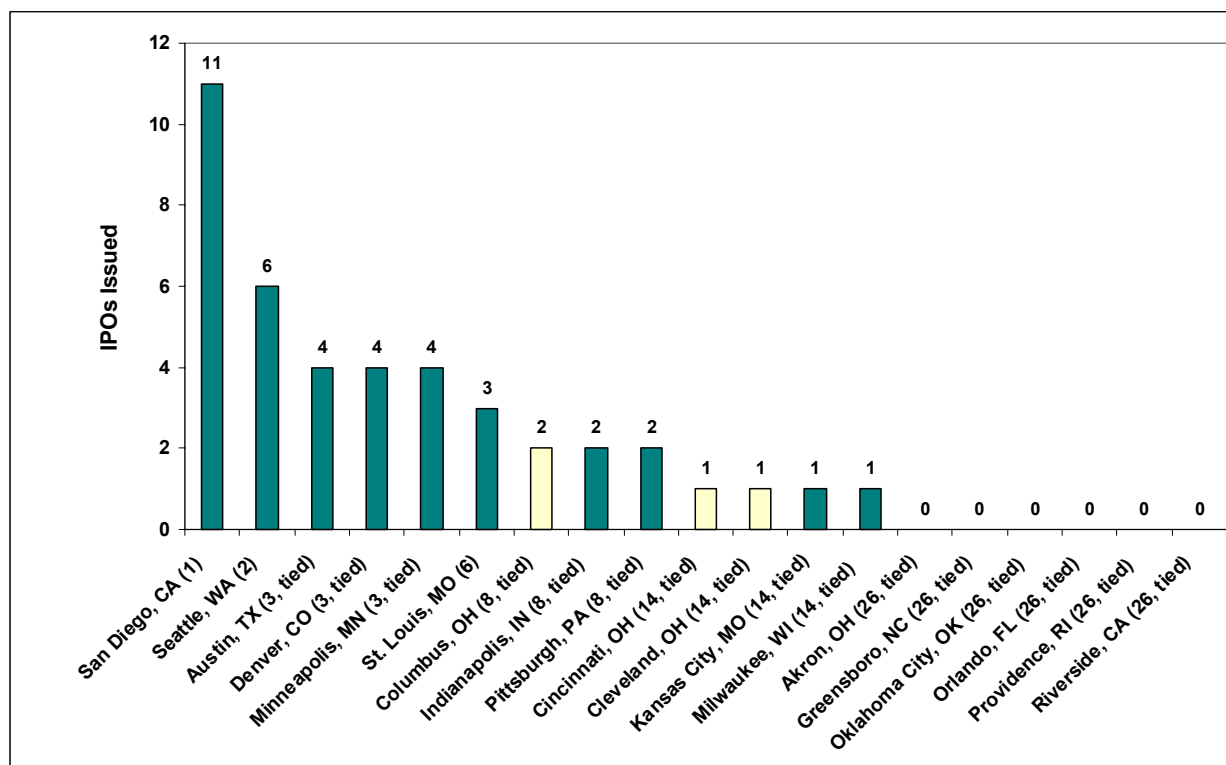
Although the pace of IPO activity accelerated between 2003 and 2004, five metro areas accounted for 54 percent of new IPOs: San Diego and Seattle each had an increase of six, while Austin, Minneapolis, and St. Louis all showed an increase of three. In contrast, metro areas across the state of Ohio collectively reported a net increase of only three IPOs between 2003 and 2004.

Table B-13 in Appendix B summarizes IPO activity for all comparable metropolitan areas between 2000 and 2004. Table B-14 ranks metro areas by number of IPOs for 2003,

¹⁸ The International Steel Group (ISG) became a publicly held company on December 12, 2003. After acquiring the steelmaking assets of the bankrupt LTV Corporation, ISG moved the corporate headquarters from downtown Cleveland to Richfield in northern Summit County. ISG was purchased by Mittal Steel in 2005 and subsequently moved their headquarters to Chicago. U-Store-It Trust, located in Middleburg Heights, became a publicly held company on October 22, 2004. The company focuses on the development and operation of self-storage facilities across the U.S. It currently manages 202 facilities in 21 states and employs 460 persons.

2004, and the period 2000 through 2004. Figure 7 shows the number of IPOs issued by companies for selected MSAs in 2004. Only one IPO was issued in the Cleveland area that year. The same was true for Cincinnati, but two IPOs were issued in Columbus.

Figure 7. Number of IPOs Issued for Selected MSAs, 2004



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh. The number in parentheses adjacent to the metro area name indicates its ranking among the 36 comparable regions. The number above the bar indicates the number of IPOs that were issued by companies located in the respective metropolitan area during 2004.

Data Source: IPO Monitor, <http://www.ipomonitor.com>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

FIRM BIRTHS

The number of new firm births is perhaps the most popular measure of entrepreneurship in regional economic research.^{19, 20} It is conceptually well understood, relatively easy to

¹⁹Advanced Research Technologies, LLC, Powell, OH, and FINTEL, LLC, Madison, WI. (2005). *The innovation-entrepreneurship nexus: A national assessment of entrepreneurship and regional economic growth and development*.

measure, and can be adjusted to control for size differences of metropolitan areas. In this study, population differences are controlled for by dividing the number of new firm births by the size of the labor force in each metro area.²¹ The down side in using new firm births as a measure of entrepreneurship is that the analyst does not know how many of the new enterprises qualify as actual entrepreneurial ventures. Therefore, caution is advised when interpreting the data.

The percentage change in the number of new firm births represents the extent to which a region's level of entrepreneurship is growing or declining and at what rate. If entrepreneurship has a positive impact on regional economic growth, then a region's ability to accelerate its level of entrepreneurial activity over time can be a particularly effective competitive advantage. Stability in this measure over time reflects a region's ability to sustain its competitive advantage in the creation and growth of new ventures.

Across the 36 comparable metropolitan areas, the change in new firm births per 1,000 labor force decreased by 6.2 percent, on average, between 1998/99 and 2001/02.²² In fact, during this time period only five comparable metro areas (Buffalo, Grand Rapids, Jacksonville, Orlando, and San Antonio) showed a positive change in new firm births. The reason for this decline can be attributed to the business cycle. In 1998/99, the U.S. economy was still in a period of expansion and the dot.com phenomenon was going strong. In contrast, during the first quarter of 2001, the U.S. entered a recessionary period and the dot.com bubble had burst. Many areas, like Seattle, could not sustain the extraordinary growth in start-ups experienced in the late 1990s during the recession and a production decline that began in September 2000

²⁰For this analysis, new firm births are limited to single establishment (non-affiliated) enterprises. For example, if a person opens an insurance brokerage in a metropolitan area, that office is designated as a single establishment enterprise and would be counted as a new firm birth. On the other hand, if a major insurance company opens a sales office in a metro area, that office would be considered a multi-establishment (affiliated) enterprise and would not be counted as a new firm birth. By definition, a firm birth is a single establishment enterprise that has zero employment in the first quarter of the initial year and positive employment in the first quarter of the subsequent year. Data used in this analysis is from the U.S. Census Bureau's Longitudinal Establishment and Enterprise Micro Data (LEEM) file.

²¹Two methods have been adopted to compare firm birth rates across regional markets. The first standardizes the number of entrants relative to the number of establishments already in existence. This method is termed the ecological approach because it considers the amount of start-up activity relative to the size of the existing population of businesses. The second method, which can be characterized as the labor market approach, is to standardize the number of new firms with respect to the size of the labor force. The labor force approach has a particular theoretical appeal in that it is based on the theory of entrepreneurial choice. That is, some worker starts each new business. The labor market approach implicitly assumes that the entrepreneur starting a new business is in the same labor market within which that new establishment operates. For more information, see Armington, C. & Acs, Z.J. (2002). "The determinants of regional variation in new firm formation." *Regional Studies*, Vol. 36.1, pp. 33-45.

²²New firm births in 1998/99 should be interpreted as follows: single establishment firms that had zero employment during the first quarter of 1998 and positive employment during the first quarter of 1999. Other calendar year designations, e.g., 2001/02 have a similar interpretation.

(see National Bureau of Economic Research, <http://www.nber.org>). The result for areas like Seattle were double-digit declines in firm births between 1998/99 and 2001/02. However, Seattle still outpaced places like Grand Rapids in the number of new firm births during 2000/01 and 2001/02.

Similar results are seen when comparing new firm births between 2000/01 and 2001/02. During this period, 29 out of 36 metro areas reported declines. The only metro areas showing increases were Grand Rapids, Indianapolis, Jacksonville, Kansas City, Orlando, Sacramento, and St. Louis. Austin posted the biggest decline at more than 12 percent. Cleveland, Columbus, Cincinnati, and Pittsburgh showed similar drops averaging 4.5 percent.

The highest-ranking comparable metro areas in new firm births (in order of rank) include Denver, Orlando, San Diego, Jacksonville, and Tampa. Note that three of these areas are located in the state of Florida. Since Florida is known as a year-round vacation destination, some observers may question the number of new firm births found in the state that are real entrepreneurial ventures as opposed to the setting up of another new enterprise.

The Cleveland metro area ranked 25th in new firm births during 2000/01, 26th in new firm births during 2001/02, and 13th in the change in new firm births between 1998/99 and 2001/02. Cleveland's overall new firm birth ranking was 26th out of 36 comparable metro areas. This low ranking is not surprising given the widely held belief that individuals and businesses in the Cleveland area are much better at innovating than in commercializing their innovations. However, Cleveland did rank higher than Cincinnati, Columbus, or Pittsburgh in the new firm birth indicator. Columbus and Cincinnati reported overall rankings of 33rd and 35th, respectively. Pittsburgh was slightly higher at 29th. See Table B-16.

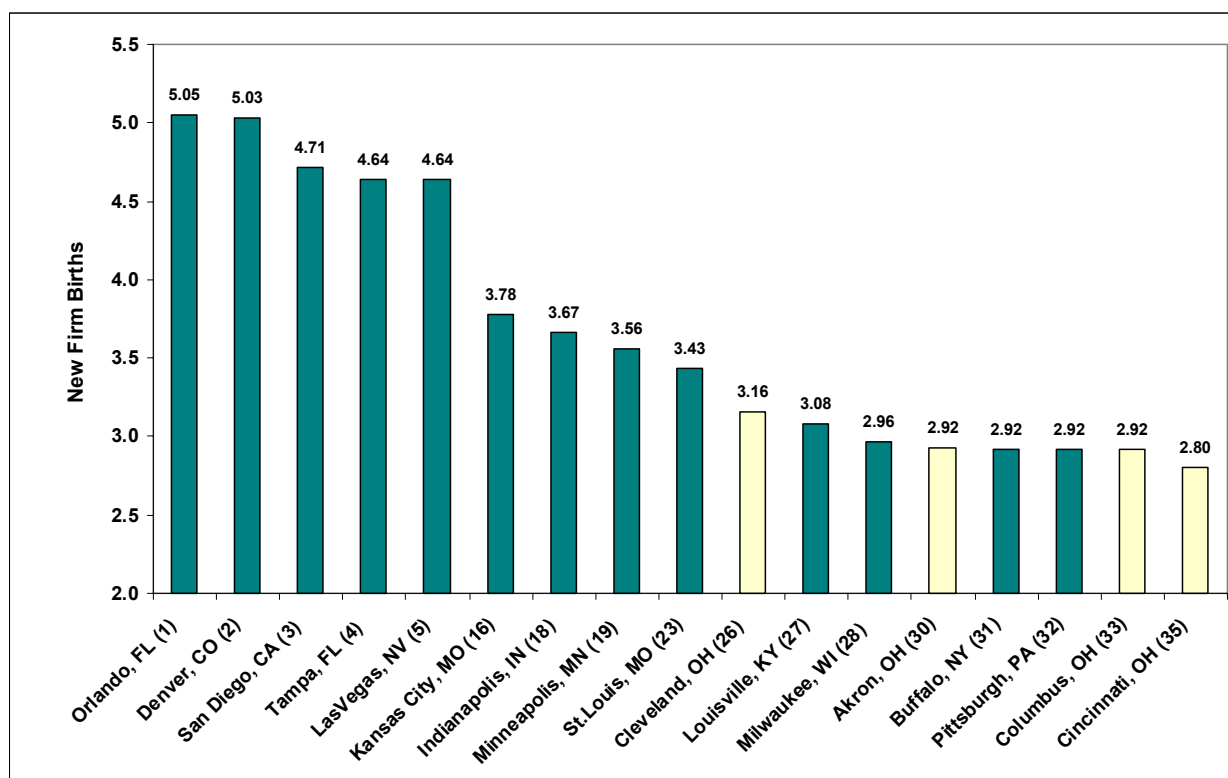
During 2001/02, three industry sectors accounted for 40 percent of all new firm births in each of the top five metro areas (Orlando, Denver, San Diego, Jacksonville, and Tampa) as well as in Cleveland, Columbus, Cincinnati, and Pittsburgh. These industries were construction (NAICS 23), retail trade (NAICS 44-45), and professional, scientific, and technical services (NAICS 54). Other services (NAICS 81) was also among the top industry sectors in new firm births in six of the nine metro areas.

Manufacturing's (NAICS 31-33) share of new firm births was relatively small across the top five metro areas and in Cleveland, Columbus, Cincinnati, and Pittsburgh. The Cleveland metro area reported the highest share of manufacturing starts at 4.3 percent. The second highest was San Diego (4 percent). The lowest share of manufacturing-related firm births was found in Jacksonville (2.4 percent). Interestingly, Advanced Research Technologies (see

footnote 3) found that the most entrepreneurial regions in the U.S. tended away from manufacturing as an economic base.

Table B-15 in Appendix B summarizes new firm birth activity for all comparable metropolitan areas. Table B-16 lists firm birth rankings in the comparable metro areas. Figure 8 shows a comparison of single establishment new firm births per 1,000 labor force for selected MSAs in 2001/2002. The high growth regions again rank the best.

Figure 8. New Firm Births per 1,000 Labor Force for Selected MSAs, 2001/2002



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh.

The number in parentheses adjacent to the metro area name indicates its 2001/2002 ranking among the 36 comparable regions.

The number above the bar indicates the number of single establishment new firm births per 1,000 labor force in the respective metropolitan area during 2001/2002.

Data Source: U.S. Census Bureau – Longitudinal Establishment and Enterprise Micro Data (LEEM) file.

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

BUSINESS COSTS

Although business costs are not usually associated with innovation or entrepreneurship, this economic indicator is a very important measure of the regional business climate. Companies located in a lower business cost region are more competitive than those in a higher cost region if everything else is equal between the two regions. The result being that an entrepreneur may find it more attractive to set up shop in a lower cost metro area.

This report utilizes the 2004 *North American Business Cost Review* (NABCR), produced by Economy.com, as the basis for comparing the 36 metropolitan areas. NABCR's total business cost index is derived from four components: labor, energy, state and local taxes, and office rent. The U.S. index equals 100 for total business cost and each of the four components. For a specific metropolitan area, if any of its indices is greater than 100, then the total cost or component cost is greater than the U.S. average. If an index is less than 100, then the total cost or component cost is less than the U.S. average. As an example, the labor index for the Cleveland metropolitan area equals 111.6. This means that labor costs in the Cleveland area are 11.6 percent higher than the U.S. average. By comparison, the labor index in the Portland (OR) region equals 80.6. This means that labor costs in the Portland area are about 19 percent lower than the U.S. average.

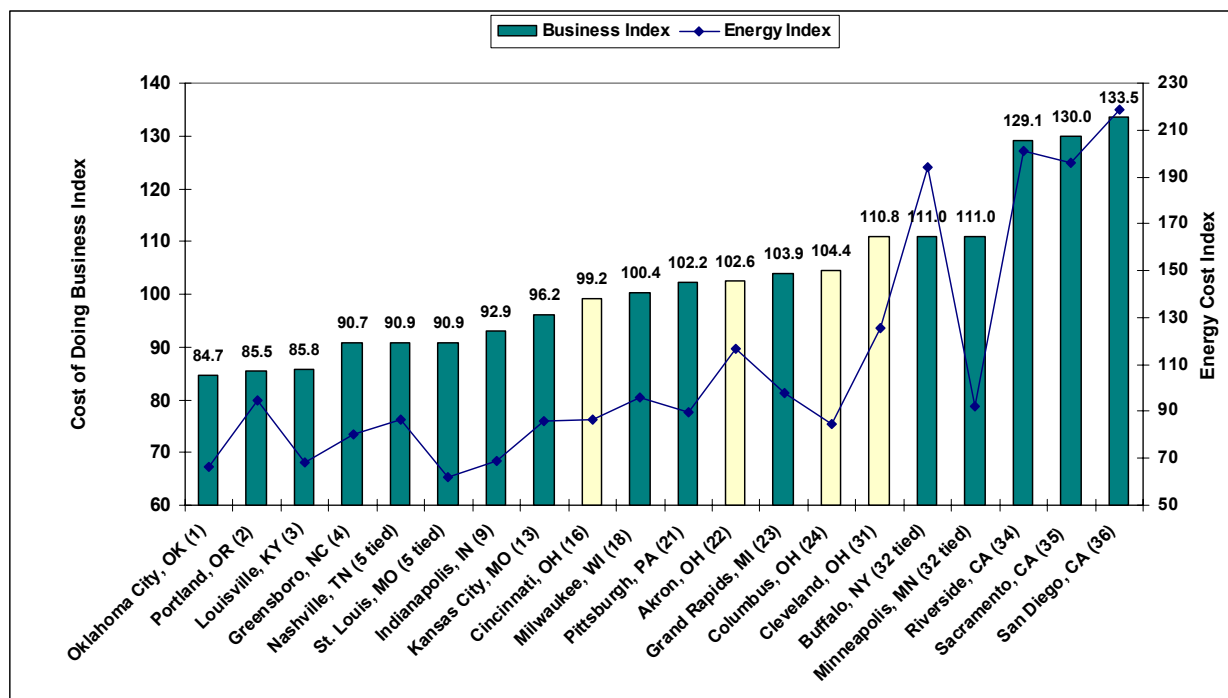
The data reveal that the Cleveland metro area is a high-cost place to do business. Cleveland ranks 31st (index = 110.8) in total business cost. Only five other comparable metro areas report higher business costs than Cleveland—Buffalo (111.0), Minneapolis (111.0), Riverside (129.1), Sacramento (130.0), and San Diego (133.5). In contrast, metro areas with the lowest business costs are Oklahoma City (84.7), Portland (85.5), Louisville (85.8), Greensboro (90.7), Nashville (90.9), and St. Louis (90.9).

The primary reason for Cleveland's high business cost ranking is energy. Energy costs in Cleveland are 25 percent above the U.S. average. This is especially troublesome for manufacturers whose production processes are heavily dependent on natural gas or electricity. In addition, Ohio is known as a high tax state. Cincinnati, Akron, Columbus, and Cleveland rank 30th through 33rd, respectively, in the tax index. Although these four metro areas have an average tax index equaling 105, 26 of the 36 comparable metro areas report taxes that fall below the U.S. average.

Figure 9 shows a comparison of the overall business cost index and energy sub-index for selected MSAs in 2004. Table B-17 in Appendix B provides a listing of the total business

cost index as well as labor, energy, taxes, and office rent sub-indices for all comparable metropolitan areas in 2004.

Figure 9. Cost of Doing Business Index & Energy Sub-Index for Selected MSAs, 2004



Notes:

Metro areas represented include the five highest ranking, the five lowest ranking, those located in the state of Ohio (excluding Canton and Youngstown), others in the Midwest, and Pittsburgh.

The number in parentheses adjacent to the metro area name indicates its 2004 ranking among the 36 comparable regions.

The number above the bar indicates the overall cost of doing business index for the respective metropolitan area during 2004.

Data Source: Economy.com, Inc., <http://www.economy.com>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

APPENDIX A – DATA SOURCE INFORMATION

SBIR & STTR Awards

U.S. Small Business Administration

<http://tech-net.sba.gov>

High-Tech Employment

U.S. Department of Labor, Bureau of Labor Statistics

<http://www.bls.gov>

NIH Awards

National Institutes of Health

<http://www.nih.gov>

University R&D Expenditures

National Science Foundation

<http://caspar.nsf.gov>

Patents

Data purchased from: United States Patent and Trade Office

<http://www.uspto.gov>

571-272-5600

Venture Capital

Data purchased from: Thomson Financial Venture Economics

<http://www.thomsonfinancial.com>

888-989-8373

Initial Public Offerings

IPO Monitor

<http://www.ipomonitor.com>

Firm Births

Data purchased from: U.S. Census Bureau

Longitudinal Establishment and Enterprise Micro Data (LEEM) file

<http://www.census.gov>

Business Costs

Data purchased from: Economy.com, Inc.

<http://www.economy.com>

866-275-3266

APPENDIX B – DATA TABLES

Table B-1. SBIR/STTR Award Activity, 2000-2003

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Table B-13. Initial Public Offerings, 2000-2004

Table B-14. Initial Public Offering Rankings

Table B-15. Single Establishment New Firm Births

Table B-16. New Firm Birth Rankings

Table B-17. Business Costs Indices, 2004

Table B-1 SBIR/STTR Award Activity, 2000-2003

Metropolitan Statistical Area	2000			2001			2002			2003			2000-2003 Total		
	Awards	Firms	Value	Awards	Firms	Value	Awards	Firms	Value	Awards	Firms	Value	Awards	Firms	Value
Akron, OH	10	5	\$1,935,475	8	6	\$2,797,123	10	5	\$2,179,844	10	5	\$2,493,762	38	21	\$9,406,204
Austin, TX	46	24	\$9,867,345	49	20	\$12,713,873	61	23	\$16,486,493	89	32	\$18,720,257	245	99	\$57,787,968
Buffalo, NY	21	14	\$4,948,050	10	8	\$2,554,023	17	11	\$4,963,334	16	9	\$6,241,783	64	42	\$18,707,190
Canton, OH	0	0	\$0	1	1	\$99,989	0	0	\$0	0	0	\$0	1	1	\$99,989
Charlotte, NC	4	3	\$898,391	3	3	\$267,760	0	0	\$0	6	5	\$1,005,342	13	11	\$2,171,493
Cincinnati, OH	23	17	\$4,121,674	25	19	\$5,593,896	32	21	\$9,176,153	32	18	\$11,829,625	112	75	\$30,721,348
Cleveland, OH	40	24	\$10,697,246	52	21	\$9,321,718	45	20	\$16,013,686	69	38	\$19,905,087	206	103	\$55,937,737
Columbus, OH	22	12	\$6,450,034	31	19	\$7,241,452	37	19	\$8,834,940	41	26	\$10,862,773	131	76	\$33,389,199
Denver, CO	80	35	\$17,112,342	77	28	\$15,303,688	115	40	\$30,071,258	120	42	\$28,232,557	392	145	\$90,719,845
Grand Rapids, MI	1	1	\$736,706	1	1	\$82,600	1	1	\$100,000	0	0	\$0	3	3	\$919,306
Greensboro, NC	7	2	\$937,361	7	2	\$1,825,048	7	2	\$3,505,451	3	1	\$1,050,009	24	7	\$7,317,869
Indianapolis, IN	10	9	\$980,625	7	6	\$1,672,908	8	8	\$1,861,309	10	8	\$4,177,923	35	31	\$8,692,765
Jacksonville, FL	0	0	\$0	1	1	\$69,978	2	2	\$532,492	7	4	\$2,355,239	10	7	\$2,957,709
Kansas City, MO	2	1	\$530,000	1	1	\$120,000	2	2	\$829,913	7	6	\$1,294,944	12	10	\$2,774,857
Las Vegas, NV	1	1	\$100,000	2	2	\$162,756	6	4	\$1,030,038	8	5	\$1,851,960	17	12	\$3,144,754
Louisville, KY	5	4	\$1,529,392	4	3	\$339,982	11	5	\$2,581,995	8	4	\$1,716,794	28	16	\$6,168,163
Memphis, TN	0	0	\$0	5	3	\$469,772	0	0	\$0	4	3	\$468,132	9	6	\$937,904
Milwaukee, WI	6	6	\$676,477	6	6	\$1,356,860	5	4	\$1,926,779	9	6	\$2,837,574	26	22	\$6,797,690
Minneapolis, MN	65	34	\$14,087,539	65	32	\$15,257,697	85	37	\$24,588,076	94	40	\$29,065,779	309	143	\$82,999,091
Nashville, TN	13	6	\$2,335,514	12	7	\$3,075,509	17	10	\$4,162,294	14	7	\$3,162,830	56	30	\$12,736,147
Oklahoma City, OK	6	5	\$831,509	7	7	\$894,686	10	6	\$2,424,418	8	7	\$1,064,448	31	25	\$5,215,061
Orlando, FL	31	18	\$9,080,183	23	17	\$6,017,252	32	20	\$6,377,563	34	21	\$12,046,350	120	76	\$33,521,348
Phoenix, AZ	30	19	\$7,175,426	29	22	\$7,286,336	38	26	\$11,566,909	37	22	\$10,284,578	134	89	\$36,313,249
Pittsburgh, PA	28	21	\$4,572,426	42	28	\$8,014,674	56	35	\$18,206,770	49	34	\$12,125,873	175	118	\$42,919,743
Portland, OR	26	16	\$4,333,900	25	16	\$5,918,523	32	15	\$7,285,388	50	29	\$9,384,538	133	76	\$26,922,349
Providence, RI	25	19	\$3,720,655	16	13	\$4,012,019	21	18	\$5,607,780	21	10	\$3,166,767	83	60	\$16,507,221

Table B-1 SBIR/STTR Award Activity, 2000-2003 (continued)

Metropolitan Statistical Area	2000			2001			2002			2003			2000-2003 Total		
	Awards	Firms	Value	Awards	Firms	Value	Awards	Firms	Value	Awards	Firms	Value	Awards	Firms	Value
Richmond, VA	7	5	\$565,370	3	3	\$298,283	6	5	\$533,642	7	5	\$686,509	23	18	\$2,083,804
Riverside, CA	9	7	\$1,976,025	13	7	\$2,851,882	19	13	\$4,354,893	20	14	\$8,213,485	61	41	\$17,396,285
Sacramento, CA	18	13	\$4,204,060	16	13	\$4,207,811	18	13	\$6,271,276	23	14	\$4,558,737	75	53	\$19,241,884
San Antonio, TX	25	12	\$4,159,876	17	13	\$3,458,139	7	4	\$3,303,273	16	12	\$3,191,438	65	41	\$14,112,726
San Diego, CA	201	123	\$46,272,111	215	112	\$57,796,295	252	130	\$68,023,869	261	136	\$93,736,099	929	501	\$265,828,374
Seattle, WA	92	52	\$18,207,541	73	50	\$19,525,441	112	69	\$40,071,614	108	61	\$35,315,799	385	232	\$113,120,395
St. Louis, MO	21	19	\$4,338,497	16	13	\$2,966,223	30	17	\$8,173,866	20	16	\$3,350,712	87	65	\$18,829,298
Tampa, FL	14	7	\$3,122,194	22	12	\$5,294,179	25	11	\$6,612,498	21	11	\$4,539,822	82	41	\$19,568,693
Virginia Beach, VA	18	10	\$3,788,017	16	13	\$5,432,177	23	13	\$6,608,555	23	11	\$6,147,155	80	47	\$21,975,904
Youngstown, OH	0	0	\$0	0	0	\$0	0	0	\$0	0	0	\$0	0	0	\$0
TOTAL	907	544	\$194,291,961	900	528	\$214,300,552	1,142	609	\$324,266,369	1,245	662	\$355,084,680	4,194	2,343	\$1,087,943,562

TOTAL is the summation of awards, firms, or value for all 36 comparable metropolitan areas.

Source: United States Small Business Administration, http://tech-net.sba.gov/tech-net/dsp_search.cfm

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-2 SBIR/STTR Award Rankings

Metropolitan Statistical Area	2002 Rank	2003 Rank	Overall Ranking 2000-2003
Akron, OH	24	24	23
Austin, TX	6	5	5
Buffalo, NY	19	18	18
Canton, OH	33	34(tied)	35
Charlotte, NC	34(tied)	31	30
Cincinnati, OH	10	12	12
Cleveland, OH	7	6	6
Columbus, OH	9	9	9
Denver, CO	3	3	3
Grand Rapids, MI	32	34(tied)	34
Greensboro, NC	26	33	27
Indianapolis, IN	23	21	22
Jacksonville, FL	31	28	32
Kansas City, MO	30	27	31
Las Vegas, NV	28	26	29
Louisville, KY	22	29	26
Memphis, TN	34(tied)	32	33
Milwaukee, WI	27	23	25
Minneapolis, MN	4	4	4
Nashville, TN	20	22	21
Oklahoma City, OK	21	25	24
Orlando, FL	11	10	10
Phoenix, AZ	8	11	8
Pittsburgh, PA	5	7	7
Portland, OR	13	8	11
Providence, RI	14	19	14
Richmond, VA	29	30	28
Riverside, CA	18	13	20
Sacramento, CA	17	14	16
San Antonio, TX	25	20	19
San Diego, CA	1	1	1
Seattle, WA	2	2	2
St. Louis, MO	12	16	13
Tampa, FL	16	17	17
Virginia Beach, VA	15	15	15
Youngstown, OH	34(tied)	34(tied)	36

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

Table B-3. High-Tech Employment Share, 2000-2004

Metropolitan Statistical Area	High-Tech Employment Share					
	2000	2001	2002	2003	2004	Average Share 2000-2004
Akron, OH	2.89%	2.86%	3.53%	3.56%	4.24%	3.42%
Austin, TX	8.58%	7.14%	8.06%	7.47%	8.22%	7.89%
Buffalo, NY	3.19%	3.66%	3.21%	3.30%	3.71%	3.41%
Canton, OH	1.83%	1.80%	1.80%	1.63%	1.75%	1.76%
Charlotte, NC	4.22%	3.86%	3.91%	3.42%	3.93%	3.87%
Cincinnati, OH	3.73%	4.03%	3.99%	4.16%	4.56%	4.09%
Cleveland, OH	3.68%	3.51%	3.38%	3.30%	3.78%	3.53%
Columbus, OH	4.64%	4.44%	4.62%	4.73%	4.74%	4.63%
Denver, CO	7.13%	6.76%	6.34%	6.68%	6.80%	6.74%
Grand Rapids, MI	3.20%	3.22%	3.50%	3.42%	4.10%	3.49%
Greensboro, NC	2.92%	2.90%	2.96%	2.74%	3.38%	2.98%
Indianapolis, IN	3.61%	3.52%	3.86%	3.65%	4.18%	3.76%
Jacksonville, FL	4.05%	3.84%	3.98%	3.75%	3.86%	3.90%
Kansas City, MO	5.36%	5.25%	4.47%	4.62%	5.01%	4.94%
Las Vegas, NV	1.85%	1.71%	1.71%	1.80%	2.07%	1.83%
Louisville, KY	2.87%	3.08%	2.86%	2.94%	3.50%	3.05%
Memphis, TN	2.79%	2.84%	2.72%	2.88%	3.01%	2.85%
Milwaukee, WI	4.01%	4.13%	4.50%	4.58%	5.04%	4.45%
Minneapolis, MN	5.72%	5.60%	5.27%	5.66%	6.58%	5.77%
Nashville, TN	3.00%	2.82%	2.99%	3.03%	3.34%	3.04%
Oklahoma City, OK	3.09%	3.90%	3.39%	3.55%	4.01%	3.59%
Orlando, FL	4.10%	3.47%	3.90%	3.79%	3.63%	3.78%
Phoenix, AZ	5.56%	5.23%	4.59%	4.10%	4.37%	4.77%
Pittsburgh, PA	4.15%	4.15%	3.99%	4.15%	4.50%	4.19%
Portland, OR	4.86%	4.99%	4.67%	5.03%	5.35%	4.98%
Providence, RI	2.92%	3.18%	2.82%	3.36%	2.61%	2.98%
Richmond, VA	4.69%	4.51%	4.47%	4.73%	4.89%	4.66%
Riverside, CA	1.68%	1.85%	2.06%	2.05%	2.16%	1.96%
Sacramento, CA	5.04%	5.64%	5.15%	5.55%	5.85%	5.44%
San Antonio, TX	2.91%	2.96%	3.73%	3.17%	3.75%	3.30%
San Diego, CA	5.91%	5.88%	5.72%	5.81%	6.31%	5.92%
Seattle, WA	9.09%	8.95%	7.64%	7.75%	8.15%	8.31%
St. Louis, MO	4.26%	4.09%	4.27%	4.51%	4.83%	4.39%
Tampa, FL	3.86%	3.58%	3.60%	3.38%	3.59%	3.60%
Virginia Beach, VA	4.04%	4.73%	4.38%	4.62%	5.26%	4.61%
Youngstown, OH	1.80%	1.65%	1.83%	1.91%	1.65%	1.77%

Source: U.S. Department of Labor, Bureau of Labor Statistics, <http://www.bls.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-4. High-Tech Employment Share Rankings

Metropolitan Statistical Area	2003 Rank	2004 Rank	Average Share Rank '00-'04
Akron, OH	20	17	25
Austin, TX	2	1	2
Buffalo, NY	27	25	26
Canton, OH	36	35	36
Charlotte, NC	22	21	18
Cincinnati, OH	14	14	16
Cleveland, OH	26	23	23
Columbus, OH	9	13	11
Denver, CO	3	3	3
Grand Rapids, MI	23	19	24
Greensboro, NC	32	29	30
Indianapolis, IN	19	18	20
Jacksonville, FL	18	22	17
Kansas City, MO	10	10	8
Las Vegas, NV	35	34	34
Louisville, KY	30	28	28
Memphis, TN	31	31	32
Milwaukee, WI	12	9	13
Minneapolis, MN	5	4	5
Nashville, TN	29	30	29
Oklahoma City, OK	21	20	22
Orlando, FL	17	26	19
Phoenix, AZ	16	16	9
Pittsburgh, PA	15	15	15
Portland, OR	7	7	7
Providence, RI	25	32	31
Richmond, VA	8	11	10
Riverside, CA	33	33	33
Sacramento, CA	6	6	6
San Antonio, TX	28	24	27
San Diego, CA	4	5	4
Seattle, WA	1	2	1
St. Louis, MO	13	12	14
Tampa, FL	24	27	21
Virginia Beach, VA	11	8	12
Youngstown, OH	34	36	35

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-5. NIH Awards, 2001-2004

Metropolitan Statistical Area	2001		2002		2003		2004		2001-2004 Total	
	Awards	Value	Awards	Value	Awards	Value	Awards	Value	Awards	Value
Akron, OH	29	\$6,491,974	40	\$9,763,837	34	\$9,209,370	31	\$8,787,778	134	\$34,252,959
Austin, TX	167	\$38,030,721	191	\$47,126,265	232	\$72,784,211	209	\$72,810,864	799	\$230,752,061
Buffalo, NY	278	\$78,877,975	286	\$82,745,423	311	\$97,179,305	314	\$108,031,143	1,189	\$366,833,846
Canton, OH	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
Charlotte, NC	16	\$2,485,476	21	\$4,177,487	28	\$5,584,014	20	\$4,043,794	85	\$16,290,771
Cincinnati, OH	400	\$119,267,952	452	\$141,114,417	504	\$172,698,200	502	\$188,327,186	1,858	\$621,407,755
Cleveland, OH	714	\$226,962,290	739	\$230,389,935	786	\$272,612,230	772	\$304,169,242	3,011	\$1,034,133,697
Columbus, OH	381	\$123,591,747	387	\$111,484,394	415	\$174,840,716	443	\$204,354,015	1,626	\$614,270,872
Denver, CO	629	\$201,899,202	657	\$211,347,788	682	\$231,233,855	678	\$251,659,325	2,646	\$896,140,170
Grand Rapids, MI	3	\$1,022,664	2	\$1,240,422	4	\$1,430,721	13	\$3,377,362	22	\$7,071,169
Greensboro, NC	20	\$3,439,927	16	\$2,879,353	21	\$4,782,125	23	\$7,570,274	80	\$18,671,679
Indianapolis, IN	290	\$97,596,176	298	\$98,931,532	341	\$111,753,828	341	\$117,382,778	1,270	\$425,664,314
Jacksonville, FL	18	\$6,669,362	23	\$7,801,797	27	\$9,817,654	37	\$12,119,487	105	\$36,408,300
Kansas City, MO	183	\$54,881,269	177	\$53,539,384	179	\$60,715,126	164	\$57,115,653	703	\$226,251,432
Las Vegas, NV	5	\$1,007,050	3	\$990,186	3	\$723,841	5	\$1,814,400	16	\$4,535,477
Louisville, KY	120	\$28,275,277	134	\$34,863,232	146	\$44,472,824	179	\$58,931,278	579	\$166,542,611
Memphis, TN	278	\$88,156,839	277	\$86,671,438	292	\$120,213,301	302	\$111,061,866	1,149	\$406,103,444
Milwaukee, WI	245	\$81,901,516	266	\$88,624,974	289	\$109,134,741	295	\$105,284,017	1,095	\$384,945,248
Minneapolis, MN	627	\$200,811,781	647	\$216,214,330	708	\$255,840,107	699	\$276,408,339	2,681	\$949,274,557
Nashville, TN	555	\$177,202,256	618	\$222,250,923	720	\$261,748,559	742	\$284,918,556	2,635	\$946,120,294
Oklahoma City, OK	149	\$49,882,760	170	\$59,412,566	200	\$80,974,750	176	\$79,908,193	695	\$270,178,269
Orlando, FL	8	\$1,934,450	13	\$2,836,768	21	\$4,535,919	20	\$3,851,124	62	\$13,158,261
Phoenix, AZ	102	\$24,375,831	102	\$26,717,458	140	\$38,750,161	134	\$39,520,750	478	\$129,364,200
Pittsburgh, PA	967	\$340,862,296	1,024	\$387,465,739	1,084	\$423,053,552	1,193	\$465,971,463	4,268	\$1,617,353,050
Portland, OR	475	\$141,033,177	535	\$163,958,648	586	\$187,690,794	562	\$186,493,885	2,158	\$679,176,504
Providence, RI	363	\$94,736,831	381	\$104,574,775	439	\$131,354,125	454	\$134,265,580	1,637	\$464,931,311

Table B-5. NIH Awards, 2001-2004 (continued)

Metropolitan Statistical Area	2001		2002		2003		2004		2001-2004 Total	
	Awards	Value	Awards	Value	Awards	Value	Awards	Value	Awards	Value
Richmond, VA	226	\$58,558,066	235	\$65,099,704	230	\$71,830,513	241	\$75,549,474	932	\$271,037,757
Riverside, CA	67	\$18,743,331	71	\$24,825,197	83	\$25,903,627	95	\$36,905,233	316	\$106,377,388
Sacramento, CA	302	\$88,732,880	341	\$109,876,002	368	\$125,169,295	394	\$138,229,202	1,405	\$462,007,379
San Antonio, TX	335	\$133,704,742	342	\$152,974,337	343	\$183,370,497	334	\$177,494,502	1,354	\$647,544,078
San Diego, CA	1,567	\$759,820,518	1,644	\$632,238,986	1,729	\$1,133,448,164	1,837	\$1,230,217,524	6,777	\$3,755,725,192
Seattle, WA	1,367	\$596,761,721	1,466	\$627,107,362	1,535	\$876,563,779	1,568	\$897,537,818	5,936	\$2,997,970,680
St. Louis, MO	984	\$335,332,908	1,005	\$387,755,285	1,018	\$442,003,342	1,055	\$493,326,152	4,062	\$1,658,417,687
Tampa, FL	129	\$34,964,371	136	\$47,129,711	151	\$52,993,390	164	\$70,440,814	580	\$205,528,286
Virginia Beach, VA	47	\$9,352,690	32	\$7,642,781	42	\$9,173,117	39	\$9,903,093	160	\$36,071,681
Youngstown, OH	1	\$120,580	0	\$0	2	\$134,866	0	\$0	3	\$255,446
TOTAL	12,047	\$4,227,488,606	12,731	\$4,451,772,436	13,693	\$5,803,724,619	14,035	\$6,217,782,164	52,506	\$20,700,767,825

TOTAL is the summation of awards or value for all 36 comparable metropolitan areas.

Source: National Institutes of Health, <http://www.nih.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-6. NIH Award Rankings

Metropolitan Statistical Area	2003 Rank	2004 Rank	Overall Rank '01-'04
Akron, OH	28	29	29
Austin, TX	19	20	20
Buffalo, NY	18	16	16
Canton, OH	36	35	35
Charlotte, NC	30	31	31
Cincinnati, OH	10	10	10
Cleveland, OH	5	5	5
Columbus, OH	11	11	11
Denver, CO	8	8	8
Grand Rapids, MI	33	33	33
Greensboro, NC	31	30	30
Indianapolis, IN	15	15	15
Jacksonville, FL	29	27	27
Kansas City, MO	22	24	24
Las Vegas, NV	34	34	34
Louisville, KY	24	23	23
Memphis, TN	16	17	17
Milwaukee, WI	17	18	18
Minneapolis, MN	7	7	7
Nashville, TN	6	6	6
Oklahoma City, OK	21	21	21
Orlando, FL	32	32	32
Phoenix, AZ	25	25	25
Pittsburgh, PA	3	3	3
Portland, OR	9	9	9
Providence, RI	13	12	12
Richmond, VA	20	19	19
Riverside, CA	26	26	26
Sacramento, CA	14	14	14
San Antonio, TX	12	13	13
San Diego, CA	1	1	1
Seattle, WA	2	2	2
St. Louis, MO	4	4	4
Tampa, FL	23	22	22
Virginia Beach, VA	27	28	28
Youngstown, OH	35	36	36

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-7. University-Related R&D Expenditures, 2000-2003

Metropolitan Statistical Area	FY 2000		FY 2001		FY 2002		FY 2003		Total R&D Expenditures 2000-2003
	Inst	R&D Expenditures	Inst	R&D Expenditures	Inst	R&D Expenditures	Inst	R&D Expenditures	
Akron, OH	3	\$34,323,000	3	\$38,114,000	3	\$45,473,000	3	\$46,866,000	\$164,776,000
Austin, TX	2	\$277,318,000	2	\$303,988,000	2	\$329,075,000	2	\$351,475,000	\$1,261,856,000
Buffalo, NY	2	\$189,375,000	2	\$188,381,000	2	\$241,704,000	2	\$242,790,000	\$862,250,000
Canton, OH	0	\$0	0	\$0	0	\$0	0	\$0	\$0
Charlotte, NC	2	\$8,077,000	2	\$8,100,000	1	\$8,773,000	1	\$12,599,000	\$37,549,000
Cincinnati, OH	4	\$183,912,000	3	\$206,916,000	3	\$231,187,000	3	\$269,244,000	\$891,259,000
Cleveland, OH	4	\$205,034,000	4	\$212,079,000	4	\$234,159,000	4	\$265,228,000	\$916,500,000
Columbus, OH	3	\$361,982,000	3	\$391,291,000	3	\$433,044,000	3	\$497,268,000	\$1,683,585,000
Denver, CO	3	\$30,386,000	3	\$36,806,000	3	\$37,173,000	2	\$39,111,000	\$143,476,000
Grand Rapids, MI	1	\$1,191,000	1	\$1,300,000	1	\$1,509,000	1	\$1,714,000	\$5,714,000
Greensboro, NC	3	\$16,579,000	3	\$20,335,000	3	\$20,618,000	2	\$20,758,000	\$78,290,000
Indianapolis, IN	0	\$0	0	\$0	0	\$0	0	\$0	\$0
Jacksonville, FL	0	\$0	1	\$1,222,000	1	\$2,061,000	1	\$4,421,000	\$7,704,000
Kansas City, MO	2	\$20,324,000	2	\$19,961,000	2	\$25,496,000	2	\$32,124,000	\$97,905,000
Las Vegas, NV	1	\$24,215,000	1	\$27,008,000	1	\$30,527,000	1	\$42,205,000	\$123,955,000
Louisville, KY	2	\$64,524,000	2	\$73,912,000	2	\$82,162,000	2	\$89,710,000	\$310,308,000
Memphis, TN	4	\$29,284,000	2	\$30,713,000	1	\$33,625,000	1	\$38,728,000	\$132,350,000
Milwaukee, WI	4	\$100,264,000	4	\$116,702,000	4	\$133,939,000	4	\$149,700,000	\$500,605,000
Minneapolis, WI	5	\$413,707,000	5	\$464,928,000	5	\$498,519,000	5	\$511,905,000	\$1,889,059,000
Nashville, TN	5	\$196,805,000	5	\$213,084,000	5	\$247,584,000	5	\$321,026,000	\$978,499,000
Oklahoma City, OK	3	\$153,964,000	3	\$152,353,000	3	\$174,158,000	3	\$178,978,000	\$659,453,000
Orlando, FL	1	\$47,646,000	1	\$79,287,000	1	\$66,351,000	1	\$89,880,000	\$283,164,000
Phoenix, AZ	1	\$108,117,000	1	\$118,763,000	1	\$123,016,000	1	\$145,591,000	\$495,487,000
Pittsburgh, PA	3	\$435,451,000	3	\$496,235,000	3	\$594,346,000	3	\$602,883,000	\$2,128,915,000
Portland, OR	7	\$168,897,000	7	\$174,673,000	6	\$178,946,000	6	\$221,728,000	\$744,244,000
Providence, RI	4	\$136,602,000	4	\$152,052,000	4	\$178,082,000	4	\$203,607,000	\$670,343,000

Table B-7. University-Related R&D Expenditures, 2000-2003 (continued)

Metropolitan Statistical Area	FY 2000		FY 2001		FY 2002		FY 2003		Total R&D Expenditures 2000-2003
	Inst	R&D Expenditures	Inst	R&D Expenditures	Inst	R&D Expenditures	Inst	R&D Expenditures	
Richmond, VA	4	\$94,491,000	4	\$106,188,000	4	\$119,220,000	4	\$135,697,000	\$455,596,000
Riverside, CA	3	\$109,746,000	3	\$122,812,000	4	\$142,400,000	4	\$148,188,000	\$523,146,000
Sacramento, CA	1	\$364,789,000	1	\$432,396,000	1	\$456,653,000	1	\$482,145,000	\$1,735,983,000
San Antonio, TX	4	\$115,644,000	4	\$128,088,000	4	\$141,498,000	4	\$148,193,000	\$533,423,000
San Diego, CA	5	\$575,291,000	4	\$615,291,000	4	\$652,098,000	3	\$714,607,000	\$2,557,287,000
Seattle, WA	1	\$529,342,000	1	\$589,626,000	1	\$627,273,000	1	\$684,814,000	\$2,431,055,000
St. Louis, MO	4	\$404,460,000	4	\$450,438,000	4	\$477,966,000	4	\$545,436,000	\$1,878,300,000
Tampa, FL	1	\$145,397,000	1	\$171,550,000	1	\$197,894,000	1	\$213,249,000	\$728,090,000
Virginia Beach, VA	5	\$94,387,000	5	\$99,880,000	5	\$113,687,000	5	\$130,304,000	\$438,258,000
Youngstown, OH	1	\$532,000	1	\$849,000	1	\$1,259,000	1	\$1,398,000	\$4,038,000
TOTAL	98	\$5,642,056,000	95	\$6,245,321,000	93	\$6,881,475,000	90	\$7,583,570,000	\$26,352,422,000

TOTAL is the summation of institutions (Inst) or R&D expenditures for all 36 comparable metropolitan areas.

Inst: Number of institutions in a metropolitan area reporting R&D expenditures.

Data Source: National Science Foundation, <http://caspar.nsf.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-8. University-Related R&D Expenditure Rankings

Metropolitan Statistical Area	Ranking by R&D Expenditure		
	2002 Rank	2003 Rank	Overall Ranking 2000-2003
Akron, OH	25	25	25
Austin, TX	8	8	8
Buffalo, NY	10	12	12
Canton, OH	35(tied)	35(tied)	35(tied)
Charlotte, NC	31	31	31
Cincinnati, OH	12	10	11
Cleveland, OH	11	11	10
Columbus, OH	7	6	7
Denver, CO	26	27	26
Grand Rapids, MI	33	33	33
Greensboro, NC	30	30	30
Indianapolis, IN	35(tied)	35(tied)	35(tied)
Jacksonville, FL	32	32	32
Kansas City, MO	29	29	29
Las Vegas, NV	28	26	28
Louisville, KY	23	24	23
Memphis, TN	27	28	27
Milwaukee, WI	19	17	19
Minneapolis, WI	4	5	4
Nashville, TN	9	9	9
Oklahoma City, OK	16	16	16
Orlando, FL	24	23	24
Phoenix, AZ	20	20	20
Pittsburgh, PA	3	3	3
Portland, OR	14	13	13
Providence, RI	15	15	15
Richmond, VA	21	21	21
Riverside, CA	17	19	18
Sacramento, CA	6	7	6
San Antonio, TX	18	18	17
San Diego, CA	1	1	1
Seattle, WA	2	2	2
St. Louis, MO	5	4	5
Tampa, FL	13	14	14
Virginia Beach, VA	22	22	22
Youngstown, OH	34	34	34

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-9. Utility Patent Activity, 2000-2004

Metropolitan Statistical Area	2000		2001		2002		2003		2004		2000-2004	
	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors
Akron, OH	476	738	508	813	545	839	510	744	488	731	2,527	3,865
Austin, TX	1,926	4,028	1,993	4,212	1,945	4,211	2,134	4,410	2,065	4,320	10,063	21,181
Buffalo, NY	418	810	426	787	391	750	409	790	382	752	2,026	3,889
Canton, OH	172	244	193	295	229	330	229	384	198	329	1,021	1,582
Charlotte, NC	353	542	353	550	316	496	296	458	263	381	1,581	2,427
Cincinnati, OH	1,031	2,175	1,117	2,280	1,238	2,642	1,194	2,728	996	2,305	5,576	12,130
Cleveland, OH	952	1,576	981	1,642	949	1,623	907	1,537	854	1,474	4,643	7,852
Columbus, OH	446	799	478	861	460	819	464	864	499	904	2,347	4,247
Denver, CO	797	1,152	820	1,255	809	1,203	816	1,161	787	1,148	4,029	5,919
Grand Rapids, MI	256	433	268	450	265	477	252	419	233	373	1,274	2,152
Greensboro, NC	170	237	156	211	175	240	195	261	197	280	893	1,229
Indianapolis, IN	664	1,342	642	1,352	664	1,378	654	1,476	562	1,190	3,186	6,738
Jacksonville, FL	136	309	117	202	133	296	156	333	135	327	677	1,467
Kansas City, MO	318	581	284	513	385	684	369	673	386	731	1,742	3,182
Las Vegas, NV	188	253	193	254	169	228	217	284	208	295	975	1,314
Louisville, KY	172	256	179	272	160	264	198	338	213	417	922	1,547
Memphis, TN	187	332	194	404	180	320	193	345	179	294	933	1,695
Milwaukee, WI	654	1,124	798	1,413	807	1,515	689	1,206	629	1,172	3,577	6,430
Minneapolis, MN	2,468	5,311	2,440	5,332	2,596	5,845	2,826	6,407	2,546	5,891	12,876	28,786
Nashville, TN	192	305	219	344	204	311	213	301	207	312	1,035	1,573
Oklahoma City, OK	195	317	204	377	178	281	176	304	138	237	891	1,516
Orlando, FL	307	503	408	773	363	654	393	750	376	665	1,847	3,345
Phoenix, AZ	1,435	2,681	1,288	2,375	1,401	2,642	1,428	2,626	1,418	2,623	6,970	12,947
Pittsburgh, PA	850	1,667	802	1,640	769	1,587	799	1,667	756	1,608	3,976	8,169
Portland, OR	1,194	2,047	1,332	2,452	1,484	2,703	1,779	3,310	1,758	3,399	7,547	13,911
Providence, RI	617	910	583	892	567	867	604	890	652	1,043	3,023	4,602

Table B-9. Utility Patent Activity, 2000-2004 (continued)

Metropolitan Statistical Area	2000		2001		2002		2003		2004		2000-2004	
	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors	Patents Granted	Number of Inventors
Richmond, VA	220	361	206	322	209	360	224	382	218	454	1,077	1,879
Riverside, CA	495	637	523	645	527	680	559	722	527	670	2,631	3,354
Sacramento, CA	542	908	560	947	576	922	662	1,080	629	1,004	2,969	4,861
San Antonio, TX	283	452	302	485	269	465	270	425	261	449	1,385	2,276
San Diego, CA	2,102	3,918	2,359	4,402	2,423	4,681	2,617	5,102	2,492	4,690	11,993	22,793
Seattle, WA	1,272	2,232	1,360	2,418	1,462	2,695	1,602	2,907	1,678	3,251	7,374	13,503
St. Louis, MO	685	1,344	741	1,356	772	1,659	770	1,483	672	1,542	3,640	7,384
Tampa, FL	443	641	420	608	408	576	427	622	388	557	2,086	3,004
Virginia Beach, VA	183	333	179	277	187	305	208	342	168	296	925	1,553
Youngstown, OH	96	155	86	140	103	171	73	106	77	111	435	683
Total	22,895	41,653	23,712	43,551	24,318	45,719	25,512	47,837	24,235	46,225	120,672	224,985

TOTAL is the summation of patents granted or number of inventors for all 36 comparable metropolitan areas.

Data Source: United States Patent and Trade Office, <http://www.uspto.gov>

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-10. Utility Patent Rankings

Metropolitan Statistical Area	2003 Rank	2004 Rank	Overall Ranking 2000-2004
Akron, OH	18	18	17
Austin, TX	3	3	3
Buffalo, NY	19	19	19
Canton, OH	26	29	28
Charlotte, NC	23	24	23
Cincinnati, OH	7	7	7
Cleveland, OH	8	8	8
Columbus, OH	17	16	16
Denver, CO	11	11	11
Grand Rapids, MI	25	27	25
Greensboro, NC	34	31	34
Indianapolis, IN	12	14	13
Jacksonville, FL	35	34	35
Kansas City, MO	22	20	22
Las Vegas, NV	32	30	33
Louisville, KY	29	26	31
Memphis, TN	30	32	29
Milwaukee, WI	13	12	12
Minneapolis, MN	1	1	1
Nashville, TN	31	28	27
Oklahoma City, OK	33	35	32
Orlando, FL	20	21	21
Phoenix, AZ	6	6	6
Pittsburgh, PA	9	9	9
Portland, OR	4	4	4
Providence, RI	15	13	15
Richmond, VA	27	25	26
Riverside, CA	16	17	18
Sacramento, CA	14	15	14
San Antonio, TX	24	23	24
San Diego, CA	2	2	2
Seattle, WA	5	5	5
St. Louis, MO	10	10	10
Tampa, FL	21	22	20
Virginia Beach, VA	28	33	30
Youngstown, OH	36	36	36

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table B-11. Venture Capital Activity, 2000–2004

Metropolitan Statistical Area	2000			2001			2002			2003			2004			2000-2004 Total		
	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$
Akron, OH	3	3	56.00	1	1	11.00		3	60.58	1	1	3.50	2	2	7.25	10	10	138.33
Austin, TX	193	157		134	102	1,170.28	67	58	433.05	71		531.52	81	67	835.23	546	444	5,313.72
Buffalo, NY	10	8	130.53	7	5	8.94		8	39.90	8	7	50.82	9	8	34.05	43	36	264.24
Canton, OH	0	0		1	1	15.20	0	0	0.00	0		0.00	1	1	0.00	2	2	15.20
Charlotte, NC	29	23	582.93	16	14	87.45		17	96.23	19	15	84.03	10	9	236.90	94	78	1,087.54
Cincinnati, OH	21	17		16	13	109.51	16	12	178.90	9		22.22	16	12	64.01	78	60	560.15
Cleveland, OH	27	22	316.17	20	14	45.92		15	81.96	16	13	33.25	13	11	20.33	95	75	497.63
Columbus, OH	26	17		12	11	65.70	12	8	82.17	6		36.45	7	5	18.25	63	47	521.02
Denver, CO	159	105	2,929.43	76	62	765.32	58	47	356.90	56	39	494.58	53	42	378.20	402	295	4,924.43
Grand Rapids, MI	3	3	3.11	0	0	0.00	0	0	0.00	1		4.50	1	1	1.00	5	5	8.61
Greensboro, NC	14	13	100.12	8	8	17.03	3	3	46.12	5	4	21.19	2	2	36.50	32	30	220.96
Indianapolis, IN	27	21	285.96	7	7	45.45	7	6	34.35	3	3	37.65	7	6	51.65	51	43	455.06
Jacksonville, FL	13	9	110.29	2	2	14.50	4	4	72.40	4	4	82.45	3	3	24.20	26	22	303.84
Kansas City, MO	42	31	565.07	14	13	163.46	9	8	17.10	7	7	14.30	13	12	149.50	85	71	909.43
Las Vegas, NV	3	3	13.95	4	3	0.09	3	3	3.15	2	2	11.00	6	4	264.12	18	15	292.31
Louisville, KY	14	11	161.04	8	5	10.48	4	3	3.41	6	4	5.40	6	6	34.03	38	29	214.36
Memphis, TN	15	14	66.98	10	10	33.05	4	4	30.50	1	1	20.00	1	1	5.00	31	30	155.53
Milwaukee, WI	9	7	24.95	8	6	17.40	4	4	4.75	3	3	8.85	4	4	21.95	28	24	77.90
Minneapolis, MN	121	98	1,163.23	95	80	571.90	60	52	613.13	66	45	325.72	56	46	442.03	398	321	3,116.01
Nashville, TN	36	26	325.59	25	22	154.76	16	13	88.03	19	18	81.25	20	18	173.36	116	97	822.99
Oklahoma City, OK	6	6	35.89	3	3	23.40	4	3	25.00	0	0	0.00	3	3	11.01	16	15	95.30
Orlando, FL	23	20	229.21	15	13	198.25	7	7	64.40	8	6	38.89	11	10	55.09	64	56	585.84
Phoenix, AZ	66	53	636.47	38	32	257.77	20	18	167.66	21	16	55.07	16	12	54.67	161	131	1,171.64
Pittsburgh, PA	80	62	874.38	54	42	448.22	35	32	158.58	30	24	434.00	26	25	371.26	225	185	2,286.44
Portland, OR	69	54	1,031.02	50	37	373.99	29	25	245.78	31	23	132.15	35	24	190.12	214	163	1,973.06
Providence, RI	18	13	92.67	9	8	41.87	13	8	59.37	10	8	43.11	13	10	81.47	63	47	318.49

Table B-11. Venture Capital Activity, 2000–2004 (continued)

Metropolitan Statistical Area	2000			2001			2002			2003			2004			2000-2004 Total		
	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$	Deals	Cos.	Invest Mil \$
Richmond, VA	18	16	176.28	10	9	49.80	8	6	18.17	5	4	4.55	1	1	0.30	42	36	249.10
Riverside, CA	2	1	16.25	3	3	7.80	2	2	6.00	0	0	0.00	1	1	1.50	8	7	31.55
Sacramento, CA	18	13	276.92	15	12	134.21	9	7	95.56	9	8	65.05	7	6	48.84	58	46	620.58
San Antonio, TX	13	9	57.60	15	9	44.16	2	2	18.55	7	6	66.40	6	6	80.15	43	32	266.86
San Diego, CA	260	200	2,378.39	181	147	1,805.56	144	117	1,165.88	147	111	849.12	149	114	1,226.53	881	689	7,425.48
Seattle, WA	272	206	2,750.48	166	126	1,089.21	112	84	589.42	97	70	437.19	134	100	818.78	781	586	5,685.08
St. Louis, MO	39	30	697.99	19	19	273.93	31	21	171.84	34	24	112.48	19	12	64.23	142	106	1,320.47
Tampa, FL	24	22	393.11	15	13	97.77	17	12	136.31	16	10	70.80	12	8	65.15	84	65	763.14
Virginia Beach, VA	6	6	5.36	5	3	17.24	3	3	5.40	1	1	2.30	4	4	39.45	19	17	69.75
Youngstown, OH	2	2	10.39	4	3	6.40	0	0	0.00	0	0	0.00	0	0	0.00	6	5	16.79
TOTAL	1,681	1,301	19,345.36	1,066	858	8,177.02	754	615	5,170.55	719	550	4,179.79	748	596	5,906.11	4,968	3,920	42,778.83

TOTAL is the summation of deals, companies (cos), or investment (invest) for all 36 comparable metropolitan areas.

Deals: Total number of VC deals finalized in the respective metropolitan area.

Cos: Total number of companies receiving VC monies in the respective metropolitan area.

Investment: Total monies invested by all venture capitalists in the respective metropolitan area.

Data Source: Thomson Financial Venture Economics

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Note: Data is continuously updated and is therefore subject to change.

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

Table B-12. Venture Capital Rankings

Metropolitan Statistical Area	2003 Rank	2004 Rank	Overall Rank (2000-2004)
Akron, OH	31	30	32
Austin, TX	3	3	3
Buffalo, NY	17	19	21
Canton, OH	33(tie)	35	36
Charlotte, NC	10	10	11
Cincinnati, OH	21	12	15
Cleveland, OH	13	16	13
Columbus, OH	20	24	19
Denver, CO	4	5	4
Grand Rapids, MI	30	33	35
Greensboro, NC	24	29	26
Indianapolis, IN	23	21	20
Jacksonville, FL	18	27	24
Kansas City, MO	22	9	14
Las Vegas, NV	28	15	27
Louisville, KY	25	23	25
Memphis, TN	29	31	28
Milwaukee, WI	27	26	29
Minneapolis, MN	5	4	5
Nashville, TN	9	8	10
Oklahoma City, OK	33(tie)	28	31
Orlando, FL	19	17	16
Phoenix, AZ	11	13	8
Pittsburgh, PA	6	6	6
Portland, OR	7	7	7
Providence, RI	15	14	18
Richmond, VA	26	34	23
Riverside, CA	33(tie)	32	33
Sacramento, CA	14	22	17
San Antonio, TX	16	20	22
San Diego, CA	1	1	1
Seattle, WA	2	2	2
St. Louis, MO	8	11	9
Tampa, FL	12	18	12
Virginia Beach, VA	32	25	30
Youngstown, OH	33(tie)	36	34

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

Table B-13. Initial Public Offerings, 2000–2004

Metropolitan Statistical Area	Number Of IPOs per Calendar Year					Metro Total	2004 Market Value (\$Mil) ^a
	2000	2001	2002	2003	2004		
Akron, OH	0	0	0	1	0	1	\$0.0
Austin, TX	4	0	0	1	4	9	\$5,521.6
Buffalo, NY	1	0	0	0	0	1	\$0.0
Canton, OH	0	0	0	0	0	0	\$0.0
Charlotte, NC	0	1	0	0	0	1	\$0.0
Cincinnati, OH	1	0	0	0	1	2	\$149.0
Cleveland, OH	0	0	0	0	1	1	\$569.6
Columbus, OH	0	0	0	0	2	2	\$498.7
Denver, CO	5	0	4	2	4	15	\$4,983.3
Grand Rapids, MI	0	0	0	0	0	0	\$0.0
Greensboro, NC	0	0	0	0	0	0	\$0.0
Indianapolis, IN	0	2	1	0	2	5	\$535.4
Jacksonville, FL	0	0	0	0	2	2	\$693.5
Kansas City, MO	0	2	0	1	1	4	\$370.8
Las Vegas, NV	0	0	2	1	3	6	16890.8 ^b
Louisville, KY	0	0	0	0	1	1	\$876.5
Memphis, TN	0	1	0	1	1	3	\$330.3
Milwaukee, WI	0	0	0	1	1	2	\$453.0
Minneapolis, MN	6	1	2	1	4	14	\$1,285.7
Nashville, TN	2	0	0	2	1	5	\$401.0
Oklahoma City, OK	1	0	0	0	0	1	\$0.0
Orlando, FL	0	0	1	0	0	1	\$0.0
Phoenix, AZ	6	0	1	1	2	10	\$969.8
Pittsburgh, PA	2	0	1	0	2	5	\$556.3
Portland, OR	2	0	0	0	2	4	\$356.3
Providence, RI	0	0	1	0	0	1	\$0.0
Richmond, VA	0	0	0	1	1	2	12874.6 ^c
Riverside, CA	0	1	0	0	0	1	\$0.0
Sacramento, CA	1	0	0	0	1	2	\$390.5
San Antonio, TX	0	0	0	0	1	1	\$4,850.6
San Diego, CA	7	3	2	5	11	28	\$2,124.9
Seattle, WA	6	3	2	0	6	17	\$1,531.0
St. Louis, MO	2	1	0	0	3	6	\$885.6
Tampa, FL	1	0	0	2	1	4	\$1,146.2
Virginia Beach, VA	0	0	1	0	1	2	\$59.5
Youngstown, OH	0	0	0	0	0	0	\$0.0
TOTAL	47	15	18	20	59	159	\$59,304.5

^aMarket value (December 21, 2004) of companies that went public in calendar year 2004 in the respective metro area.

^b\$16.6 billion of the market value is attributed to the Las Vegas Sands, a company that owns and operates resort and convention facilities.

^cMarket value is attributed to Genworth Financial, an insurance business with operations in 22 countries.

TOTAL is the summation of the number of IPOs for all 36 comparable metropolitan areas.

Data Source: IPO Monitor

Prepared by: Center for Economic Development, Maxine Goodman College of Urban Affairs, Cleveland State University

Table B-14. Initial Public Offering Rankings

Metropolitan Statistical Area	By Number of IPOs		
	2003 Rank	2004 Rank	2000-2004 Rank
Akron, OH	5(tied)	26(tied)	23(tied)
Austin, TX	5(tied)	3(tied)	6
Buffalo, NY	14(tied)	26(tied)	23(tied)
Canton, OH	14(tied)	26(tied)	33(tied)
Charlotte, NC	14(tied)	26(tied)	23(tied)
Cincinnati, OH	14(tied)	14(tied)	16(tied)
Cleveland, OH	14(tied)	14(tied)	23(tied)
Columbus, OH	14(tied)	8(tied)	16(tied)
Denver, CO	2(tied)	3(tied)	3
Grand Rapids, MI	14(tied)	26(tied)	33(tied)
Greensboro, NC	14(tied)	26(tied)	33(tied)
Indianapolis, IN	14(tied)	8(tied)	9(tied)
Jacksonville, FL	14(tied)	8(tied)	16(tied)
Kansas City, MO	5(tied)	14(tied)	12(tied)
Las Vegas, NV	5(tied)	6(tied)	7(tied)
Louisville, KY	14(tied)	14(tied)	23(tied)
Memphis, TN	5(tied)	14(tied)	15
Milwaukee, WI	5(tied)	14(tied)	16(tied)
Minneapolis, MN	5(tied)	3(tied)	4
Nashville, TN	2(tied)	14(tied)	9(tied)
Oklahoma City, OK	14(tied)	26(tied)	23(tied)
Orlando, FL	14(tied)	26(tied)	23(tied)
Phoenix, AZ	5(tied)	8(tied)	5
Pittsburgh, PA	14(tied)	8(tied)	9(tied)
Portland, OR	14(tied)	8(tied)	12(tied)
Providence, RI	14(tied)	26(tied)	23 (tied)
Richmond, VA	5(tied)	14(tied)	16(tied)
Riverside, CA	14(tied)	26(tied)	23(tied)
Sacramento, CA	14(tied)	14(tied)	16(tied)
San Antonio, TX	14(tied)	14(tied)	23(tied)
San Diego, CA	1	1	1
Seattle, WA	14(tied)	2	2
St. Louis, MO	14(tied)	6(tied)	7(tied)
Tampa, FL	2(tied)	14(tied)	12(tied)
Virginia Beach, VA	14(tied)	14(tied)	16(tied)
Youngstown, OH	14(tied)	26(tied)	33(tied)

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

Table B-15. Single Establishment New Firm Births

Metropolitan Statistical Area	New Firm Births per 1,000 Labor Force (1998-1999)	New Firm Births per 1,000 Labor Force (2000-2001)	New Firm Births per 1,000 Labor Force (2001-2002)	Change in New Firm Births (1998-2001)
Akron, OH	3.26	3.15	2.92	-10.244%
Austin, TX	4.33	4.37	3.83	-11.607%
Buffalo, NY	2.79	3.00	2.92	4.841%
Canton, OH	3.07	3.02	2.79	-9.026%
Charlotte, NC	5.00	4.54	4.12	-17.586%
Cincinnati, OH	3.11	2.90	2.80	-10.041%
Cleveland, OH	3.30	3.34	3.16	-4.214%
Columbus, OH	3.28	3.07	2.92	-11.040%
Denver, CO	5.10	5.34	5.03	-1.365%
Grand Rapids, MI	2.95	2.98	3.17	7.454%
Greensboro, NC	4.11	3.87	3.52	-14.251%
Indianapolis, IN	3.72	3.64	3.67	-1.421%
Jacksonville, FL	4.46	4.47	4.52	1.258%
Kansas City, MO	4.09	3.72	3.78	-7.418%
Las Vegas, NV	5.20	4.64	4.64	-10.848%
Louisville, KY	3.62	3.41	3.08	-14.945%
Memphis, TN	3.44	3.21	2.96	-13.928%
Milwaukee, WI	3.18	3.08	2.96	-6.620%
Minneapolis, MN	3.92	3.89	3.56	-9.100%
Nashville, TN	4.09	3.96	3.85	-5.867%
Oklahoma City, OK	4.61	4.45	4.35	-5.673%
Orlando, FL	5.03	4.74	5.05	0.387%
Phoenix, AZ	4.54	4.37	4.05	-10.790%
Pittsburgh, PA	3.16	3.05	2.92	-7.505%
Portland, OR	4.68	4.69	4.26	-8.966%
Providence, RI	4.12	3.77	3.73	-9.491%
Richmond, VA	3.94	3.94	3.90	-0.932%
Riverside, CA	3.74	3.57	3.56	-4.821%
Sacramento, CA	4.20	4.09	4.15	-1.167%
San Antonio, TX	3.37	3.59	3.45	2.551%
San Diego, CA	4.91	5.01	4.71	-4.072%
Seattle, WA	5.07	4.80	4.53	-10.737%
St. Louis, MO	3.46	3.22	3.43	-0.990%
Tampa, FL	4.78	4.66	4.64	-2.985%
Virginia Beach, VA	3.53	3.48	3.32	-6.013%
Youngstown, OH	3.04	2.88	2.81	-7.488%

New firm births (2000-2001) should be interpreted as follows: single establishment firms that had zero employment during the first quarter of 2000 and positive employment during the first quarter of 2001. Other calendar year designations have similar interpretations.
 Data Source: U.S. Census Bureau Longitudinal Establishment & Enterprise Micro Data file
 Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

Table B-16. New Firm Birth Rankings

Metropolitan Statistical Area	NFB per 1,000 Labor Force 2000- 2001	NFB per 1,000 Labor Force 2001- 2002	Change in NFBs, 1998- 2001	Overall
Akron, OH	28	30	27	30
Austin, TX	11	15	32	17
Buffalo, NY	33	31	2	18
Canton, OH	32	36	23	32
Charlotte, NC	8	11	36	22
Cincinnati, OH	35	35	26	35
Cleveland, OH	25	26	13	26
Columbus, OH	30	33	31	33
Denver, CO	1	2	9	1
Grand Rapids, MI	34	25	1	13
Greensboro, NC	17	21	34	27
Indianapolis, IN	20	18	10	14
Jacksonville, FL	9	7	4	4
Kansas City, MO	19	16	19	20
Las Vegas, NV	7	5	30	9
Louisville, KY	24	27	35	34
Memphis, TN	27	29	33	36
Milwaukee, WI	29	28	18	28
Minneapolis, MN	16	19	24	24
Nashville, TN	14	14	16	15
Oklahoma City, OK	10	8	15	7
Orlando, FL	4	1	5	2
Phoenix, AZ	12	12	29	16
Pittsburgh, PA	31	32	21	29
Portland, OR	5	9	22	10
Providence, RI	18	17	25	23
Richmond, VA	15	13	6	11
Riverside, CA	22	20	14	21
Sacramento, CA	13	10	8	6
San Antonio, TX	21	22	3	12
San Diego, CA	2	3	12	3
Seattle, WA	3	6	28	8
St. Louis, MO	26	23	7	19
Tampa, FL	6	4	11	5
Virginia Beach, VA	23	24	17	25
Youngstown, OH	36	34	20	31

NFB - New Firm Birth

Prepared by: Center for Economic Development, Maxine Goodman
Levin College of Urban Affairs, Cleveland State University.

Table B-17. Business Costs Indices, 2004

Metropolitan Statistical Area	Business Index	Business Rank	Labor Index	Labor Rank	Energy Index	Energy Rank	Tax Index	Tax Rank	Office Rent Index	Office Rank
Akron, OH	102.6	22	102.8	16	116.6	27(tied)	104.8	31	81.1	16
Austin, TX	96.9	14	96.2	7	119.3	29	84.4	10	92.5	29
Buffalo, NY	111.0	32(tied)	105.6	19	194.4	33	115.3	35(tied)	78.8	13
Canton, OH	94.2	11	101.4	15	71.1	5	99.7	26	63.5	2
Charlotte, NC	92.7	8	94.9	6	80.5	6(tied)	92.3	17	100.5	32
Cincinnati, OH	99.2	16	107.3	20	86.6	13	102.8	30	74.2	8
Cleveland, OH	110.8	31	111.6	24	125.3	30	106.7	33	84.7	21
Columbus, OH	104.4	24	111.7	25	84.4	8	105.2	32	87.2	26
Denver, CO	101.8	20	116.3	30	89.6	16	73.1	2	76.0	10
Grand Rapids, MI	103.9	23	111.3	23	97.8	22	100.3	27	66.8	3
Greensboro, NC	90.7	4	94.7	5	80.5	6(tied)	91.4	16	79.9	15
Indianapolis, IN	92.9	9	101.2	14	68.6	4	94.0	18	74.6	9
Jacksonville, FL	107.1	27	119.3	34	100.9	24	83.5	9	76.6	12
Kansas City, MO	96.2	13	99.6	11(tied)	86.1	11	84.9	12	85.5	23
Las Vegas, NV	109.9	30	112.0	26	128.7	31	90.4	15	106.6	35
Louisville, KY	85.8	3	92.1	2	68.5	3	96.2	19	70.0	4
Memphis, TN	94.4	12	100.3	13	87.4	14	75.6	3	76.2	11
Milwaukee, WI	100.4	18	103.6	17	95.9	21	115.3	35(tied)	86.2	24
Minneapolis, MN	111.0	32(tied)	115.1	29	91.9	18	107.3	34	105.0	34
Nashville, TN	90.9	5(tied)	97.0	8	86.4	12	72.6	1	83.0	19
Oklahoma City, OK	84.7	1	98.6	10	66.2	2	81.9	8	56.4	1
Orlando, FL	105.7	25	116.5	31	89.4	15	90.3	14	86.9	25
Phoenix, AZ	94.1	10	93.4	3	100.0	23	84.6	11	89.6	27
Pittsburgh, PA	102.2	21	105.2	18	89.9	17	96.4	20	94.2	30
Portland, OR	85.5	2	80.6	1	94.8	20	101.5	28	83.5	20
Providence, RI	101.1	19	94.3	4	146.6	32	99.1	24	81.3	17
Richmond, VA	100.2	17	112.2	27	85.9	9(tied)	80.2	6	78.9	14

Table B-17. Business Costs Indices, 2004 (continued)

Metropolitan Statistical Area	Business Index	Business Rank	Labor Index	Labor Rank	Energy Index	Energy Rank	Tax Index	Tax Rank	Office Rent Index	Office Rank
Riverside, CA	129.1	34	120.4	35	200.8	35	102.6	29	100.1	31
Sacramento, CA	130.0	35	121.2	36	196.2	34	98.3	23	111.2	36
San Antonio, TX	92.4	7	99.6	11(tied)	94.5	19	78.4	4	73.1	7
San Diego, CA	133.5	36	119.2	33	218.6	36	97.7	21	102.7	33
Seattle, WA	106.6	26	110.6	22	105.2	25	99.5	25	85.3	22
St. Louis, MO	90.9	5(tied)	98.4	9	61.8	1	79.5	5	91.0	28
Tampa, FL	107.5	28	118.5	32	105.5	26	87.3	13	82.5	18
Virginia Beach, VA	98.3	15	110.1	21	85.9	9(tied)	81.4	7	71.0	6
Youngstown, OH	107.7	29	114.5	28	116.6	27(tied)	98.1	22	70.2	5

Source: Economy.com, Inc., North American Business Cost Review, 2004 Edition.

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University.

APPENDIX C – INNOVATION AND ENTREPRENEURSHIP INDICES

CREATING THE INDEX

The innovation and entrepreneurship indices are metrics based on several economic indicators. The methodology used to create the indices is based on models found in the *Metro Area and State Competitiveness Report* and a paper entitled: “Have Central Cities Come Back?”²³ The most difficult and often controversial part in creating an index is choosing a weighting scheme. The approach taken here is the simplest and most transparent: within each sub-index, each variable carries equal weight.

The aggregated (overall) index was calculated using several economic indicators—four for the innovation index (see Table 1) and three for the entrepreneurship index (see Table 3). Each indicator has one or more variables associated with it (see Tables 1 and 3). After data was collected for each variable, four steps were needed to construct the index:

Step 1: Each variable was standardized using a median score. The median score is analogous to the familiar z-score, but it uses a set of measures that are less susceptible to the influence of outliers than z-scores. In addition, median scores are an alternative to z scores for index creation when the variables used have highly skewed distributions.

Step 2: The indicator value for each metro area is the average of the standardized component variables.

Step 3: The indicator value is then scaled to give it a range from 1.00 (worst) to 10.00 (best). This scaled value becomes the sub-index.

Step 4: The aggregated (overall) innovation and entrepreneurship indices are the averages of their respective sub-indices.

²³Tuerck, David G. (2003). *Metro Area and State Competitiveness Report 2002*. The Beacon Hill Institute at Suffolk University, Boston, MA. <http://www.beaconhill.org>.
Furdell, K., Wolman, H.L., Hill, E.W. (2004). *Have Central Cities Come Back?* Paper presented at the 2004 annual meeting of the Urban Affairs Association in Washington, DC.

Table C-1. Innovation Index and Sub-Indices by Economic Indicator

Metropolitan Statistical Area	Innovation Index		Innovation Indicators Sub-Indices			
	Index	Rank	SBIR/STTR Awards	Hi-Tech Employment	R&D Funding	Patents
Akron, OH	2.32	23	1.30	4.54	1.21	2.22
Austin, TX	5.93	4	3.31	10.00	2.54	7.88
Buffalo, NY	2.49	20	1.58	3.82	2.51	2.05
Canton, OH	1.13	35	1.00	1.13	1.00	1.39
Charlotte, NC	1.99	28	1.20	4.13	1.08	1.54
Cincinnati, OH	3.66	9	2.14	4.99	3.13	4.38
Cleveland, OH	3.63	10	3.25	3.92	3.91	3.46
Columbus, OH	3.43	13	2.37	5.23	3.75	2.38
Denver, CO	4.57	5	4.20	8.05	2.96	3.07
Grand Rapids, MI	1.97	29	1.00	4.36	1.04	1.48
Greensboro, NC	1.73	33	1.09	3.37	1.12	1.35
Indianapolis, IN	2.63	15	1.42	4.46	1.90	2.72
Jacksonville, FL	1.91	30	1.24	4.03	1.11	1.28
Kansas City, MO	2.60	16	1.25	5.60	1.52	2.04
Las Vegas, NV	1.33	34	1.26	1.57	1.13	1.38
Louisville, KY	1.99	27	1.23	3.54	1.71	1.49
Memphis, TN	1.81	32	1.12	2.86	1.93	1.33
Milwaukee, WI	3.00	14	1.32	5.64	2.21	2.82
Minneapolis, MN	6.51	3	3.90	7.76	4.40	10.00
Nashville, TN	2.52	19	1.41	3.32	3.96	1.39
Oklahoma City, OK	2.19	26	1.27	4.24	2.03	1.21
Orlando, FL	2.30	25	2.23	3.71	1.29	1.97
Phoenix, AZ	3.51	12	2.22	4.72	1.74	5.37
Pittsburgh, PA	4.25	7	2.66	4.91	6.03	3.40
Portland, OR	4.55	6	2.48	6.06	3.08	6.60
Providence, RI	2.33	22	1.55	2.31	2.69	2.76
Richmond, VA	2.54	18	1.20	5.44	1.99	1.52
Riverside, CA	1.85	31	1.80	1.69	1.68	2.23
Sacramento, CA	3.63	11	1.70	6.75	3.40	2.68
San Antonio, TX	2.38	21	1.53	3.87	2.52	1.59
San Diego, CA	9.07	1	10.00	7.38	10.00	8.92
Seattle, WA	7.32	2	4.70	9.90	8.34	6.34
St. Louis, MO	4.00	8	1.67	5.36	5.78	3.20
Tampa, FL	2.31	24	1.62	3.65	2.08	1.90
Virginia Beach, VA	2.60	17	1.70	5.95	1.45	1.31
Youngstown, OH	1.00	36	1.00	1.00	1.00	1.00

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

Table C-2. Entrepreneurship Index and Sub-Indices by Economic Indicator

Metropolitan Statistical Area	Entrepreneurship Index		Entrepreneurial Indicators Sub-Indices		
	Index	Rank	Venture Capital	Initial Public Offering	Firm Births
Akron, OH	1.38	34	1.12	1.00	2.01
Austin, TX	4.77	4	6.35	4.27	3.70
Buffalo, NY	2.97	18	1.51	1.00	6.41
Canton, OH	1.37	35	1.05	1.00	2.07
Charlotte, NC	1.85	29	1.93	1.00	2.63
Cincinnati, OH	1.82	30	1.84	1.82	1.79
Cleveland, OH	2.60	23	1.66	1.82	4.31
Columbus, OH	1.92	28	1.34	2.64	1.77
Denver, CO	5.96	3	4.14	4.27	9.46
Grand Rapids, MI	3.27	16	1.05	1.00	7.76
Greensboro, NC	1.46	32	1.17	1.00	2.22
Indianapolis, IN	3.46	13	1.43	2.64	6.30
Jacksonville, FL	4.29	5	1.20	2.64	9.03
Kansas City, MO	2.85	21	1.93	1.82	4.82
Las Vegas, NV	3.66	10	1.73	3.45	5.78
Louisville, KY	1.40	33	1.38	1.82	1.00
Memphis, TN	1.30	36	1.06	1.82	1.03
Milwaukee, WI	2.08	27	1.25	1.82	3.17
Minneapolis, MN	4.18	7	4.45	4.27	3.82
Nashville, TN	3.18	17	2.31	1.82	5.42
Oklahoma City, OK	2.93	20	1.18	1.00	6.62
Orlando, FL	4.22	6	1.65	1.00	10.00
Phoenix, AZ	2.97	19	1.82	2.64	4.44
Pittsburgh, PA	2.82	22	3.01	2.64	2.81
Portland, OR	3.65	11	2.85	2.64	5.46
Providence, RI	2.27	26	1.74	1.00	4.08
Richmond, VA	3.29	15	1.05	1.82	6.98
Riverside, CA	2.37	25	1.06	1.00	5.06
Sacramento, CA	3.57	12	1.43	1.82	7.48
San Antonio, TX	3.42	14	1.46	1.82	6.97
San Diego, CA	9.31	1	10.00	10.00	7.92
Seattle, WA	6.66	2	8.50	5.91	5.56
St. Louis, MO	3.75	9	1.90	3.45	5.88
Tampa, FL	3.84	8	1.63	1.82	8.08
Virginia Beach, VA	2.42	24	1.28	1.82	4.16
Youngstown, OH	1.52	31	1.00	1.00	2.56

Prepared by: Center for Economic Development, Maxine Goodman Levin College of Urban Affairs, Cleveland State University

APPENDIX D – COMPARABLE METRO AREA IDENTIFICATION CRITERIA

The comparable metropolitan areas included in this report are similar in size to the Cleveland metropolitan statistical area (MSA), i.e., they are within one standard deviation in population or labor force and meet at least one additional criterion—structure, location, or growth.

- **Structure** - Metropolitan areas whose percentage of the labor force are within one standard deviation of the Cleveland MSA in each of the following categories: occupations that are related to sales and office support functions; managerial and professional occupations; and employment in industries that comprise the manufacturing sector.²⁴
- **Location** - Metropolitan areas that are located in the Midwestern states including North Dakota (ND), South Dakota (SD), Nebraska (NE), Kansas (KS), Minnesota (MN), Iowa (IA), Missouri (MO), Wisconsin (WI), Illinois (IL), Michigan (MI), Indiana (IN), and Ohio (OH).
- **Growth** - Fastest growing metropolitan areas in the United States by actual growth in the labor force or percentage growth in the labor force between June 1997 and June 2002. Data source: Bureau of Labor Statistics.

Although the Akron, Canton, and Youngstown MSAs do not meet the above criteria, they were included in the study because regional economic development agencies—BioEnterprise, Fund for Our Economic Future, JumpStart, NorTech, and Team NEO—consider them part of their service area.

²⁴Professional occupations include those in areas such as law, engineering, accounting, and information technology.