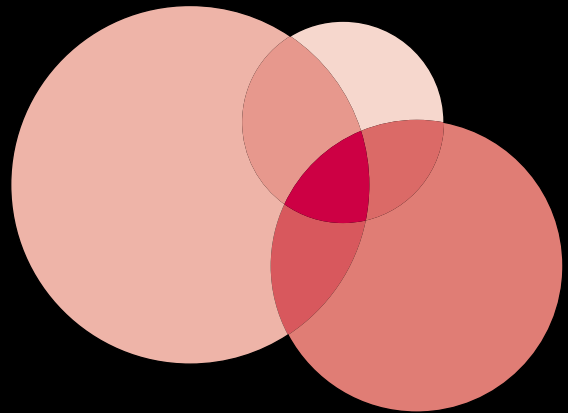




((OLDER CENTRAL COUNTIES IN THE NEW ECONOMY))

By Paul D. Gottlieb, PhD ((2001))



U.S. Economic Development Administration
Weatherhead School of Management Case Western Reserve University
In collaboration with staff of the Cuyahoga County Planning Commission

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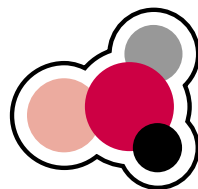
A report in fulfillment of the terms of grant # 99-07-13810 U.S. Economic Development Administration of the U.S. Department of Commerce

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This publication was prepared by Paul D. Gottlieb of the Weatherhead School of Management. The statements, findings, conclusions, and recommendations are those of the author and do not necessarily reflect the views of the Economic Development Administration or the Cuyahoga County Planning Commission.

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Executive Summary

The big picture: Older central counties in the national context

- The 61 older central counties in the United States house 29% of the nation's population and 34% of the nation's employment on only 2% of the nation's land area. These dense counties, many of them already built-out, contain the richest and poorest segments of the U.S. population side by side.
- The 61 older central counties contain 38% of the nation's high-tech employment and 45% of the nation's advanced business services employment. These "new economy" sectors are therefore more concentrated in older central counties than are other types of employment.
- Looking at growth rates across urban and rural county categories, advanced business service employment is decentralizing to smaller metropolitan and rural areas more quickly than is high-tech employment. The growth trends for advanced business services mirror those for total employment. In contrast, high-tech employment continues to concentrate in the central and fringe counties of large metropolitan areas, meaning those with one million or more people.

Distribution of employment and industries within older central counties

- The older manufacturing industries in Cuyahoga County, Ohio locate in a linear pattern that reflects the importance of the rail, river, and canal infrastructure of a century ago. New economy employment locates in a nodal pattern, frequently at interstate interchanges, including the downtown.
- The downtown is an important and growing node for new economy employment, including high-technology manufacturing. This is even true in medium-sized metropolitan areas like Cleveland. Central county governments should continue their support of development in the downtown.
- While specific high-tech industries are concentrated in certain Cuyahoga County edge cities, the academic literature on intrametropolitan firm clustering is inconclusive. We have no strong evidence that firms locate near each other to transact business in the typical edge city. It follows that policies in support of such centers should focus on place, not on industries. Local public officials are adamant in their opinion that industries rarely cluster in edge cities for the purpose of interaction, and that infrastructure represents the most important lever for public policy.



Broadband infrastructure and new economy firm location

- Broadband infrastructure is a potential location factor for small and medium-sized firms that cannot afford their own infrastructure. Real estate developers trying to lease fast-wired buildings in the suburbs (not server hotels, but generic office space) report that demand for broadband speeds is neither as strong nor as widespread as they had hoped. This raises the issue of e-commerce education and advocacy among small businesses in places like Northeast Ohio.
- Cleveland's location as a hub of national Internet carriers is an advantage only to the extent these carriers compete to extend this capacity over the "last mile." Since there is no guarantee that private telecommunications companies will wire the county in accordance with public objectives, municipal and county governments should become better informed about these processes and broadband locations. Some communities in the United States are building their own broadband systems, though this can be a risky proposition for public entities.

New economy development policies should target different socio-economic groups

- An ideal new economy landscape might include high-density employment centers surrounded by well-designed, pedestrian- and bicycle-friendly residential communities — all informed by principles of neo-traditional design. Regardless of the design philosophy, communities should realize that knowledge workers value aesthetics and amenities, and dislike haphazard planning.
- Tech-oriented knowledge workers in Cuyahoga County work in both new and old economy zones, but they live in areas with high educational attainment outside of the older industrial zone. For the most part, they are scarce in minority neighborhoods. An investigation into the residential side of new economy development necessarily raises issues of equity and the so-called "digital divide."
- The main policy challenges for older central counties are *retention, amenities, and equity*. ○

America's 61 "Older Central Counties"

MARICOPA COUNTY, AZ
ALAMEDA COUNTY, CA
LOS ANGELES COUNTY, CA
RIVERSIDE COUNTY, CA
SACRAMENTO COUNTY, CA
SAN BERNARDINO COUNTY, CA
SAN DIEGO COUNTY, CA
SAN FRANCISCO CITY/COUNTY, CA
SANTA CLARA COUNTY, CA
DENVER CITY/COUNTY, CO
HARTFORD COUNTY, CT
DISTRICT OF COLUMBIA, DC
BROWARD COUNTY, FL
DADE COUNTY, FL
HILLSBOROUGH COUNTY, FL
SEMINOLE COUNTY, FL
DE KALB COUNTY, GA
FULTON COUNTY, GA
GWINNETT CO, GA
COOK COUNTY, IL
MARION COUNTY, IN
WYANDOTTE COUNTY, KS
NEW ORLEANS CITY/ORLEANS, LA
BALTIMORE CITY, MD
MIDDLESEX COUNTY, MA
SUFFOLK COUNTY, MA
WAYNE COUNTY, MI
HENNEPIN COUNTY, MN
RAMSEY COUNTY, MN
CLAY COUNTY, MO
JACKSON COUNTY, MO
ST. LOUIS CITY, MO
HILLSBOROUGH COUNTY, NH
CAMDEN COUNTY, NJ
ESSEX COUNTY, NJ
HUDSON COUNTY, NJ
BRONX COUNTY, NY
ERIE COUNTY, NY
KINGS COUNTY, NY
MONROE COUNTY, NY
NEW YORK COUNTY, NY
QUEENS COUNTY, NY
RICHMOND COUNTY, NY
MECKLENBURG COUNTY, NC
CUYAHOGA COUNTY, OH
FRANKLIN COUNTY, OH
HAMILTON COUNTY, OH
MULTNOMAH COUNTY, OR
ALLEGHENY COUNTY, PA
PHILADELPHIA CITY/COUNTY, PA
SHELBY COUNTY, TN
BEXAR COUNTY, TX
DALLAS COUNTY, TX
GALVESTON COUNTY, TX
HARRIS COUNTY, TX
TARRANT COUNTY, TX
SALT LAKE COUNTY, UT
NEWPORT NEWS CITY, VA
NORFOLK CITY, VA
KING COUNTY, WA
MILWAUKEE COUNTY, WI



Introduction

The policy task we have set for ourselves in this report is broad. We seek to answer the question: “How should an older central county think about spatial planning in the so-called New Economy?” The answer to this question requires a review of literatures in geography and planning, as well as original mapping and data research. Our partner for this research has been the Planning Commission of Cuyahoga County, Ohio, where Cleveland is the county seat. Constant interaction with local planners in a workshop setting has improved the quality and applicability of the research reported here.

In addition to the obvious relevance of this project to Cleveland and Cuyahoga County, the results transfer readily to other old central counties around the country. These are counties that contain a large number of the urban poor in this country. But older central counties exhibit sharp contrasts, containing many of the nation’s affluent residents alongside the urban poor. As areas that are dense with telecommunications infrastructure, and as the entertainment and business service centers of their respective regions, older central counties enjoy considerable opportunities in the new high-tech economy even as they grapple with social welfare needs, many of which are lodged at the county level of government.

According to the U.S. Department of Agriculture (USDA), there were 167 central counties of large metropolitan areas—those with population greater than one

million—in 1990. For this study we adjusted the Department of Agriculture’s 1990 typology to match their earlier, 1980 definition of older central counties (table 1). We have selected only those counties in each large primary metropolitan statistical area that contain the largest central city. These 61 older central counties contain 29% of the population and 34% of the employment in the entire United States (see table 2 and figure 1).

A quick word about “older”

Our 61 counties are necessarily dense and urban because they lie at the core of the nation’s largest metropolitan areas. But are they really older? Generally speaking, counties in the core of any metropolitan area are older than those on the periphery because they were settled first—before the waves of suburbanization that began in the 19th century and accelerated after World War II. There is usually a steady decline in the age of any metro area’s housing stock as you move from its city neighborhoods to its outer suburbs.

It is less true that the central counties of metropolitan areas above 1 million people are older than the counties of smaller metropolitan areas. Certainly the longer a central county has been in existence, the more time its metropolitan area has had to grow to a scale of a million or more. Many sites of initial settlement in the United States fit this profile. Bigger is clearly older for the metropolitan areas of New York, Boston, Philadelphia, and Denver—within the

TABLE 1. USDA RURAL-URBAN CLASSIFICATION SYSTEM FOR U.S. COUNTIES, 1980 and 1990⁽¹⁾

COUNTY CLASSIFICATION ^{(2),(3)}	NUMBER OF COUNTIES IN 1980 ⁽¹⁾	NUMBER OF COUNTIES IN 1990 ⁽¹⁾
Central county of MSA over 1 million population	54	61 ⁽³⁾
Fringe county of MSA over 1 million population	173	238 ⁽³⁾
County in MSA with 250,000 to 1 million population	289	315
County in MSA with under 250,000 population	198	199
Nonmetropolitan county adjacent to an MSA	918	989
Nonmetropolitan county not adjacent to an MSA	1465	1299
TOTAL COUNTIES	3097	3101

Source: Butler, M. 1990. *Rural-urban continuum codes for metro and nonmetro counties*. Agriculture and Rural Economy Division, Economic Research Service, U.S. Department of Agriculture. Staff Report No. 9028; Butler, M., and C. Beale. 1994. *Rural-urban continuum codes for metro and nonmetro counties*. Agriculture and Rural Economy Division, Economic Research Service, U.S. Department of Agriculture. Staff Report No. AGES 9425.

Notes:

- (1) The population data underlying these codes are for the census years, but county metropolitan status is that which was released three years after each census, incorporating census findings. Therefore the codes could accurately be described as either 1980 & 90 or 1983 & 93.
- (2) For purposes of the present analysis, the Agriculture Department’s ten county classifications have been collapsed into six. Here rural counties are distinguished solely on the basis of their adjacency to metro areas, rather than on the size of their urbanized populations. Thus a small-scale measure of rural urbanization is sacrificed in favor of a large-scale measure: relationship to the metro core. This more streamlined presentation should highlight the salient trends.
- (3) MSA is defined as the CMSA if applicable, MSA elsewhere. Several fringe counties of large metropolitan areas were redefined by the USDA as ‘central’ for the 1990 update on the basis of a new criterion, a population threshold. In order to maintain comparability with the 1980 codes, we have applied the older definition to 1990, in which a large-metro county can only be central if it contains a central city. All the remaining codes were defined similarly in both years.



Rocky Mountain region, at least.

But sometimes the site of initial settlement is overtaken economically by a subsequent settlement. It is instructive to make a list of these historically bypassed metro areas, using the central city's year of incorporation as a guide to their age. Savannah, Georgia was founded in 1789, Macon in 1823, and Atlanta only in 1847. Galveston, Texas was founded in 1839 but Dallas did not incorporate until 1871. St. Augustine, Florida was founded in 1565 and incorporated under state law in 1824. Miami did not incorporate until 1896. Washington, DC (1790) was beaten to the starting line by Williamsburg (1722), Baltimore (1745), and Richmond (1782).

There is a story behind each of these bypassed cities, of course. For the purposes of this study, we will simply say that the central counties of metropolitan areas above 1 million people are likely to be fairly old — if not the oldest counties in their states or regions — and that they are certainly older than the counties that surround them. This slight ambiguity in the word “older” reflects the dual purpose of the Department of Agriculture's typology, which distinguishes counties both within and between different types of metropolitan areas.

Research approach

We seek to inform economic development policy in older central counties in the context of the new economy. Our research inquiry involved four steps:

- (1) We conducted a detailed analysis of high-technology and producer services employment across USDA county categories;
- (2) We reviewed academic literatures that might be relevant to development policy in older central counties;

- (3) We created maps of phenomena within Cuyahoga County, Ohio, that relate to this geographic literature; and
- (4) We held two workshops with community leaders in Cuyahoga who reacted to preliminary findings and provided anecdotal research information.

We identified four literatures in geography and planning that should be relevant to county policy making and are therefore worthy of review:

- (1) The *industry cluster* concept holds that specialized competitors, customers, and suppliers that concentrate in a metro region will be more competitive because they share a dedicated labor force, utilize technological knowledge, and spur each other on to greater performance. But what does this theory mean at the *intrametropolitan* scale — especially for older, central counties? Do firms in the same industry cluster at a scale smaller than the entire labor market? If so, where?
- (2) The rise of *edge cities* and the location decisions of high-technology and producer service firms within metropolitan areas;
- (3) The location of high-speed information infrastructure; and
- (4) The location of knowledge, broadly defined.

We describe the policy relevance of these academic literatures below. First we profile America's older central counties and describe their role in the new economy. ○

TABLE 2. DESCRIPTIVE DATA ON COUNTY CATEGORIES

Mean values	Older central counties (N=61)	Other metro counties (N=775)	Nonmetro counties (N=2304)	Cuyahoga County, OH	
Land area (square miles)	1231.4	778.5	1240.8	458.3	
Average Population in 2000	1,322,772	186,546	24,394	1,393,978	
Percent population growth, 1990-2000	11.2	18.0	8.8	-1.3	
Percent population growth, 1980-1990	12.6	14.7	0.7	-5.8	
Percent employment growth, 1988-1997	12.7	23.8	14.1	11.3	
Percent white population in 1996	72.5	87.7	88.6	71.6	
Percent black population in 1996	21.9	9.9	8.6	26.6	
Percent Hispanic population in 1996	13.3	5.2	5.0	2.6	
Percent adults with high school degree, 1990	76.3	74.8	67.7	74	Sources: USA
Percent adults with college degree, 1990	23.4	17.8	11.8	20.1	Counties 1998 CD
Personal income per-capita in 1994	\$23,871	\$19,429	\$16,703	\$25,126	ROM; 2000
Payroll per employee in 1995	\$28,900	\$22,563	\$18,389	\$29,377	decennial census;
Percent persons below poverty line in 1993	17.3	13.1	17.5	18.1	1997 County
Unemployment rate in 1996	5.5	4.9	6.4	5.2	Business Patterns
Average new private housing units authorized, 1997	5235	1159	96	2513	Categories based
--> per square mile	10.6	2.3	0.2	5.5	on USDA 1990
Average valuation of new private housing units 1997 (\$000)	\$542,103	\$113,553	\$8,531	\$369,984	rural-urban
--> per square mile	\$845,575	\$216,964	\$16,705	\$807,297	continuum codes
					(adjusted).



Older Central Counties in the U.S.: An Overview

Page 3 lists the 61 older central counties in the United States. Table 2 provides descriptive data, comparing this category to all other metropolitan counties, to all non-metropolitan counties, and to Cuyahoga County, Ohio.

The large average land area of older central counties is explained by the inclusion of San Bernardino and Riverside Counties among the 61. The remaining statistics are a study in contrasts. Older central counties are the most populous county category. They grew more slowly than other metropolitan counties between 1990 and 2000, but they had faster population growth than rural counties—in spite of having a much larger population base.

Older central counties have a disproportionate share of the nation's minorities, and they match rural counties' high poverty and unemployment rates. At the same time, older central counties lead the nation in per-capita income and employee earnings. While some of these earnings compensate for these counties' higher cost of living, the fact that older central counties have high educational attainment suggests that their income advantage also reflects a return to human capital. As the dense cores of large metropolitan areas, older central counties are expected to be places where so-called "urbanization economies" help businesses to be more productive; this should also show up in workers' paychecks.

As a group, older central counties have the least developable land of all the county categories, and this is thought to be a serious constraint on their growth.¹ Nevertheless, the average older central county has been

authorizing more new housing units per square mile than other metropolitan counties, and these units have higher average valuations.

Cuyahoga is typical of older central counties around the nation, except that it is smaller and more densely populated than average. Cuyahoga also has two characteristics that typify midwestern counties: slow growth and relatively few Hispanic residents. Both are partly due to the fact that midwestern metros are not the location of choice for international immigrants into the United States.

Total employment across county categories

The fact that a mere 2% of the nation's counties with approximately 2% of the nation's land area contain one-third of all economic and demographic activity is a remarkable testament to the continued viability of the cores of large metropolitan areas in this country. Provided that we include the suburbs of central counties—and not just their central cities—the cores of large metro areas continue to dominate other parts of the country by almost every measure. Figure 1 shows this dominance clearly for total employment. (*Note:* Had we maintained the USDA's 167-county definition of central counties in large metros, the dominance of the central counties would be so great we could not include all the categories on the same bar chart—so large would be the difference in the scale of employment.)

Figure 2, however, shows that the employment dom-



inance of the 61 older central counties is eroding. Every county category except for non-adjacent rural counties is growing faster than the 61 central counties. In planning jargon, the older central counties enjoy a dominant “share” but suffer from a “shift” that will inevitably redistribute employment to other types of counties.

Does figure 2 describe an inevitable decentralization of economic activity within the United States? Not necessarily. Membership of the USDA county categories is not fixed. While the fringe county of a large metropolitan area cannot suddenly become a central county, every once in a while a metropolitan area with 250,000 to 1 million people will join the 1 million club (e.g., Orlando in the 1990s). When this happens, that metropolitan area’s central county should rightfully be added to the 61 existing central counties.

Any measure of decentralization should look at the distribution of population and employment across types of counties—not across a set of counties whose classifications are fixed for all time.³ The bar charts in this report do not make this adjustment because USDA county classification codes are not available after the early 1990s. Thus, we leave the important question of the decentralization of America’s population and employment to the many studies now emerging from the 2000 decennial census.³

New economy employment across county categories

In order to get a handle on older central counties’ role in the new economy, we must define a set of industries that fit this phrase. We have identified a set of

industries that pay above-average salaries, employ a high proportion of educated professionals, and have experienced extraordinary growth in employment and earnings over the 1990s. These industries fall into three categories: information technology, biotechnology, and producer services.

Although computer hardware is produced for export in a relatively small handful of metropolitan areas, information technology (IT) has become a business service in every metropolitan area, one that is frequently outsourced. Our definition of IT industries is based on the influential reports of the American Electronics Association (AEA).⁴

The AEA high-tech definition ignores that other great growth sector in the U.S.: biotechnology. The Center for Regional Economic Issues used expert opinion to establish its own definition of the biotechnology sector.⁵ The Center maintains unsuppressed County Business Patterns data at the 4-digit SIC level. This permits us to use 4-digit industry classifications to define a high-tech sector that combines both IT and biotech (see figure 3). This combined list of high-tech jobs was featured in the *New Economy Index of Metropolitan Areas*, a joint publication of the Center and the Progressive Policy Institute.⁶

A possible criticism of our list of high-tech industries is that it ignores new technologies that have not gotten as much press attention as IT and biotech. Some of these, like advanced materials, may be housed within more traditional SICs, like plastics or industrial machinery.

If we choose to rely on the SIC system, however, we cannot separate these cutting-edge sectors from older industries that have experienced lackluster growth and do

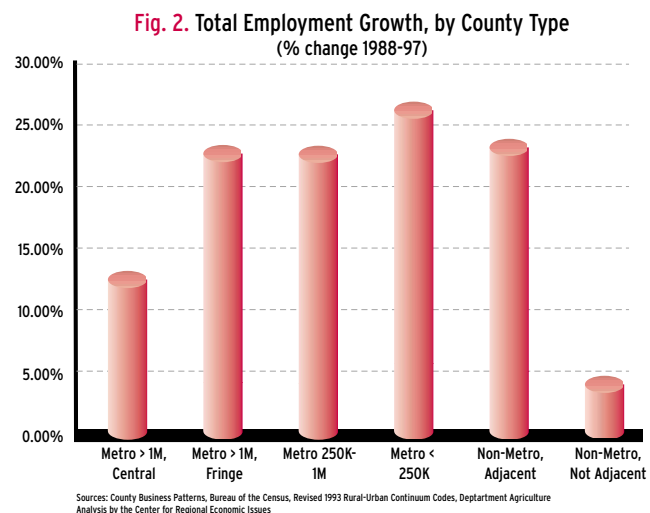
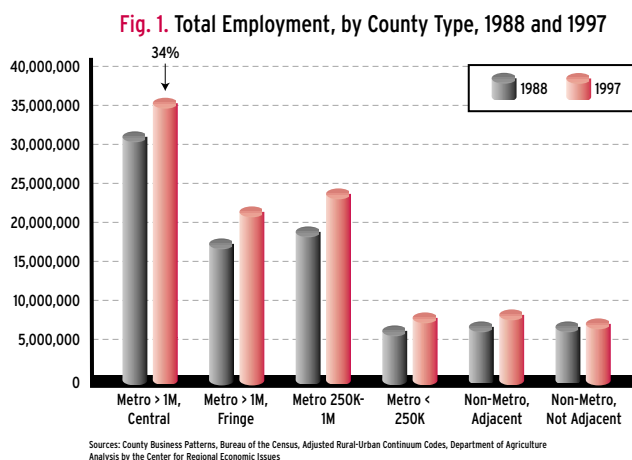
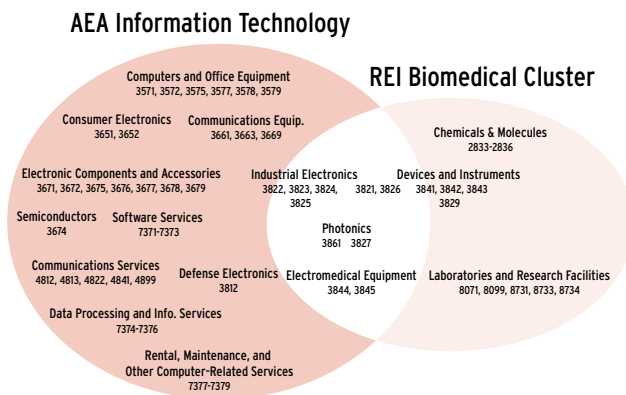




Fig 3. High-Tech Industry Definition



not employ a high proportion of scientists and engineers. IT and biotech are fundamental technologies that have proven staying power and broad market demand. Since our goal is to trace the geography of knowledge industries in general, the reader may view our list of high-tech industries as illustrative rather than comprehensive. We expect other high-technology jobs to locate in a similar pattern, if their location is driven by the production needs of a technology-based business or by the lifestyle needs of educated professionals.

Because we focus on knowledge jobs, we also decided to look at a sector known as producer services—i.e., services provided to businesses rather than to individual consumers. Producer services have been widely studied by economic geographers because of their rapid growth and presumed relationship to command-and-control systems within corporate and urban hierarchies.⁷

For our purposes, the key characteristic of producer service industries is that they employ lots of degreed professionals. Our short list of these industries was designed to avoid industries, like banks, that employ less-educated clerks or exhibit a retail location pattern at the intrametropolitan scale. We call the resulting sector “advanced business services” (see figure 4). As with our high-tech industries, this list should be regarded as illustrative rather than comprehensive. Our goal is to look at knowledge-driven, new economy jobs as an ideal type. To that end, high-tech and advanced business services jobs will often be combined into a single category on the Cuyahoga County maps.

High-tech employment

Figure 5 shows the distribution of high-technology jobs across the USDA county categories in 1988 and 1997,

while figure 6 shows the relative growth rates between the two years. Older central counties have a higher share of high-technology jobs (38%) than they do of total jobs (34%). The standard interpretation of this fact is that high technology is a more centralized activity than others, relying on urbanization economies and face-to-face contacts in the center of large metropolitan areas.⁸ An alternative explanation is that high-tech workers are particularly interested in cosmopolitan amenities that can only be found in the central counties of the nation’s largest metropolitan areas.⁹

Also notable in a comparison of figures 1 and 5 are the relatively large share of high-technology employment in the fringe counties of large metropolitan areas and the relatively small share of high-technology employment in nonmetropolitan counties. Again, the story is one of centralization relative to the remainder of the economy.

Not only are high-technology industries relatively centralized, their growth rates are less decentralizing than are those of aggregate employment. In our graph of high-tech employment growth between 1988 and 1997 (figure 6), the fringe and central counties of large metropolitan areas rank first and second among all the county categories. In our graph of total employment growth (figure 2) older central counties rank second to last, while the fringe counties of large metropolitan areas are tied for third.

An obvious question arises: Are these results driven by a few well-known tech counties, like Santa Clara, California, or Middlesex, Massachusetts? If so, the pat-

Fig. 4 Advanced Business Services Industry Definition

SIC 8700	Engineering, accounting, research, management services (“consultants”)
SIC 8100	Legal services
SIC 7310	Advertising

tern shown in figures 5 and 6 may not be relevant to metropolitan areas like Cleveland, Tucson, or Kansas City. They may be the product of a few special cases.

Employment is indeed concentrated within the 61-county cohort. The five largest central counties (Los Angeles, Cook, New York, Harris, and Dallas, in order) contain 30.3% of total employment in the 61 counties. The



top five *high-tech* counties (Santa Clara, Los Angeles, Middlesex, Cook, and Dallas, in order) contain 36.5% of the high-tech employment in the 61 counties.

It is important to note that the uneven distribution of high-tech employment across the 61 counties is not all that different from the uneven distribution of total employment across the 61 counties. New York, Los Angeles, and Cook counties are the behemoths in the U.S. urban system no matter which industry you look at. Even if relatively few counties were active in high technology, the fact would remain that those counties exist at the core of large metropolitan areas.

Moreover, an examination of the distribution of high-tech jobs within the Cleveland PMSA (figure 7) shows that the central county of a medium-sized metropolitan area can be even more dominant in high-tech than would be the case in Atlanta, Chicago, or New York. While figure 7 omits rural counties entirely, the ratio of central to fringe county high-technology jobs in the Cleveland PMSA is clearly higher than for all metropolitan areas with more than 1 million people (figure 5).

This makes sense, since the fringe counties of metropolitan areas like New York and Atlanta are more urbanized than fringe counties in the Cleveland PMSA: *they contain more of everything*. Meanwhile, high-tech employment in Cuyahoga County is big enough to matter. The county's 29,000 high-tech jobs constitute 1.5% of the 61-county total and .5% of all high-tech jobs in the nation (compared to Cuyahoga's .7% share of total U.S. employment).

We conclude that (1) high-technology jobs are relatively concentrated in the nation's older central counties, (2) this phenomenon is not restricted to the Boston and San Jose metropolitan areas, and (3) high-tech location within Cuyahoga County constitutes a reasonable case study, since the sector is not trivial there.

Advanced business services employment

Figure 9 shows that advanced business services employment is even more centralized across the nation than is high-tech. The 61 older central counties have 45% of advanced business services employment, compared to 38% of high-tech and 34% of total employment.

This location pattern should be no surprise. Theorists argue that advanced business services require frequent face-to-face contact and close proximity to corporate headquarters and government offices in the central city.¹⁰ Business services are also increasingly easy to export, and can therefore locate in financial or government centers at the very peak of the global urban hier-

Fig. 5. High-Tech Employment, by County Type, 1988 and 1997

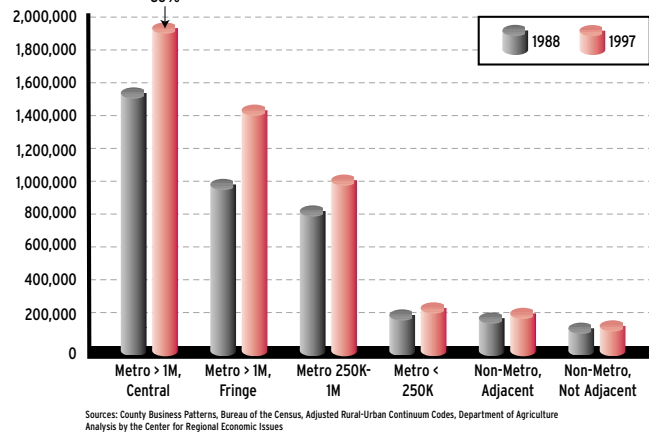


Fig. 6. High-Tech Growth by County Type (% change 1988-97)

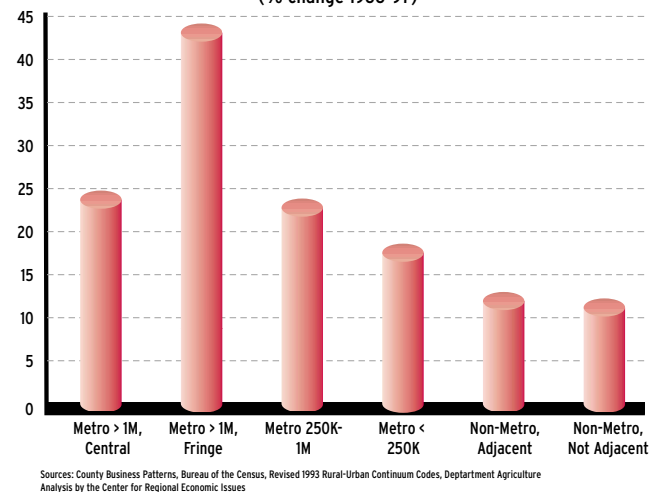
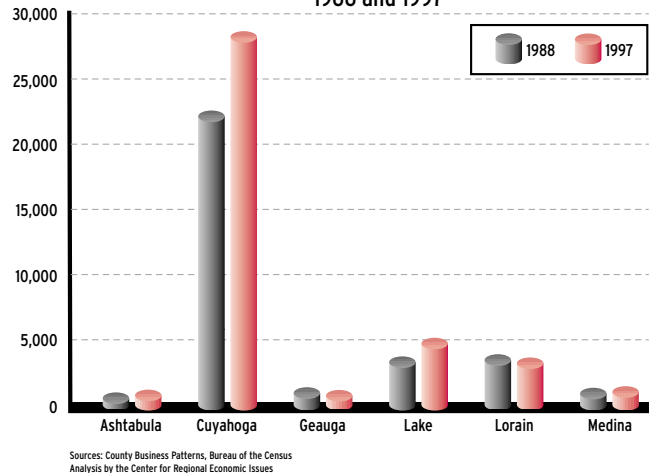


Fig. 7. High-Tech Employment in Cleveland PMSA Counties, 1988 and 1997





archy (so-called “world cities”). These trends explain the concentration of business services jobs in the urban core on the one hand, and in U.S. metropolitan areas with more than 1 million people on the other. Manhattan, Los Angeles County, and Cook County alone combine for almost 28% of advanced business services employment in the 61 older counties, 12.4% of advanced business services nationwide.

Interestingly, county growth patterns for advanced business services look more like those of total employment than do high-tech (figure 10). Many types of counties share in business services growth, while older central counties lag behind. It appears that business services are still less likely to export outside the metropolitan region than high-tech manufacturers: therefore they must follow their customers within the metro area.

Although still relatively centralized, we would expect business services location to begin to track the trend in total employment. As the latter sprawls, so will the former. Opportunities for face-to-face contact foregone in the central city may need to be recreated in dense employment centers on the periphery (more on this below). Some components of advanced business services, like law firms involved in heavy litigation, must remain in the core administrative centers. Others will suburbanize in pursuit of clients.

An analysis of the share and shift of advanced business services within the Cleveland PMSA (figures 11 and 12) parallels our earlier discussion of high-tech employ-

ment. Advanced business services are even more centralized within this single medium-sized PMSA than they are in all metropolitan areas with more than a million people (compare figures 9 and 11). But Cleveland’s outlying counties are growing faster than the core, as is the case across all large metropolitan areas.

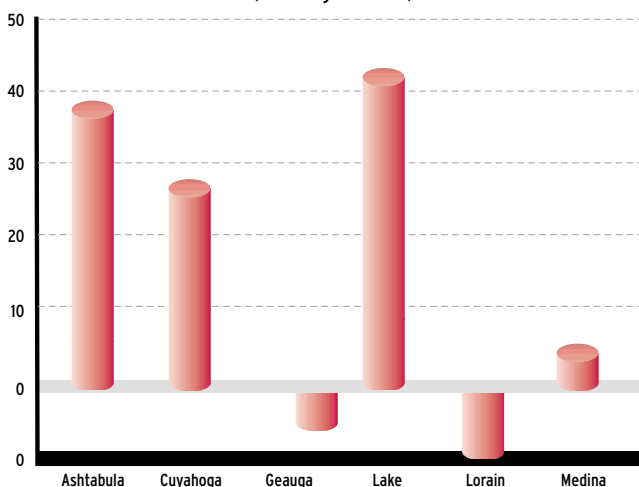
We conclude that the cross-county shift in advanced business services mirrors trends in the broader economy, while the cross-county shift in high-technology employment does not. Cuyahoga County remains a reasonable case study for both new economy sectors.

Policy implications of the national overview

It is difficult to know whether to be optimistic or pessimistic about new economy development in older central counties. On the one hand, older central counties appear to have locational advantages for those sectors that are fast growing and knowledge-intensive. High tech and advanced services are disproportionately located in older central counties throughout the nation.

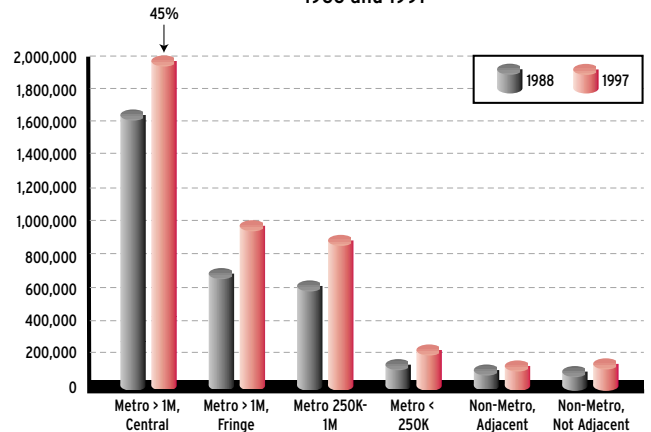
Growth trends are redistributing jobs away from the “big 61,” but more for producer services than for high tech. And just because outlying counties are growing faster does not mean that central county dominance will disappear anytime soon. First, counties are moving up the urban hierarchy even as employment grows more quickly in fringe counties and smaller metros. A second thing to consider is the pace of decentralization. Note that if present growth rates across the six counties continued,

Fig. 8. High-Tech Employment growth in Cleveland PMSA (% change 1988-97)



Sources: County Business Patterns, Bureau of the Census, Revised 1993 Rural-Urban Continuum Codes, Department Agriculture Analysis by the Center for Regional Economic Issues

Fig. 9. Advanced Business Services Employment, by County Type 1988 and 1997



Sources: County Business Patterns, Bureau of the Census, Revised 1993 Rural-Urban Continuum Codes, Department of Agriculture Analysis by the Center for Regional Economic Issues



Cuyahoga County's share of total new economy employment within its primary metropolitan area would not fall below 50% until well into the next century.

Over the last twenty years, economists and geographers have been impressed by the extent to which the new information technologies have not reduced the importance of agglomeration in the nation's urban centers.¹¹ If this observation is true for the economy at large, it is even more so for new economy sectors like high technology and producer services. Joel Kotkin, for example, foresees a renaissance in central cities that is related to the increased role of the creative process in such cutting-edge businesses as "new media."¹² Broadway and *haute couture* need the big city; is the same now true of electronic media and industrial design? Trends like these should cause the leaders of older central counties to rejoice.

The more ominous trends for older central counties lie in population movements, demographic and social trends, and the realities of real estate development. Because residences still lie farther out, on average, than employment, older central counties have a smaller share of metropolitan population than they have of metropolitan jobs. Exurban residents are more affluent and have relatively weak attachments to central city institutions.¹³

Central city social problems seep into inner suburbs, weakening the competitive advantage of central county suburbs vis-à-vis those in outlying counties. There is no guarantee that the demand for face-to-face contact in dense urban centers will continue to dominate those

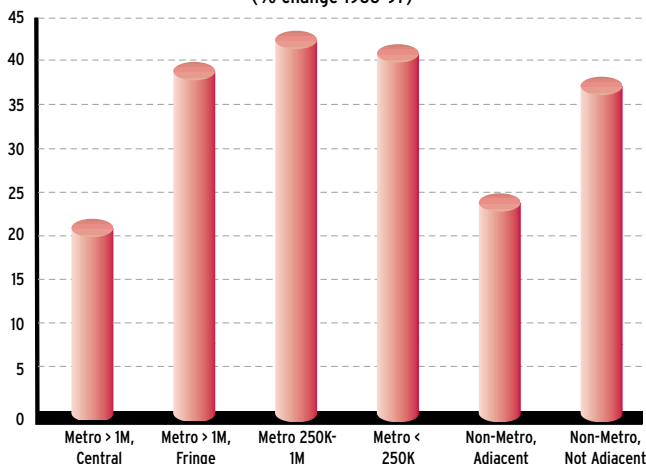
forces that drive knowledge businesses to locate where many workers and proprietors live. Land assembly is a perpetual problem in older central counties, and the existing housing stock is viewed as older and less desirable.¹⁴

Finally, modern information technologies have yet to achieve their full potential for conducting business at a distance. What will happen when everybody sitting in an office enjoys on-demand videoconferencing capabilities? Recent employment trends in older central counties have not been overly alarming: the problem, in the words of the mutual fund companies, is that "past performance is no guide to future performance."

That is why many older central county officials feel that they are fighting a rear-guard action against urban sprawl. These leaders embrace Smartgrowth and other programs designed to combat outward migration. Yet in economic development terms, the real challenge is to *strengthen and retain* the agglomeration advantages that older central counties already enjoy. One piece of this agenda is to recognize the special role played by the nation's large downtowns in tourism and advanced business services.¹⁵ Most large cities have already figured this out, and have installed the infrastructure—convention centers, fiber optic lines, executive education facilities—necessary to retain these functions.

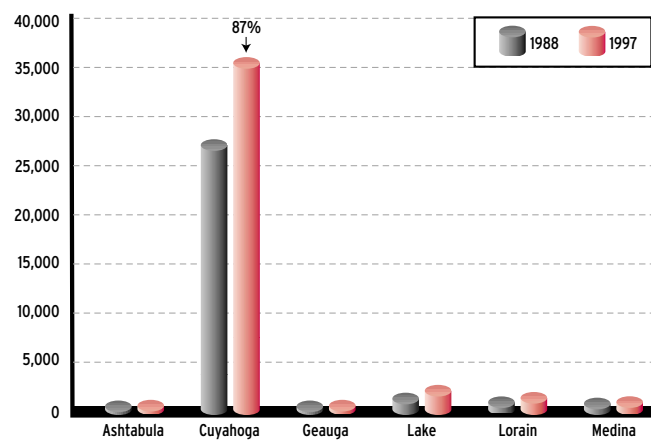
A second, less well-recognized piece of the older central county agenda is to recognize that these counties have high-quality business locations that are suburban in every sense of the word. These are the older, established

Fig. 10. Advanced Business Services Employment, by County Type (% change 1988-97)



Sources: County Business Patterns, Bureau of the Census, Revised 1993 Rural-Urban Continuum Codes, Department Agriculture Analysis by the Center for Regional Economic Issues

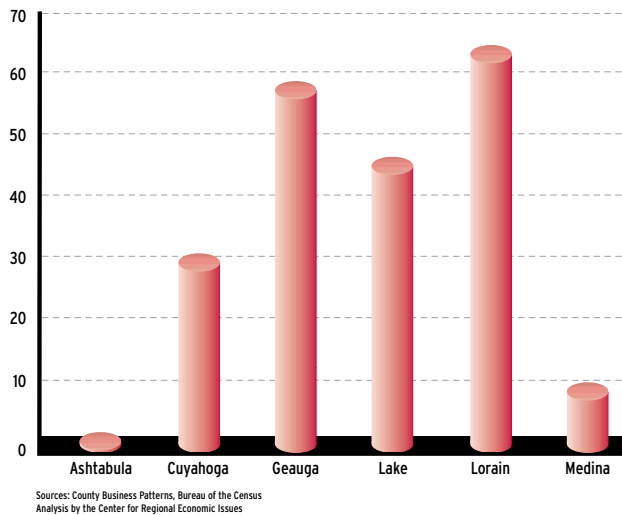
Fig. 11. Advanced Business Services Employment in Cleveland PMSA Counties 1988 and 1997



Sources: County Business Patterns, Bureau of the Census Analysis by the Center for Regional Economic Issues



Fig. 12. Advanced Business Services Employment Growth in Cleveland PMSA (% change 1988-97)



edge cities that lie at interstate intersections within the central counties. If these locations can be better understood and planned for, with amenity and business support systems that appeal to the knowledge workers who use them, then development may be concentrated in high-density locations inside older central counties.

Spatially sensitive economic development planning can help control sprawl at both intra- and intercounty scales. It may even be the case that an anachronistic debate between the “city” and the “suburbs”—with all edge cities lumped into the latter category—has caused us to lose sight of achievable, intermediate-range objectives in the fight against urban sprawl.¹⁶ This simple premise drives much of the work in this report.

The following section seeks to develop a better understanding of high-density employment centers within the polycentric metropolis that is Greater Cleveland. We are particularly interested in understanding the overlay of Cleveland’s economic geography (edge cities, downtown, industrial corridors) with the new economy sectors defined in this section. This mapping analysis, combined with feedback from our community workshops, has helped us develop policy recommendations that support Cuyahoga County’s knowledge-driven edge cities without sacrificing the county’s traditional industrial base. ○



Location of Old and New Economy Industries within Cuyahoga County, Ohio

In order to contrast the intracounty location patterns of old and new economy industries, we have defined a set of manufacturing industries that have a long history in Greater Cleveland. These industries are basic aluminum, copper, chemicals, motor vehicles, and steel. The distribution of these sectors within Cuyahoga County is depicted in figure 13. In this figure, we have drawn a stylized boundary around the old economy sectors. The main lesson of these two figures is that the old economy has located in a linear pattern that follows rail rights-of-way and the Cuyahoga River Valley. This location pattern is a legacy of manufacturing firms' orientation to the transportation infrastructure of a hundred years ago.

Contrast figure 13 with a map of the combined new economy sectors of high technology and advanced business services. This map (figure 14) shows a clear *nodal* pattern, with employment concentrated in the downtown and at major highway intersections throughout the county. This nodal pattern is not evident until you use graduated circles to depict establishment size. It follows that new economy establishments are larger in edge city locations than they are elsewhere in the county. This fact — not so much establishment clustering — accounts for the large number of jobs in these locations.

Another interesting finding from figure 14 is that we did not identify strong clusters of private high tech employment adjacent to some of our large public and nonprofit research institutions. These include Cleveland's

massive research hospital complex at University Circle (numbered 2 in figure 14) and a NASA facility adjacent to Cleveland Hopkins airport (numbered 14 in figure 14). Our failure to classify the area around NASA as a new economy employment center was a judgment call, since it could be regarded as a small cluster on the basis of employment visible to the eye. There is very little private high tech employment, however, in University Circle.

The data mapped in figure 14 is restricted to private-sector establishments. Both NASA-Airport and University Circle qualify as high-density employment centers using a standard edge city criterion.⁷ In the case of NASA-Airport, much of this employment is in durable manufacturing, transport, professional services, and public administration. In the case of University Circle, it is overwhelmingly concentrated in nonprofit healthcare delivery and research.¹⁸ Other cities, like Seattle, have seen a private-sector biomedical cluster arise in the vicinity of their nonprofit health research institutes.¹⁹ Cleveland's failure to grow such a cluster adjacent to the Cleveland Clinic and Case Western Reserve University may be the result of a weak technology transfer strategy or just plain entrepreneurial bad luck. Alternatively, an absence of traffic congestion in a medium-sized metro area like Cleveland may permit biotech startups to locate in outlying nodes without sacrificing communication opportunities.

The nodal location of new economy employment in Cuyahoga County is reflected in other mappable datasets. A map of corporate members of the Northeast



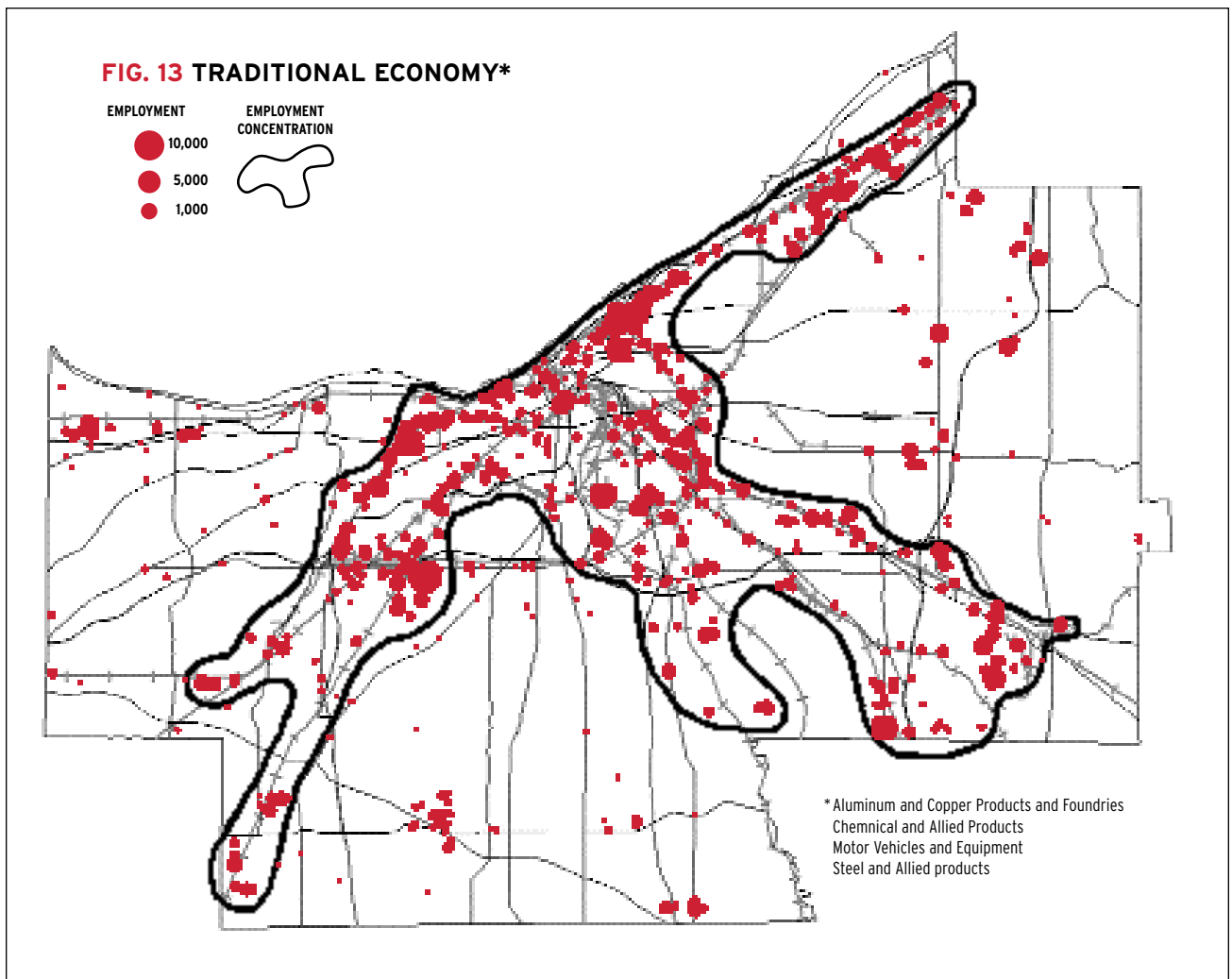
Oho Software Association (figure 15) shows that these firms appear to avoid the county's old economy corridor, with the exception of those areas in the corridor that overlap with the high-density centers identified in figure 14. Software firms are widely scattered in the outer suburbs of the county. If we had data on the employment size of these software association members, we would expect to see larger establishments clustered at interstate intersections, as in figure 14.

Another popular measure of new economy activity is "gazelle companies," those of medium size with very rapid revenue growth.²⁰ Our local measure of gazelle companies was taken from a list of "Weatherhead 100 companies" from 1995 to 2000 (figure 16). These fast-growing companies received awards from the Weatherhead School of Management for their dynamism. They seem to locate in the tech nodes of figure 14, or in the immediate vicinity of these nodes. Cleveland's

downtown is very well represented as a locus of fast-growing companies, which is good news for central city advocates.

Our broad conclusion from this section that the old and new industry sectors were attracted to the transportation system that dominated urban life at the time the sector was born. And notwithstanding the well-known migration of manufacturing establishments to greenfield sites served by truck, the historic location pattern of this sector has been durable, lasting well beyond the decline in the importance of rail transport. This in itself is good news for older central counties, as Cuyahoga maintains 61% of the PMSA's manufacturing employment—a sector for which a central location is not obviously important.

Participants in our county workshops overwhelmingly believe that transportation infrastructure drives urban form, and should be the overwhelming focus of



Source: InfoUSA

Prepared by the Cuyahoga County Planning Commission, 1/13/01



planning and lobbying. Just because economic activity originally clustered around transportation nodes, however, does not mean that agglomeration economies and local networking opportunities cannot be created after the fact. More on this below.

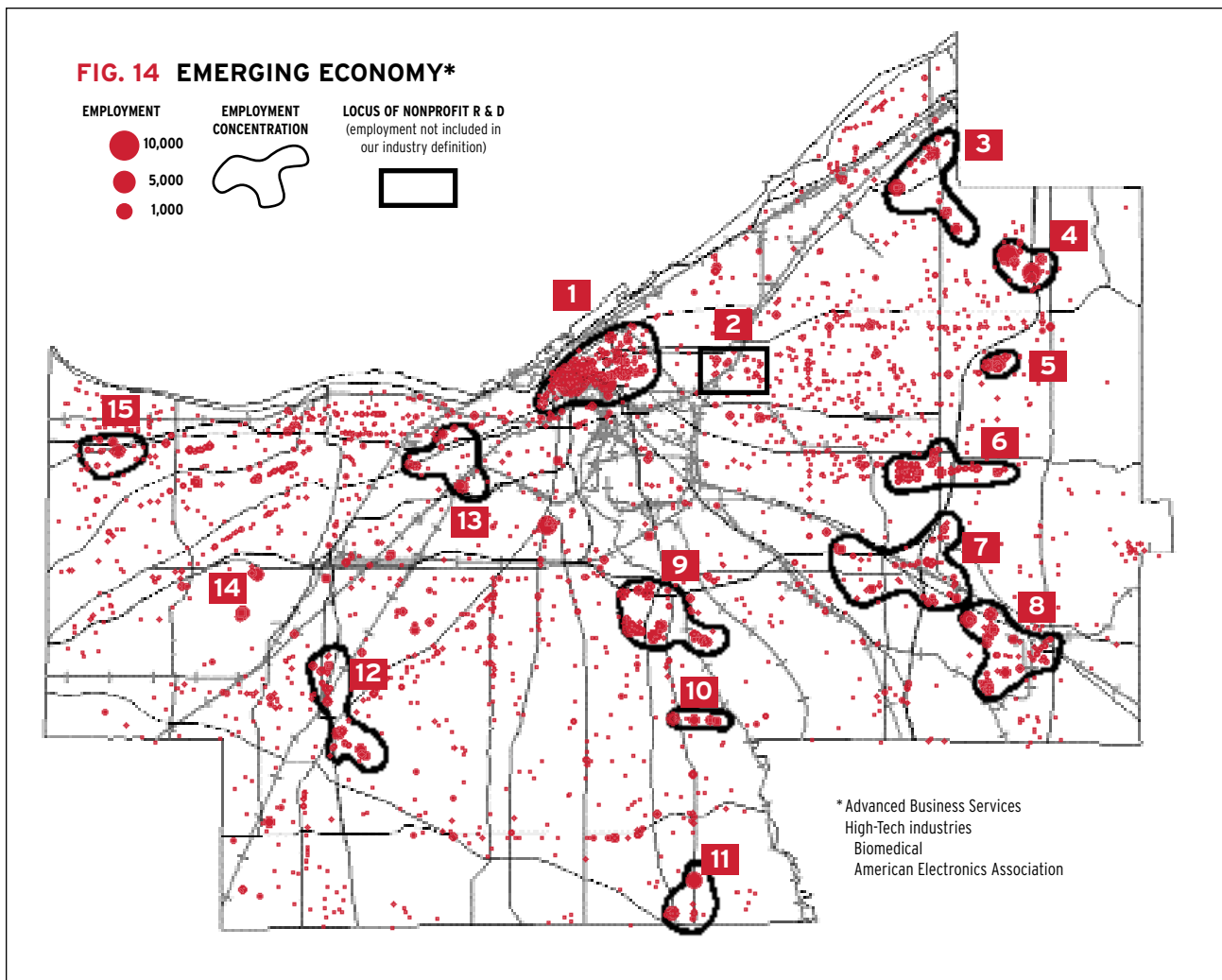
Edge cities in the literature

The rise of edge cities in metropolitan areas has been well reported by academics and popular writers. The term was coined by journalist Joel Garreau in his 1991 book entitled *Edge City: Life on the New Frontier* (New York: Doubleday, 1991). Garreau's definition of edge cities required that they be relatively new settlements with 5 million square feet of office space and 600,000 square feet of retail in a concentrated suburban location. Garreau also noted the importance of interstate highway intersections in determining edge city locations.

Garreau paints a picture of edge cities that stresses

their uniformity — generic office, retail, hotel, and roadside services — and minimizes a possible residential component. Other authors have described larger suburban units that contain all economic and population-serving functions, making them fully independent of the central city. Urban historian Robert Fishman describes a “technoburb” as a “peripheral zone, perhaps as large as a county” that contains “shopping malls, industrial parks, campuslike office complexes, hospitals, schools, and a full range of housing types.”²¹

For Fishman, the conceptual center of any technoburb is each worker's place of residence. Joel Kotkin echoes Fishman in his new book, *The New Geography: How the Digital Revolution is Reshaping the American Landscape* (2000). Kotkin has coined the term “nerdistan” to describe “self-contained high-end suburbs that have grown up to service the needs of both the burgeoning high-technology industries and their workers.” For



Source: InfoUSA

Prepared by the Cuyahoga County Planning Commission, 1/13/01



Kotkin, upscale residents, newness, and exclusivity are key characteristics of nerdistans. The entire city of Irvine, California, is a favorite example.

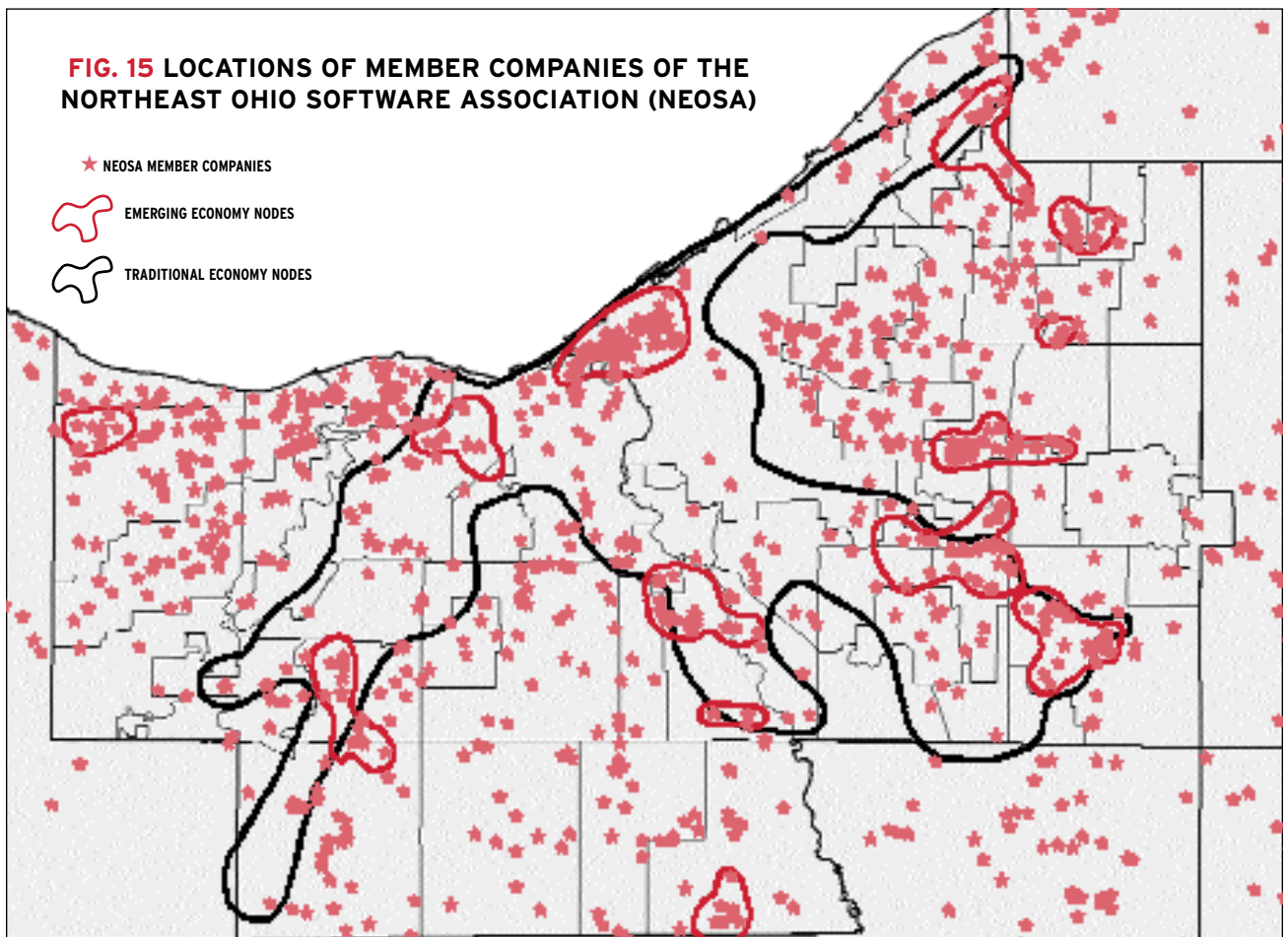
Academics looking at edge cities have kept closer to Garreau's idea of a dense employment center located at a suburban highway intersection. Their main critique of Garreau has been the idea of industrial uniformity. Bingham and Kimble and Bogart and Ferry, in separate studies of edge cities in Ohio, were struck by the fact that high-density suburban employment centers often specialize in different industries at the 1-digit SIC level. Identified using location quotient analysis,²² these edge city industry specializations frequently include manufacturing but rarely retail.²³

Another thrust of the academic work on edge cities has been to identify the hidden structure underlying the "polycentric city."²⁴ Metropolitan areas of the same size have roughly the same number of high-density employment centers within them, and these centers tend to follow the rank-size rule (few large centers, more smaller

ones) previously observed only for cities within nations.²⁵ Finally, all metropolitan areas have roughly the same percentage of total employment in their high-density employment centers, including downtowns. This constant is roughly 30% in metropolitan areas that do not have activist regional planning programs.²⁶

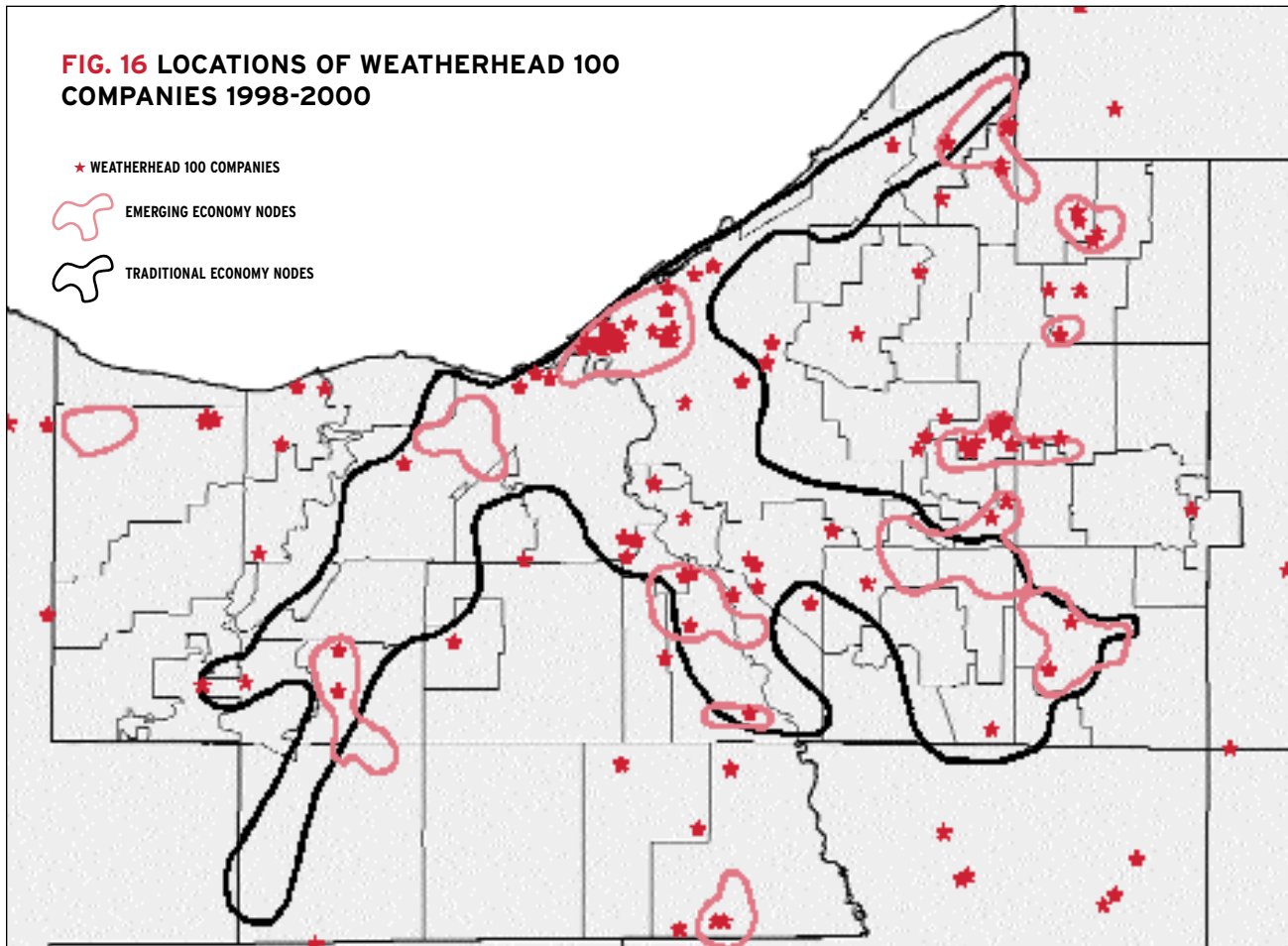
The main finding of this literature, according to urban economist Tom Bogart, is that the pattern of employment in metropolitan areas is "not sprawl—it's structure." If this structure is useful to the modern economy, then perhaps it should be supported rather than opposed.

Before we describe a range of planning policies that might support high-density employment centers in older central counties (including downtowns), we will review the literature on submetropolitan industry clustering. This literature is relevant to public policy because it will help to determine the proper mode of intervention in high-density employment centers. Should we, for example, encourage manufacturing firms located across the street to talk to



Source: Northeast Ohio Software Association, CPC/REI

Prepared by the Cuyahoga County Planning Commission, April 2001



Source: REI/CPC

Prepared by the Cuyahoga County Planning Commission, April 2001

each other about joint ventures, technology development, or labor recruitment? Or should we just make sure that the street lying between them is well-paved and has enough lanes?

We cannot answer questions like these until we know a bit more about the behavior of firms in industrial and geographic space. ○



Do Industries Cluster within Metropolitan Areas?

Figures 13 and 14 show that industry employment is not uniformly distributed within Cuyahoga County: it clearly clusters at a subcounty scale. These maps also depict the county's rail and highway infrastructure, which appear to be important location factors for the old and new sectors, respectively.

The fact that firms have oriented themselves to transportation infrastructure in the past does not mean that they don't also locate next to firms in related industries for the purpose of conducting transactions. The two phenomena can occur simultaneously, and are potentially distinguishable empirically.²⁷

We should also answer the question of what constitutes a "related industry" for purposes of this analysis. Michael Porter, who popularized agglomeration theory in the early 1990s, argued that competitors, customers, and suppliers achieve competitive advantages by co-locating in space. He later asserted that these clustering advantages can be created at a scale smaller than metropolitan areas, for example in central city neighborhoods.²⁸

The academic literature that discovered that edge cities specialize cannot prove that transactional clustering has taken place. First, the literature relies heavily on 1-digit SIC codes. We know that some edge cities specialize in durable manufacturing, but this classification is too broad to constitute an industry cluster in the classic sense of the term. Second, in the absence of an input-

output table, the SIC system cannot identify customers and suppliers that transact business together. For example, we might expect manufacturers identified in the edge city studies to locate alongside a set of producer service firms — engineering consultants, for example — with particular expertise in their product lines. Third, observed 1-digit industry specialization in edge cities is consistent with a standard economic model of comparative advantage, spatial specialization, and intrametropolitan trade. That is indeed how the results have been interpreted.²⁹

Comparative advantage is a different explanation for the co-location of similar firms than is transactional clustering. To give a concrete example: the edge city of Solon in Cuyahoga County (numbered 8 in figure 14) has been identified, using location quotient analysis, as a region-wide manufacturing and wholesale center.³⁰ Solon is served by a rail line, and it may have hidden advantages for manufacturing that include permissive zoning, tax breaks, or a manufacturing-ready workforce. These fixed place factors could easily drive Solon's attractiveness as a place for manufacturing.

There is no evidence that similar firms locate together in Solon for the purpose of interacting with each other. Instead, their main goal may be to enjoy Solon's inherent comparative advantage as a place to make things.³¹



Separating agglomeration effects from infrastructure orientation: Cleveland's metrowide industry clusters

Another way to look for submetropolitan clustering behavior is to begin with regional-scale industry clusters and see whether those same industries also co-locate within the region — for example in a single municipality. The advantage of this technique is that one can use the proper, accepted definition of industry clusters at a scale we already know is relevant. The initial identification of industries can use not only high location quotients, but also input-output tables. The goal is to identify industries that are highly concentrated in a region and are also embedded in a local supply chain of customers, suppliers, and competitors. These industries are already known to communicate with each other. It is logical to see if their communication needs cause them to cluster in intrametropolitan space, as well as in particular metro areas across the country.

For this portion of the study we examined a number of Northeast Ohio industry clusters that were identified by researchers at Cleveland State University using location quotient analysis and input-output relationships.³² Many of these clusters are similar to the old economy sectors mapped in figure 13. Steel, aluminum and copper, plastics, and chemicals were identified as regional specialties by the Cleveland State research team. Other Northeast Ohio industry clusters are instruments and controls, health care, financial services, motor vehicles, and insurance.

For all of these industry groups, we calculated location quotients for polygons within the region, to see if the industries cluster at a scale below that of the metropolitan area. For our polygons, we settled on census transportation analysis zones. There are about 900 transportation analysis zones in the Cleveland PMSA, each representing roughly the same number of work trips.

The choice of a denominator for the location quotient is very important when doing this type of analysis. If the denominator industry is fundamentally different from the numerator industry, then a high location quotient may indicate a differential attraction to underlying infrastructure (as shown, for example, in figures 13 and 14 above).

On the other hand, if the denominator industry is assumed to be similar to the numerator industry in its infrastructure orientation, then a high location quotient is more likely to be explained by transactional clustering. Thus, we calculated location quotients in which the denominator for health care is all finance and all servic-

es, while the denominator for motor vehicles is manufacturing only. In the case of steel and aluminum/copper, we added the denominator “all metal manufacturing” in order to further rule out infrastructure needs as an explanation of clustering as indicated by a high location quotient.

The results of this analysis do not support the existence of intrametropolitan clustering for the purpose of conducting transactions. This is in spite of the fact that many of the polygons exhibit high location quotients whether the analysis is conducted using employee or establishment counts. These high-LQ polygons are distributed fairly evenly throughout the region, however, while many of the polygons between them have zero employment in the numerator industry.

These maps are consistent with a simple reality: at this scale of industry and geographic analysis, business establishments are indivisible — lumpy, if you will — and this must necessarily show up as a series of high location quotients within the region. The fact that high-LQ polygons are isolated and widely-scattered is significant: many of these have only one establishment, or a handful of establishments associated with the same firm.

The only regional cluster industry for which the high-LQ polygons appear to be adjacent is chemicals. Many chemical firms locate near the boundary of the City of Cleveland and a town called Newburgh Heights. Chemical firms are more concentrated here than manufacturing in general, which is the denominator industry used for this calculation. Even here, however, we do not know whether this co-location is the result of a chemical-friendly industrial park. The need for cross-firm communication is only one possible explanation — and not necessarily the most likely.

New economy specializations of Cuyahoga edge cities identified in this study

It is possible that the clustering of our three new economy industries — biotechnology, information technology, and advanced business services — represent true transactional clustering (or leader-follower behavior) rather than sector-specific comparative advantage. These industry sectors are narrowly defined, so they are more likely to share technical labor force or specialized suppliers than would a category like durable manufacturing. Our definition of the information technology and biotechnology sectors includes both manufacturing and service components, a key attribute of any true industry cluster (see figure 3).

All of our new economy sectors utilize generic office



space or light manufacturing facilities and probably ship by truck—if they ship at all. It is therefore difficult to identify specialized attributes of place that would create comparative advantage for these sectors. An exception might be biomedical industries, where specialized laboratory facilities, local government tolerance for biohazards, or proximity to Cleveland’s hospital complex (node #2 in figure 14) might be important. Similarly, information technology companies may locate in the central business district due to the existence of server hotels, reliable electric power, or cosmopolitan amenities that are said to be particularly important to new media talent.³³

Table 3 shows employment counts for each of the new economy employment sectors in each of the employment clusters identified in figure 14. The number of each employment cluster in table 3 is keyed to the numbers on the map in figure 14. There is also a row for employment “outside all nodes,” so that each column in table 3 sums to total industry employment in Cuyahoga County.

In table 4, we calculate location quotients for each new economy industry in each node shown in figure 14 and table 3. The denominator industry for these location quotients is all industries, and the benchmark region for calculating the location quotients is Cuyahoga County. In boldface, we have highlighted all nodes for which the employment and establishment LQ exceed 2.0 and there are at least five establishments. In italics, we have highlighted nodes for which the employment LQ exceeds 4.0

regardless of what is going on with establishments.

One might argue that the deck is stacked in favor of high LQs here, since we defined the nodes on the basis of observed clusters of new economy industries. We do not know, however, whether the clusters observed in figure 14 reflect a more generic phenomenon that drives all industries. These are highway intersections, so they should be attractive to many sectors. The schematic boundaries in figure 14 also appear to encompass the relevant business district in each node.

The results suggest that there is a fair amount of new economy specialization in the nodes, especially if you look at employment rather than establishment concentration. Some of this apparent clustering may be caused by the location decisions of a few large establishments in uncommon industries (the methodological problem, described above, is that a large establishment is indivisible and must locate *somewhere*). The biomedical cluster in Wilson Mills (#4), containing the large firm of Marconi/Picker, looks like an example of this phenomenon.

Having said that, the edge cities of Solon (#8) and Rockside Road (#9) look like legitimate clusters for both IT and biomedical employment. Cleveland’s downtown is clearly a concentrated location for advanced business services, while Chagrin (#6) nearly makes the cut for business services. Both of these findings would confirm the prior expectations of Clevelanders. As further confirmation of the findings, the local business press has reported that

TABLE 3. EMPLOYMENT AND ESTABLISHMENT COUNTS IN CUYAHOGA COUNTY'S NEW ECONOMY EMPLOYMENT CENTERS

MAP KEY	NAME	TOTAL EMPLOYMENT	TOTAL ESTABLISHMENTS	INFORMATION TECHNOLOGY EMPLOYMENT	INFORMATION TECHNOLOGY ESTABLISHMENTS	BIOMEDICAL EMPLOYMENT	BIOMEDICAL ESTABLISHMENTS	ADVANCED BUSINESS SERVICE EMPLOYMENT	ADVANCED BUSINESS SERVICE ESTABLISHMENTS
1	Downtown	132198	5658	8336	65	1894	43	16849	1479
3	Euclid - County Airport	7456	471	869	12	264	7	175	34
4	Wilson Mills	9773	322	1251	7	1934	5	337	38
5	Cedar - Landerhaven	5269	106	151	6	400	1	441	19
6	Chagrin	17950	1890	805	40	196	32	1758	289
7	I-271/I-480	19605	1309	357	17	511	22	476	55
8	Solon	18406	864	1893	32	723	19	404	63
9	Rockside	19110	1093	2175	67	790	36	1655	118
10	Pleasant Valley	1574	50	235	3	120	2	455	5
11	Snowville - Miller	6338	137	342	6	617	4	727	10
12	Engle - I-71	12923	700	686	23	285	22	683	60
13	Cleveland West	9215	497	614	10	158	5	88	10
15	Westlake	5207	274	413	10	19	5	82	20
	Outside all nodes	407987	37224	2198	367	2696	262	8124	1956
COUNTY TOTALS		673011	50595	20325	665	10607	465	32254	4156
	Proportion of all industries	100.0%	100.0%	3.0%	1.3%	1.6%	0.9%	4.8%	8.2%
	Average establishment size in nodes	20		61		39		11	
	Average establishment size outside of nodes	11		6		10		4	

Source: InfoUSA establishment database for 2000, address-matched and mapped.



Rockside Road (#9) is a favorite location for national computer hardware and software companies setting up regional sales offices in Northeast Ohio.³⁴ The choice of an edge city location for this kind of establishment has also been noted in Seattle.³⁵

Tables 3 and 4 give us some tantalizing evidence of sectoral clustering of new economy businesses in Cleveland’s edge cities. We do not know, however, whether the clustering is due to interactions between like businesses, to a site-specific factor that is particularly important for each sector, or to simple leader-follower behavior (this could easily be the case for high-tech branch offices at Rockside Road). Therefore we do not quite know how to support these clusters with public policy, or how to create new clusters in other older central counties around the country.

Academic literature on submetropolitan industry clustering

Agglomeration theories have been such a staple of the literatures in geography and economic development that it is typically assumed transactional clustering for firms in the same supply chain must exist at the subcounty scale.³⁶ In fact, the empirical literature on this subject is rather thin, and is often descriptive or cartographic rather than consisting of definitive hypothesis tests. Some authors go so far as to argue that geographers are trapped in a kind of groupthink on this subject.³⁷ In contrast, if you ask a group of civic leaders or businesspeople whether similar businesses cluster in edge cities in order to transact business together — as we did in our community workshops — the idea is likely to be greeted with

stunned disbelief. Practitioners believe that firms seek out the best deal they can get on generic office space at an interstate exit, perhaps one that features a hotel with meeting facilities. Drive down the typical strip in any edge city, they say, and it is difficult to conclude that the companies you see are in the same business. All they have in common is an address.

There are exceptions, of course. We know that the garment industry clusters in a specific district in Manhattan, as do jewelry, the performing arts, and high finance. There are particular reasons for these submetropolitan clusters that relate to the transmission of ambiguous or creative information in repeated face-to-face transactions, and perhaps to the high costs of error. But dense central cities seem to be the places where these specialized activities congregate. The existence of transactional clustering in suburban office parks remains very much open to debate.

Economists Daniel McMillen and John McDonald examined employment density surrounding suburban subcenters in metropolitan Chicago. They argued that high density in a series of smaller zones surrounding the subcenters indicates the value of proximity to those subcenters, following the standard bid-rent theory of urban economics. Using this idea, the authors attempt to separate the economic value of access to transportation infrastructure from the economic value of access to other companies. They do this by incorporating separate variables for distance to the nearest highway interchange and distance to the nearest employment subcenter in regressions explaining employment density in the small, surrounding zones. The results show that “holding access to

TABLE 4. LOCATION QUOTIENTS CALCULATED FROM TABLE 3

MAP KEY	NAME	INFORMATION TECHNOLOGY EMPLOYMENT	INFORMATION TECHNOLOGY ESTABLISHMENTS	BIOMEDICAL EMPLOYMENT	BIOMEDICAL ESTABLISHMENTS	ADVANCED BUSINESS SERVICE EMPLOYMENT	ADVANCED BUSINESS SERVICE ESTABLISHMENTS
1	Downtown	2.1	0.9	0.9	0.8	2.7	3.2
3	Euclid - County Airport	3.9	1.9	2.2	1.6	0.5	0.9
4	Wilson Mills	4.2	1.7	12.6	1.7	0.7	1.4
5	Cedar - Landerhaven	0.9	4.3	4.8	1.0	1.7	2.2
6	Chagrin	1.5	1.6	0.7	1.8	2.0	1.9
7	I-271/I-480	0.6	1.0	1.7	1.8	0.5	0.5
8	Solon	3.4	2.8	2.5	2.4	0.5	0.9
9	Rockside	3.8	4.7	2.6	3.6	1.8	1.3
10	Pleasant Valley	4.9	4.6	4.8	4.4	6.0	1.2
11	Snowville - Miller	1.8	3.3	6.2	3.2	2.4	0.9
12	Engle - I-71	1.8	2.5	1.4	3.4	1.1	1.0
13	Cleveland West	2.2	1.5	1.1	1.1	0.2	0.2
15	Westlake	2.6	2.8	0.2	2.0	0.3	0.9



transportation constant, proximity to an employment subcenter is a statistically significant variable...these findings are general confirmation of the existence of both types of agglomeration economies.”³⁸ In our terminology, this statement means that McMillen and McDonald confirmed the importance of agglomeration economies and transportation (infrastructure) orientation as separate phenomena in Chicago’s edge cities.

One possible problem with the McMillen and McDonald study is that it does not include a measure of proximity to the intersections of two or more limited-access highways, with the exception of those highways that converge near O’Hare Airport. Had the study included such a measure, it is possible it would have been unable to separate the effects of these super-interchanges from the effect of firm clusters, since both would be located in the same places (the two variables would be collinear). Also, the McMillen-McDonald study is necessarily about the general economic advantages of high-density employment centers — not about proximity to firms in a given supply chain. The theory behind cross-industry metropolitan clustering is left vague in the paper; it is not clear that it qualifies as transactional.³⁹

Sectoral clustering within metropolitan areas

A.J. Scott has been one of the leading agglomeration theorists for many years, highlighting the conditions under which vertical disintegration and external contracting lead to the co-location of economic activities in space.⁴⁰ From our point of view, Scott’s work is particularly relevant, because he has studied clustering in small, tightly defined locations within metropolitan areas. He has also looked at high-technology manufacturers, usually in the Los Angeles basin.

Scott identified the existence of clusters of printed-circuit plants in northwest Los Angeles County and in central Orange County using maps like our figures 13 and 14. A combination of maps and surveys shows that these plants locate next to important subcontractors, and to a lesser extent, next to their materials suppliers and customers.⁴¹ In other work, Scott highlights the importance of specialized sets of workers, large defense contractors, and higher-education establishments to the location of “technopoles” in Southern California.⁴² In our framework, these factors might be regarded as infrastructural rather than transactional. But of course the line between the two is not clear cut (higher education may be regarded as a cluster participant) and worker location is endogenous in any case. Scott’s transactional theories also suggest that

firms that cluster in intrametropolitan space will be smaller and more specialized than those that do not cluster. He confirms this hypothesis for the dressmaking industry in Los Angeles, and — somewhat less dramatically — for printed circuit plants in Orange County.⁴³

A paper by Suarez-Villa and Walrod may be regarded as a direct response to Scott.⁴⁴ Also set in southern California, the paper looks at firms in the advanced electronics industries (SICs 3571, 3572, 3575, 3577, 3661, 3663, and 3845). Geographic clusters of these firms are identified by proximity to a nearest neighbor. The sample is then divided into clustered and nonclustered subsamples of firms. Consistent with transactional theories of agglomeration, the authors find that clustered firms are more likely to subcontract and utilize just-in-time inventory methods than are nonclustered firms. Contrary to expectations, however, clustered firms are larger, less productive, less profitable, and conduct less R&D than nonclustered firms.

The Suarez-Villa and Walrod findings parallel our own on larger establishment size in edge cities (figure 14). This finding may reflect simple realities in the real estate market at highway intersections rather than firm behavior. More importantly, the Suarez-Villa-Walrod paper raises the prospect that intrametropolitan clustering reflects behavioral differences that do not translate into what we really care about, which is economic performance.

Suarez-Villa and Walrod end their paper with a recommendation that is directly relevant to local policy makers:

If operational strategy is more important than spatial clustering, then localities may be better served by supporting the logistics that help to make strategic choices, such as outsourcing or just-in-time production, more effective. Deploying community resources to create localized high-technology industrial clusters, may therefore be a less effective way to promote innovation than supporting the kinds of operational strategies that strengthen firms’ innovative capabilities.⁴⁵

Or to put it another way: Focus directly on firm behavior instead of relying on a geographic abstraction whose impact on profitability is necessarily indirect.

Before we move on to a further discussion of the policy implications of this research, we touch briefly on the literature that compares the relative contribution of an urban location versus industry clustering to firm per-



formance. One paper in this literature is particularly relevant, since it uses the USDA county codes as its measure of urbanization — as we do in this report.

Bennett Harrison, Maryellen Kelley, and Jon Gant looked at a national sample of metalworking establishments. They found that plants located in counties adjacent to large metropolitan areas were the most innovative, those adjacent to small metropolitan areas came in second, counties inside metropolitan areas came in third, and plants in nonadjacent counties simply did not adopt new technologies. After controlling for firm-specific characteristics, the authors found that concentrations of nearby metalworking plants had no impact on innovation. They conclude that urbanization economies are important for firm performance, but so-called localization economies are not.⁴⁶

This study's use of the words 'metropolitan' and 'suburban' is somewhat nonstandard, so we merely repeat their contention that they found evidence of the productivity effects of suburban over metropolitan locations. More important, they failed to find any productivity effects from the co-location of firms in the same industry. In this sense, their findings parallel those of Suarez-Villa and Walrod.

Conclusion

Not surprisingly, the academic literature on intrametropolitan industry clustering uses a variety of methods and draws a number of conclusions. The existence of submetropolitan clustering for high-end crafts, like the fashion and jewelry industries, has been proven beyond all doubt. The dressmaking industry clusters in central L.A. just like it does in New York.⁴⁷

Providing a definitive proof of transactional clustering for industries in suburban areas is difficult, because the dual effects of transportation infrastructure and nearby firms cannot easily be separated. It seems clear that sectoral clustering varies widely by industry (compare, for example, the maps of dressmaking and printed circuit board firms in Scott 1988). We might also expect the practice to vary by metropolitan area. A large metropolitan area with severe traffic congestion should see tighter sectoral clustering because it takes more time to conduct intrametropolitan transactions over a given distance than would be the case in, say, Cleveland. To our knowledge, this hypothesis has not been directly tested.

Where sectoral clustering does occur, its impact on firm performance is uncertain (Suarez-Villa and Walrod, 1997). In light of the strong aversion to the cluster concept by suburban policy makers, it does not make sense to

make submetropolitan industry clustering a primary lever for county economic development policy. If the practice is valuable, then companies will presumably do it on their own. A new edge city-based chamber of commerce, for example, should work on infrastructure and planning issues, possibly workforce training. We would not expect it to be a kind of localized trade association, catering to the business needs of a narrowly defined industry located in the edge city. ◻



County Planning Policies in a World of High-Density Employment Centers

The fact remains that high-density employment centers exist in older central counties, and spatial planning policies should take this fact into account.

The first, and perhaps most important implication of our findings is that *downtown matters*. It is a central location for advanced business services, biotechnology, and information technology in Cleveland. It may be expected to be a prime location for any industry that uses technical knowledge, employs workers with advanced degrees, and trades information on a regular basis. If Cleveland is any guide, these locational patterns are not restricted to cities like Seattle, San Francisco, and New York.⁴⁸

Downtown is also the entertainment and tourism center of any metropolitan area. It is a place with a unique amenity profile that attracts a high-tech sub-niche,⁴⁹ and has considerable advantages in transportation and telecommunications infrastructure. County policy makers should assess their downtowns and redouble their commitment to infrastructure and transportation connections there.

Some have argued that the era of stadiums and convention centers is over, and it is now time to focus on creating livable neighborhoods in the downtown.⁵⁰ But decisions like these need to be made in the context of each city.

With respect to high-density employment centers outside of central cities, we have brainstormed in our

workshops a list of policies that county-level policy makers may wish to consider (see below). This list of policies is driven by two principles that reflect *political realities* within older central counties. The following two themes were stressed repeatedly by participants in our Cuyahoga County workshops:

- Do not support the new economy at the expense of the old economy. The traditional manufacturing economy in places like Cuyahoga, Wayne, and Allegheny counties employs a large proportion of the workforce and pays wages that are above average. It must be supported and made more productive, rather than being thrown onto the “dustbin of history” in pursuit of a high-technology base that, in many communities, does not yet exist.
- Do not support the high-density employment centers at the expense of the older, inner-ring suburbs that supply them with workers. Employment centers and residential neighborhoods should work synergistically to create an ideal environment for knowledge workers to live, work, and play.

The second point here is worthy of elaboration. What we want to do in the suburbs is design exquisite places for knowledge workers’ daily rounds. Knowledge workers living in the suburbs are likely to be older than those choosing to live in the city, and they are more likely to have children. Suburban land-use planning tends to



be haphazard and uncoordinated across municipalities: This fact, as much as low density, is what citizens dislike about sprawl. The New Urbanism should be a routine part of the suburban development toolkit. Evidence suggests that developers will build — and consumers will buy — better design in the suburbs; the primary roadblocks today appear to be bureaucratic.⁵

Our map of new economy employment (figure 14) suggest a regional design system that is *nodal*, with high-density employment centers surrounded by high-amenity residential sites and greenspace. This has been a driving concept behind regional planning for some time. The New Jersey State Growth Management Plan (1991) envisioned a “hierarchy of central places” with a typology of so-called “communities of place” planned at different densities, containing different mixes of housing, employment, commercial, and industrial development.⁵ Because New Jersey has a strong affordable-housing law, these high-density mixed-use centers were also designed to contain a mix of housing types.

As long we pay sufficient attention to market realities — as revealed to us by discoveries like the rank-size rule for edge cities — then our suburban landscapes can certainly be improved by planning. We should also remember that upwards of 70% of employment in metropolitan areas lies outside of high-density employment centers. Much, but not all, of this employment will be retail, which must locate close to residential markets.

We need to plan for this employment as well. It may be that the overall density and location of economic activities will not look very different when we improve our planning. Instead, we should spend more money on design everywhere, since design is valued by those knowledge workers who drive the new economy. New economy urban design may be as simple as bike paths that connect the condos to the corporate parks — and to the linear park systems that weave through regions like Greater Cleveland. The benefits of great design can be enjoyed by all socioeconomic groups within the county: the downtown and its supporting neighborhoods, as well as the suburban employment centers and their supporting neighborhoods.

Here is our preliminary list of ideas for spatially sensitive economic development planning in older central counties:

I. Synergies between old economy and new economy areas

- Think about location-specific technology transfer activities in old-new overlap areas (see figure 17).

Should our manufacturing extension program have a field office in Solon (it is currently located in downtown Cleveland)? Community college locations may be reevaluated with respect to overlap areas. Where are manufacturing-oriented consulting firms located?

- Consider the location of employment training “one-stop shops” relative to old and new economy areas.
- Improve local government coordination so that businesses incubated in the city (e.g., next to a university) can foresee an orderly process of real estate upgrading that takes them to an edge city in the central county — rather than to an outlying county or another metropolitan area.
- Resolve potential conflicts between old economy locations and new recreational uses (rail rights of way, Cuyahoga River Valley, Cleveland lakefront).
- Create systematic land-use transition strategies for old economy areas (figure 14), to the extent that employment continues to decline there.
- Consider brownfield/greenfield issues (perpetual).

II. Synergies between employment centers and residential suburbs

- Conduct more research on the amenities that knowledge workers demand in the places where they live.
- Build bike paths “from the condos to the office parks.” Make high-density employment centers more bike and pedestrian-friendly.
- Improve the commute from residential neighborhoods to employment centers by auto and by transit.
- Install broadband capacity in residential neighborhoods.
- Embrace New Urbanism.

III. Supporting high-density employment centers

- Make highway improvements at interstate intersections within older central counties. These are not necessarily sprawl generators, since interstate intersections concentrate development to some extent.



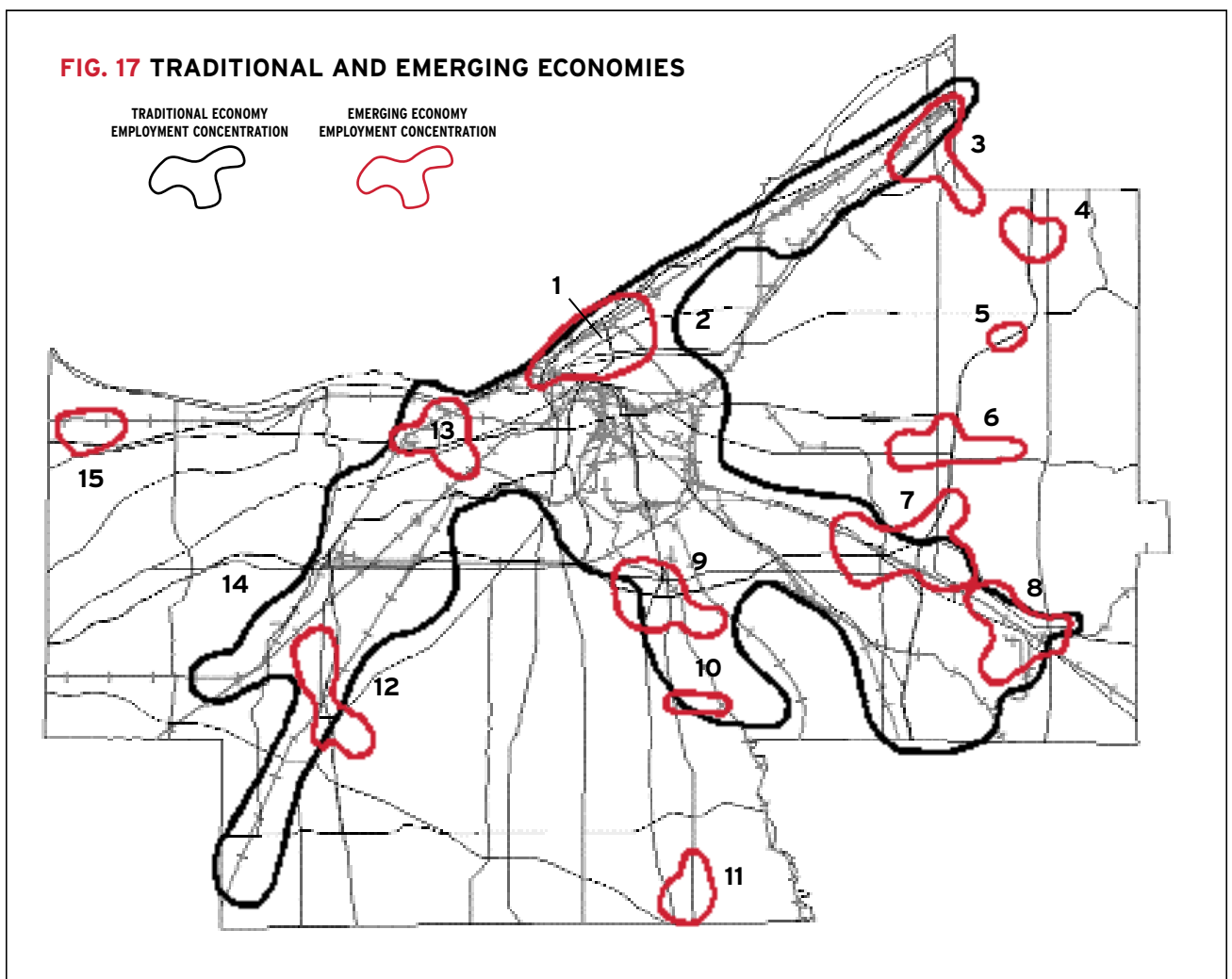
- Create employer-driven organizations in each high-density employment center concerned with planning issues.
- Clarify dominant industries and communication needs in each employment center using surveys. Will this change the character or mission of the employer-driven organization in each center?
- Create County Planning Commission “planning sub-committees” for each employment center.
- Build up high-speed Internet infrastructure in each employment center.
- Within each employment center, consider creating or encouraging attractive gathering places (pubs, side-

walk cafes, diners — places where deals are struck à la Silicon Valley).

- Communicate findings to Regional Transit Authority for coordination of transit planning.

Finally, if the goal of political leaders is to develop new economy industries in Cuyahoga County, organizations like the County Planning Commission must recognize that the challenges are much larger than simply infrastructure in edge cities. The Cleveland metropolitan area is behind the rest of the nation on high-tech development: spatial planning alone cannot cause it to turn the corner.⁵³

County government may wish to throw its weight behind the technology initiatives of such organizations as Cleveland Tomorrow.⁵⁴ The County may wish to



Source: InfoUSA

Prepared by the Cuyahoga County Planning Commission, 1/13/01



lobby the state for more funds for higher education and new startups. The rationale is simple. Since older central counties tend to dominate in new economy jobs (even more than they dominate other kinds of jobs), the benefits of a statewide high-tech strategy should flow disproportionately to central counties. As long as high-technology firms are attracted by agglomeration benefits and urban amenities, state programs in support of technology and higher education will prove to be a good bet for older central counties relative to outer suburbs and rural areas. ◦



Location of High-Speed Information Infrastructure

The literature on telecommunications and urban form is large, but it is necessarily somewhat speculative. A leading book in the field identifies two great myths of telecommunications and planning that have been laid to rest by the history of the last twenty years:⁵⁵

Myth #1: Telecommunications will make spatial proximity irrelevant, or lead to the “death of cities.”

That this is a myth should be self-evident. Telecommunications prices have been falling for many years now, and the modes of accessing information (mobile phones, e-mail, Internet, videoconferencing) have multiplied. Yet to paraphrase Mark Twain, the news of the death of cities has been greatly exaggerated. Whether the geographic category is the city, the downtown, the metropolitan area, or the older central county (see above), urban areas have either held their own or experienced a full-blown renaissance.⁵⁶

There are changes to be sure, as *nerdistans* sprout up, and as small industrial cities like Buffalo lose ground to world cities like New York. But people continue to value urban agglomerations for both business and amenity reasons. Widespread, on-demand videoconferencing might change this some day, but basic elements of human psychology would probably need to change as well. As long as people like the economic and cultural vitality of cities and metropolitan areas, our settlement system will con-

tinue to provide them.

Myth #2: Telecommunications will reduce auto trips and traffic congestion.

The reason #2 is a myth is that electronic communications and trips have been found to be complements, not only substitutes. If you lower the cost of communicating, you increase the amount of business that can be transacted in a given period of time. This actually necessitates more trips, since some part of business transactions always involve face-to-face communication. (Not coincidentally, airline trips have also been increasing since the computer revolution began.)

This result is similar to claims made about the declining use of paper in offices that installed computers in the 1980s. At first, the volume of paper in offices increased many times, as we produced more work product in less time. Only now are we entering a stage where electronic communications can substitute for paper. As technologies improve, it is possible, but by no means certain, that substitution effect of electronic communication will begin to outweigh the complementarity effects for face-to-face meetings and physical trips.

The bottom line is that communications technologies have yet to revolutionize urban form — notwithstanding some dramatic examples of land prices being bid up by elites in formerly remote spots like Aspen and Jackson Hole.⁵⁷



High-speed information infrastructure and firm location

From the point of view of economic development policy, a key question is whether firms view broadband infrastructure (e.g., availability of communications speeds above 1 Mbps at curbside) as a *location factor* within metropolitan areas. In order for it to be a location factor, firms cannot routinely select locations on other grounds and then dig into their own pockets to provide this infrastructure themselves. It must be expensive enough to pose a barrier or an advantage for certain locations within a county.

Questions like these are surprisingly difficult to answer for two reasons: All local officials know of the existence of a small handful of companies that installed their own broadband, sometimes stringing optic fiber for several miles.⁵⁸ Are such companies a rare exception, or are they the rule? Second, there is no centralized repository of information on existing broadband capacity within a metro area, so we cannot analyze the location question directly, e.g., by overlaying a map of new locaters on top of the infrastructure.

After interviewing several local experts on this subject, we have developed the following general principles, which may be useful to county policy makers elsewhere in the United States:

- (1) If a company really needs broadband anywhere in Cuyahoga County today, it can get it. The issue is cost, which is likely to be prohibitive for small companies.
- (2) To an economist, of course, willingness-to-pay is an indicator of demand. Since small companies are in many cases unwilling to pay market prices for the highest speeds,⁵⁹ there remains some question as to whether these companies want the technology “badly enough.” It may be that the penetration of IT technologies and e-commerce among companies in a region like Northeast Ohio creates positive externalities that justify intervention, education, and advocacy by government *on the demand side*.⁶⁰
- (3) Notwithstanding this discussion of demand, broadband capacity — like any infrastructure system that is not ubiquitous — remains a potential location factor for firms. The greater the build-out by telecom companies over the so-called last mile, the less it will cost a company to connect to the high-speed network.

- (4) Internet service providers and new-style local telecom carriers will frequently locate in so-called “server hotels” — dense concentrations of lines and switches, often in converted downtown buildings. But these capital-intensive communications companies are special cases. The typical corporate *user* of high-tech information will prefer to make location choices on other grounds, such as amenities. These companies, which represent the majority of high-tech enterprises, may still have a last-mile problem — even in the central city.⁶¹ Central cities and counties tend to be better wired than outlying areas, because dense markets are attractive to private companies that invest in fiber or coaxial cable.⁶²
- (5) Cleveland is particularly rich in national Internet backbone capacity, a legacy of its status as a national railroad hub.⁶³ But this fact does not translate directly into last-mile broadband accessibility. The main benefit of Cleveland’s many backbone providers is the large number of competitors who may seek to build local rings off of their national backbones — especially as long-distance companies try to provide bundled local, long-distance, and data services under provisions of the Telecom Act of 1996. The advantage to Cleveland (over Columbus, for example) looks like one of market structure rather than raw capacity.
- (6) Wireless and satellite technologies are the great wild-card that could some day eliminate broadband as an infrastructure and development issue, with the exception of such issues as tower siting.
- (7) New fiber infrastructure is now being installed in Cuyahoga County by several private companies. However, the locations of this infrastructure are proprietary, ever-changing, and extremely difficult to map; business customers are being targeted over residences; and the infrastructure is not being used intentionally to achieve regional planning objectives, such as support of inner-ring suburbs, high-density employment centers, or public institutions like hospitals or schools.⁶⁴

The previous facts, taken together, have led many cities around the United States to build their own fiber networks. This is done using a variety of technologies and employs a variety of ownership and leasing arrangements — from the standard cable-style franchise model to outright public ownership. Here are some examples that



illustrate the diversity of approaches:⁶⁵

Deployment through city sewers

–Omaha, NE; Indianapolis, IN; Albuquerque, NM

Adding telecom to existing publicly owned utilities

–Eugene, OR; Tacoma, WA; Glasgow, KY

Wire only public institutions, like government and libraries (to start)

–Palo Alto, CA; Santa Clara, CA

Downtown only

–Spokane, WA

Comprehensive coverage

–Cedar Rapids, IA; Anaheim, CA; Austin, TX

Transit-oriented

–Los Angeles blue line

Municipal governments should approach such projects with caution. They may be left with a large debt load or a white elephant if, for example, wireless technology overtakes fiber in a few years. The blurring of the distinction between regulator and industry competitor is also a concern, and the state of Texas has prohibited public ownership of broadband systems.⁶⁶

Still, this is one of the few big things a city can do to jump-start its high-tech future, and it is generating interest across the nation. If cities can pursue these strategies in more traditional ways, by opening up better lines of communication with telecom firms, negotiating locations, permitting, and franchising, then legal and financial risks can presumably be avoided. The first step may be to begin a planning process that lays out the community's spatial objectives—then bidding out the job or incenting private companies to make the necessary investments.

In a way, the problem here will be familiar to urban planners. Left alone, private infrastructure companies will “follow the market.” Planners often wish to lead the market. Given the externalities and coordination problems associated with land markets and economic development, planner-led development may be an efficient approach. And it is not necessarily risky in market terms, provided that the plan is widely known and everyone is pulling together.

A look back in Cleveland

In 1993, the Cuyahoga County Planning Commission published a study on *Telecommunications and Economic Development in Cuyahoga County*.⁶⁷ The report contained five recommendations that are worth reviewing in light of eight years of rapid technological and political change:

“Examine whether the local permitting process can be used to foster desirable patterns of development.”

In the age of Smartgrowth, this is still an issue—perhaps *the* issue for many counties. In general, broadband deployment currently advantages central over outlying counties, but it is not clear that it supports dense centers or appropriate residential neighborhoods within them.

“Examine ways to streamline local government permitting processes to ease installation of fiber optic cable.”

This is a valid complaint of telecommunications providers in many places.

“Examine and understand Ohio Bell’s call to action for regulatory reform.”

Ohio Bell, now SBC-Ameritech, has argued that it should be regulated on the basis of prices in markets where it retains market power, rather than on the basis of corporate profits. Profit regulation, the company argues, distorts investment flows and will lead to less broadband investment overall.

This argument is plausible, and has already won over competitors in 37 states nationwide. This new type of regulation (called “incentive regulation”) is now in place in Ohio and awaits a public comment period at the Public Utilities Commission of Ohio before becoming permanent.

“Consider a proposal by CWRU faculty for Cleveland’s bicentennial in 1997—a fiber optic birthday present for the town’s future.”

This is an example of a visionary idea that may have substantial marketing value for any city, in addition to its actual benefit. The idea of wiring the entire city with broadband has not formally been implemented in Cleveland.

“Explore ways in which CAMP technology development and technology deployment capabilities can be applied to further the community’s telecommunications position.”



CAMP is Cleveland's nonprofit organization created to assist local manufacturers. This recommendation has been implemented partly by CAMP, partly by the Jobs and Workforce Initiative of the Growth Association, Greater Cleveland's chamber of commerce.

Broadband will continue to be near the top of the civic agenda in older central counties, as in other places around the country. The challenge here is similar to the retention of new economy employment — meaning that central counties need to build on an existing strength rather than play catch-up.

Older central counties are better-wired than other county categories, in part because of their density — in part because their knowledge industries and institutions of higher education use information so intensively.⁶⁸ Telecommunications infrastructure holds out the distant promise of making location irrelevant, but so far its centrifugal effects are ambiguous at best (see figures 1-12). We conclude that older central counties should use and market local communications infrastructure in order to retain their attractiveness as locations for business. The goal should be to “lock in” agglomeration economies and urban excitement that will last long after the new information technologies make outlying locations competitive. ○



Location of Knowledge in Cuyahoga County

The phrases “new economy” and “knowledge economy” are often used interchangeably. Both phrases refer to the overwhelming role played by technology and education in driving productivity and income growth, whether in a nation, state, or metropolitan region.⁶⁹ Just as we asked earlier in this report whether “industry cluster” theory works at the scale of a neighborhood, we can also ask the same question about the relationship between knowledge and industrial productivity. What are the spatial manifestations of knowledge at a scale *below* that of the metropolitan area?

We have already answered this question, in part, by mapping the location of three industries that employ a large proportion of educated professionals (figure 14). Keeping the focus on technology, we assert here that we may be able to gain additional insights into the geography of knowledge by mapping patents, scientists, and engineers by place of work and by place of residence. This will help clarify the planning model of high-tech employment centers and adjacent residential districts that we built up in previous sections.

Figure 18 shows members of the Cleveland Engineering Society by place of work. Though not a perfect proxy for engineers in all disciplines,⁷⁰ it is one of a handful of ways to map workers by occupation between census years. The map shows some gravitation to the high-tech nodes, but not surprisingly it also shows CES members distributed widely throughout the county’s

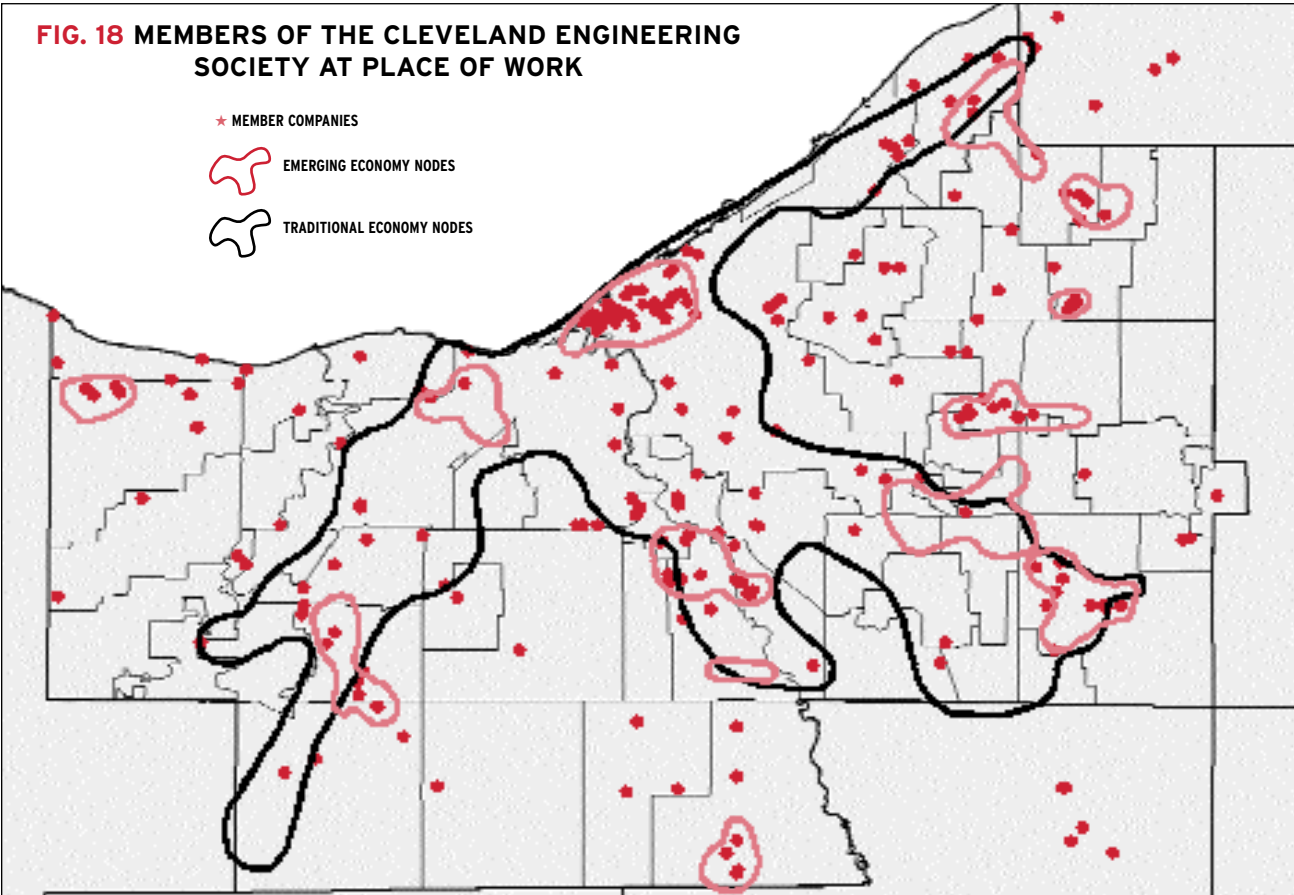
industrial corridor. This should serve as a useful reminder that technologists work in the old economy as well as the new one. Meanwhile, this is yet another new economy map in which Cleveland’s central business district jumps out at the eye.

Figure 19 shows members of the Cleveland Engineering Society by place of residence. This map looks very much like a map of year 2000 U.S. patent applicants (figure 20), data taken off the Web site of the U.S. Patent and Trademark Office. CES residential sites are overlaid on a choropleth map of educational attainment at the bachelors’ degree level. Note that areas of relatively low educational attainment (shown as light grey or white on the map) virtually replicate the industrial corridor shown in figure 13. This is the standard “social ecology” of Greater Cleveland: People with more education make more money, and have the luxury of avoiding industrial sites as places in which to live.

There are some engineers scattered in low socioeconomic status neighborhoods, but these seem to be mostly on the western arm, rather than the southern or eastern arms, of the county’s T-shaped manufacturing district. Anybody who lives in Cleveland knows that the main difference between the western and eastern sides of the city is one of race. There appears to be a relative shortage of scientists and engineers in the city’s eastside African-American neighborhoods, even controlling for educational attainment. This is illustrated graphically in figure 21. The relative shortage of blacks in science and

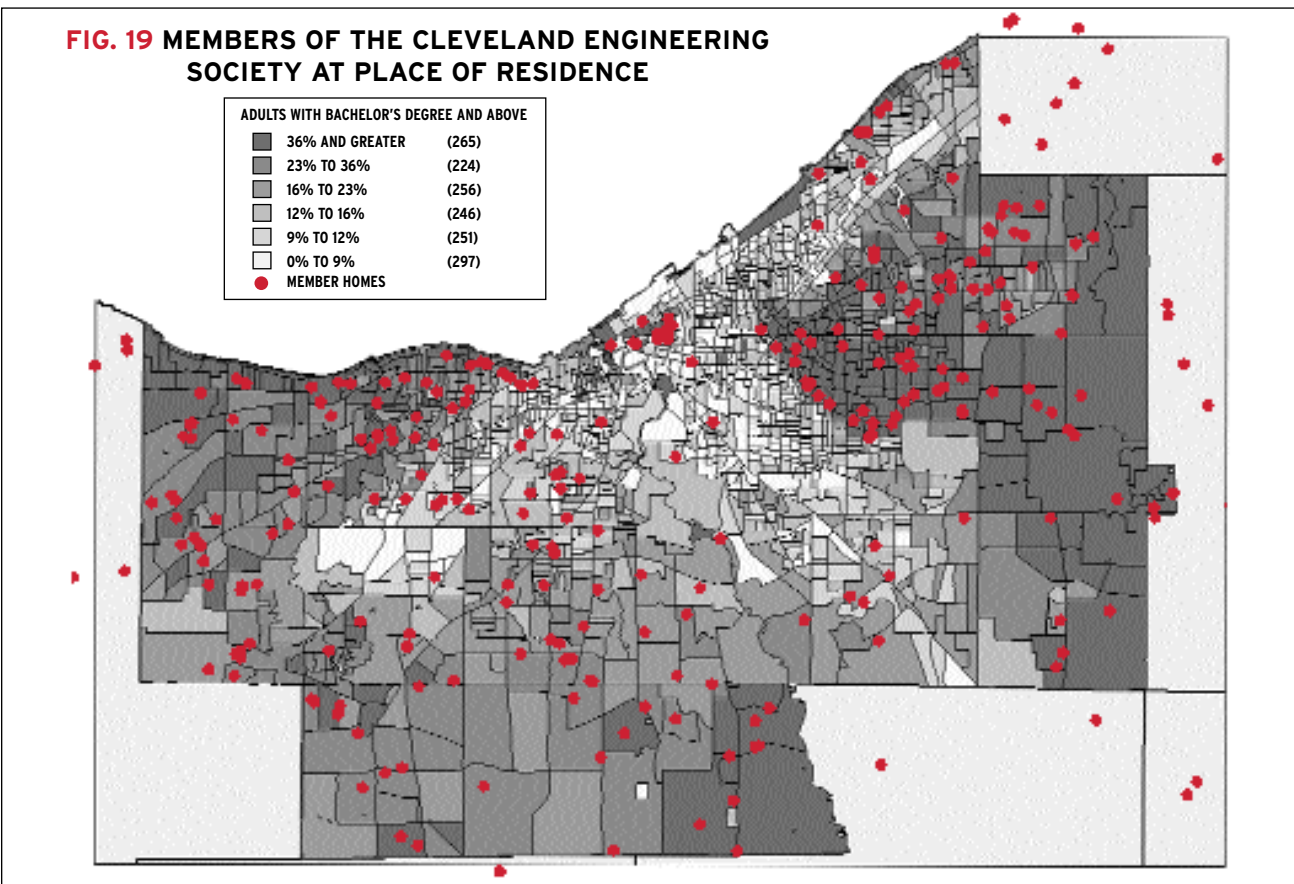


FIG. 18 MEMBERS OF THE CLEVELAND ENGINEERING SOCIETY AT PLACE OF WORK



Source: Cleveland Engineering Society, CPC/REI Prepared by the Cuyahoga County Planning Commission, Feb 2001

FIG. 19 MEMBERS OF THE CLEVELAND ENGINEERING SOCIETY AT PLACE OF RESIDENCE

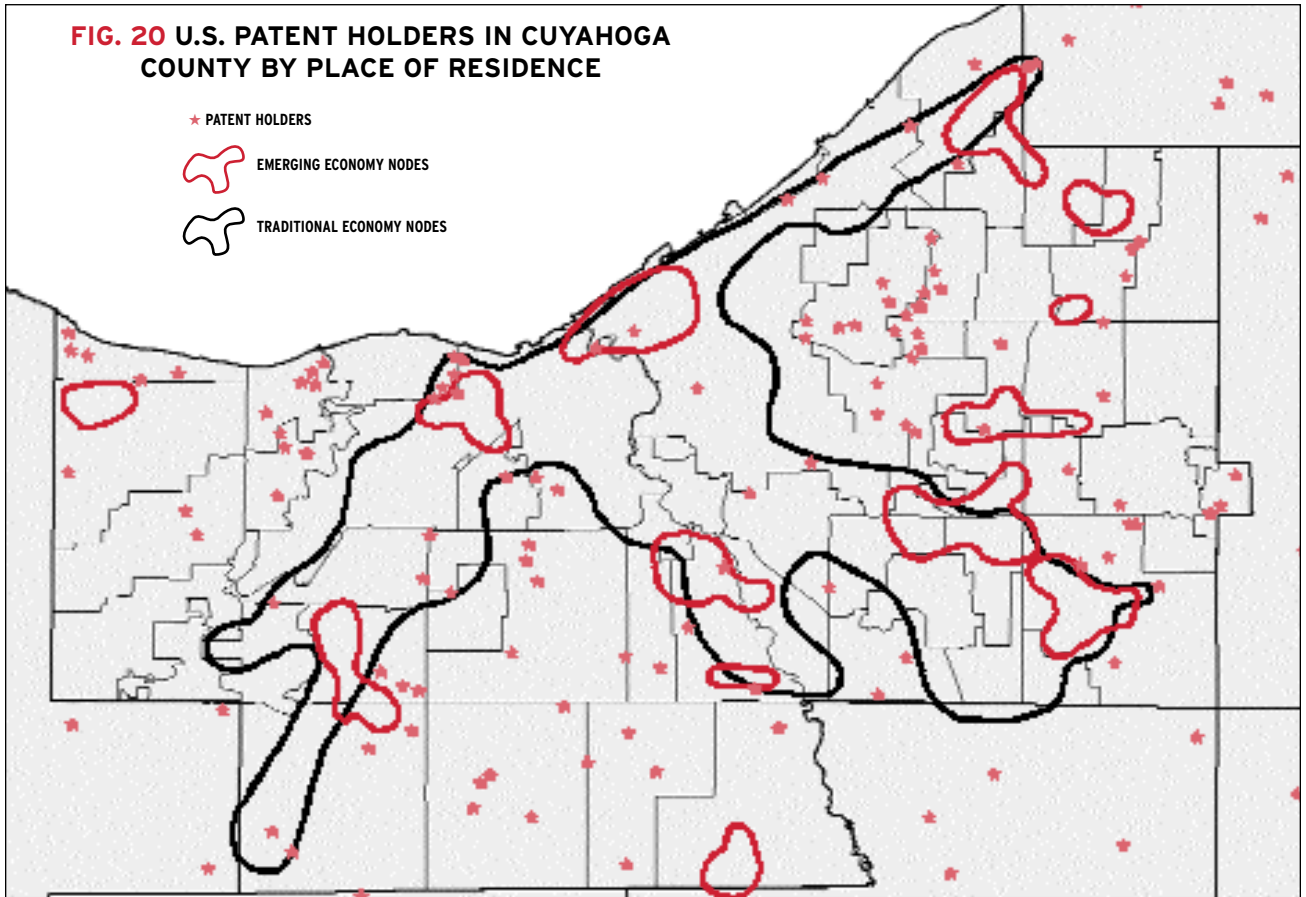


Source: Cleveland Engineering Society, CPC/REI Prepared by the Cuyahoga County Planning Commission, Feb 2001



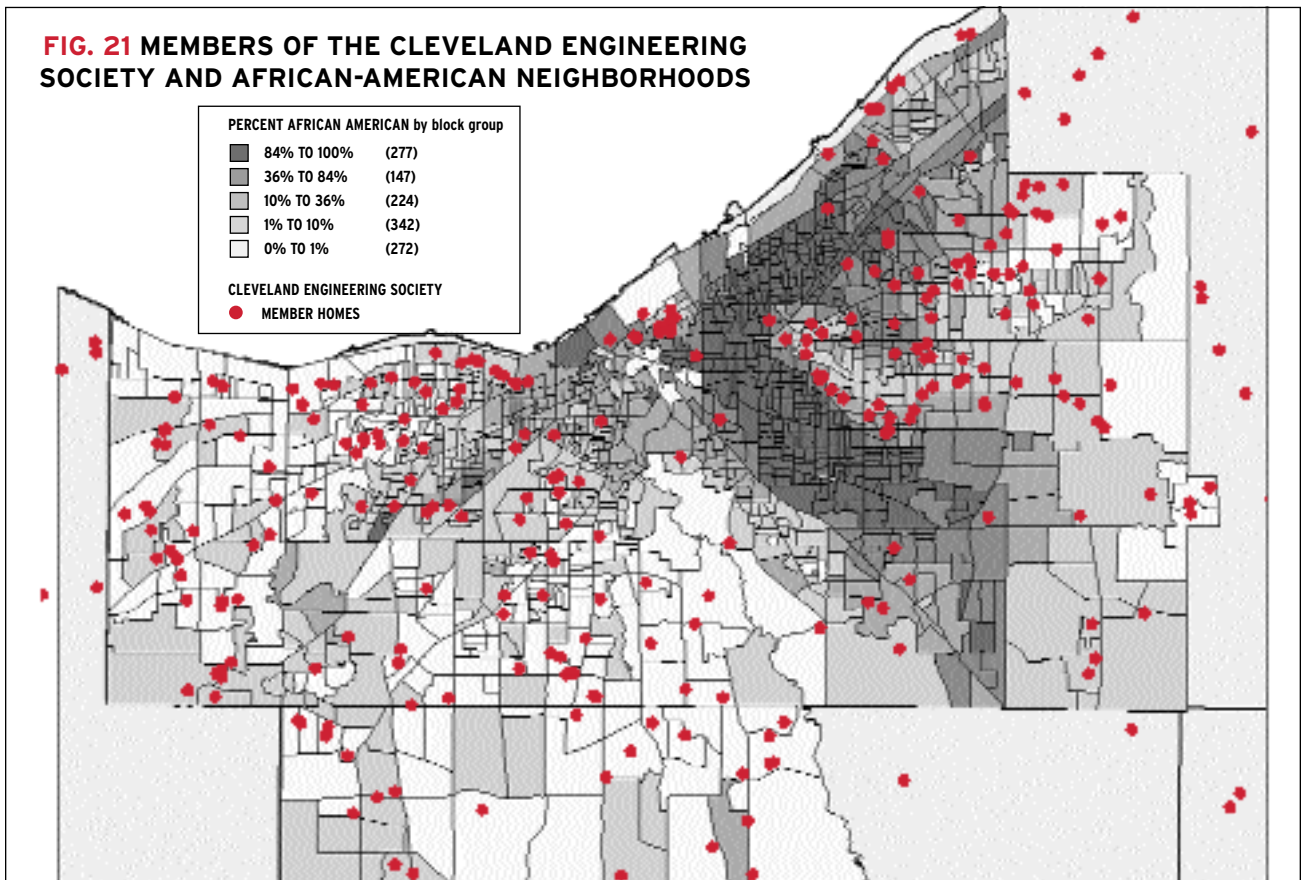
Prepared by the Cuyahoga County Planning Commission, May 24, 2001

Source: U.S. Patent and Trademark Office



Prepared by the Cuyahoga County Planning Commission, Feb 2001

Source: Cleveland Engineering Society, CPC/REI





engineering occupations has been noted by national researchers⁷ and raises serious issues of equity and opportunity in the new economy.

The “digital divide” has been defined as inequitable access to computers, computer training, and the Internet. It may also be defined more broadly as lack of access to the kind of technical and professional training that will increasingly be required in the knowledge economy. Figures 19 and 21 depict just such a digital divide.

Lack of educational attainment does not appear to be a serious problem for Cuyahoga’s inner suburbs. Places like Cleveland Heights and Shaker Heights are famous for a cultural and political commitment to education at all levels. Instead, it is a problem in Cleveland city neighborhoods located outside of downtown — in districts lying alongside the river, the lake, and railroad tracks that happen to coincide with much of the county’s heavy industry. These places represent the real challenge for any older, central county. It is crucial that they not be left behind educationally, socially, economically, or aesthetically.

The geography of knowledge in Cuyahoga County is closely related to the geography of income and power. The central business district, University Circle, select edge cities, and inner suburbs are places where knowledge flourishes. Planners should be aware of those locations where knowledge is turned into profit, but they should never lose sight of those spatial and social inequities that will continue to haunt older central counties in our increasingly meritocratic society. ◦



Policy Summary

When we began this project, we created a broad policy framework for Cuyahoga County which is applicable to all older central counties in medium-sized metros, especially in the Midwest and Northeast. Our initial policy framework for Cuyahoga looked like this:

I. Economic planning principles for Cuyahoga County.

- Sustainability focus (economic + environment + social equity) is justified, because these counties are not expected to grow rapidly under virtually any scenario.
- County must plan for redevelopment, not for growth.
- County should strengthen edge cities, as well as downtown.
- Remember that the rest of the region buys services from the central county: *They are our customers not our competitors.*

II. Recent developments in national urban policy are of crucial importance to Cuyahoga County.

- Cuyahoga County has a strong interest in Smartgrowth programs.
- Of all the counties in the region, Cuyahoga County has the strongest interest in welfare-to-work policies and in workforce development.

III. Cuyahoga County must also seize opportunities associated with the coming 'knowledge economy.'

- Location of information infrastructure
- Transport and logistics
- Locations where universities and entrepreneurs concentrate and interact
- First-class amenities, such as parks, bike paths, and good urban design

This report has focused on edge cities and on the opportunities facing older central counties in the new economy. We believe these opportunities are enormous. After all, older central counties are the places where the new economy lives *today*. The policy challenges facing these counties may be summarized using the letters R, A, and E. The challenges are *Retention, Amenities & Equity*.

We have reported several additional findings that are relevant to spatial planning in older central counties:

The central business district is a key new economy location: not just for advanced business services, but for high-tech sectors as well; and not only in Chicago and New York, but in metro areas like Cleveland. The central business district contains high-quality telecommunications infrastructure, clusters of fast-growing companies, engineers, and other knowledge workers. The cen-



tral business district is the location most accessible to the poor.⁷² County policy makers should support the downtown with additional infrastructure, while making it a location where young knowledge workers want to live. This is the next great challenge for cities like Cleveland, Pittsburgh, and Milwaukee.

New economy firms are attracted to a region's high-density edge cities, especially if those firms are large. The key insight is that these edge cities need not be in outlying counties. If we support our edge cities with telecommunications, transportation, and social infrastructure, then we may postpone further sprawl to outlying counties.

Intrametropolitan clustering of firms in the same supply chain does not provide a strong organizing principle for public policy. The idea is too theoretical, the academic evidence too mixed, to provide strong guidance for planners. Organizations like manufacturing extension services should focus on firm performance, not industry-specific local networking. Regions like Cleveland should continue to convene industry clusters at the metropolitan scale. Any further research or action on intrametropolitan clustering should rely on direct surveys and focus groups involving employers themselves.

High-density employment centers and their surrounding residential neighborhoods should be exquisitely designed and connected to each other. This is an old idea in regional planning that we have yet to implement in the United States, due to fragmented planning processes and concerns about ratables. We see the economic structure beneath the surface of our metropolitan landscapes, however, so the market is not truly choosing "random sprawl." The metropolitan area that gets this one right has the potential to steal a large block of new economy jobs from its competitors.

Combatting traffic congestion and crime are high priorities in many older central counties. We did not talk much about this here, because these are not major problems in Cuyahoga County. They arise repeatedly, however, in employer location surveys. At the intrametropolitan scale, employers do not always gravitate to the highest-amenity environments, but without exception they avoid the worst ones.⁷³ Transportation demand management, mass transit, and perhaps even road construction should be on the list of possible solutions. Nothing that works should be ruled out.⁷⁴

Municipal and county governments should take greater control of their telecommunications future, but they should do so collaboratively with private companies, who are in the best position to bear the risks of investments in broadband infrastructure.

In the new economy, the so-called digital divide is a broader concept than mere computer literacy. It has spatial dimensions that mirror broader inequities in our society. Older central counties are the places where elites in our information society rub shoulders with those who are the least connected to it. The challenges and tensions in this situation are obvious, but so are the opportunities for social synergies and for the sharing of wealth that is derived from knowledge.

We end this report with a simple observation:

There is no more exciting place to do economic development planning today than in one of the 61 older central counties in the United States. ○



- ¹ Ziona Austrian and Thomas Bier, *Great Lakes Central Counties: Is the Era of Greenfield Development Coming to an End?* Federal Reserve Bank of Chicago, Workshop on Assessing the Midwest Economy, November 1995.
- ² Paul D. Gottlieb, *Properly Measuring the Decentralization of High-Tech Industry...And Why it Matters to Theory*, Center for Regional Economic Issues, Case Western Reserve University, 1997.
- ³ See, e.g., David Firestone, "The New-Look Suburbs: Denser or More Far-Flung," *New York Times*, April 17, 2001; Edward Glaeser and Jesse Shapiro, *City Growth and the 2000 Census: Which Places Grew, and Why*, Brookings Institution Center on Urban and Metropolitan Policy, Survey Series, May 2001.
- ⁴ *Cybercities: A City-by-City Overview of the High-Technology Industry*, American Electronics Association and NASDAQ, 2000.
- ⁵ Richard Shatten, *Creating a Biomedical Economy: Report to the Edison Biotechnology Center*, Center for Regional Economic Issues, Case Western Reserve University, 1999.
- ⁶ Robert D. Atkinson and Paul D. Gottlieb, *The Metropolitan New Economy Index: Benchmarking Economic Transformation in the Nation's Metropolitan Areas*, Progressive Policy Institute and Center for Regional Economic Issues, April 2001.
- ⁷ See, e.g., James Harrington, Alan Macpherson, and John Lombard, "Interregional Trade in Producer Services: Review and Synthesis," *Growth and Change* (Fall 1991), pp. 75-94; Flavia Martinelli, "A Demand Oriented Approach to Understanding Producer Services" in *The Changing Geography of Advanced Producer Services*, ed. Peter W. Daniels and Frank Moulaert (New York: Belhaven Press, 1991); Niles Hansen, "Do Producer Services Induce Regional Economic Development?" and William Coffey and Mario Polese, "Producer Services and Regional Development: A Policy-Oriented Perspective," in *Regional Policy and Regional Integration*, ed. Niles Hansen, Kenneth Button, and Peter Nijkamp (Brookfield, VT: Edward Elgar Press, 1996); Sven Illeris, *The Service Economy: A Geographical Approach* (New York: J. Wiley, 1996); W. Richard Goe, Barry Lentnek, Alan MacPherson, and David Phillips, "The Role of Contact Requirements in Producer Services Location," *Environment and Planning A*, Vol 32 (2000), pp. 131-45.
- ⁸ It is unlikely that the location of such new industries followed consumer markets or was driven by old centralized infrastructure like ports, railroad yards, or government offices. Instead, the pattern seems to fit the standard product cycle model of firm location. This model assumes that knowledge-based activities are centrally located due to urbanization economies, while routine production activities, occurring later in the product life cycle, disperse to greenfield sites where land and labor can be acquired more cheaply (see R. Mack and P. Schaeffer, "Nonmetropolitan Manufacturing in the United States and Product Cycle Theory: A Review of the Literature," *Journal of Planning Literature* 8(2): 124-39). Product cycle driven location across urbanization categories may be observed within — as well as between — SIC codes, although routine production in industries like computer hardware may have gone offshore and effectively disappeared from the County Business Patterns dataset.
- ⁹ See Paul D. Gottlieb, *Amenities versus Agglomeration in the Location Decisions of High-Technology Firms*, Center for Regional Economic Issues, Case Western Reserve University, 1996; Richard Florida, *Competing in the Age of Talent: Environment, Amenities, and the New Economy*, A Report Prepared for the R. K. Mellon Foundation, Heinz Endowments, and Sustainable Pittsburgh, April 2000.
- ¹⁰ See the references in note 7.
- ¹¹ See, e.g., Edward Glaeser "Why Economists Still Like Cities," *City Journal* 6:2 (Spring 1996), pp. 70-77; Peter Hall, "The Future of Cities" *Computers, Environment and Urban Systems*, Vol 23 (1999), pp. 173-85.
- ¹² Joel Kotkin, *The New Geography: How the Digital Revolution is Reshaping the American Landscape* (New York: Random House, 2000), pp. 110-39.
- ¹³ See Kotkin; Joel Garreau, *Edge City: Life on the New Frontier* (New York: Doubleday, 1991).
- ¹⁴ Ziona Austrian and Thomas Bier, *op cit*.
- ¹⁵ For more on the comparative advantage of downtowns, see Paul D. Gottlieb and Tom Bogart, *The Downtown's Economic Revival: Cleveland's Recent Success and Next Steps*, Center for Regional Economic Issues, Case Western Reserve University, 1998.
- ¹⁶ The author would like to credit Professor Tom Bogart for this political insight.
- ¹⁷ William T. Bogart and William C. Ferry, "Employment Centres in Greater Cleveland: Evidence of Evolution in a Formerly Monocentric City," *Urban Studies*, Vol. 36, No. 12 (1999), pp. 2099-2110.
- ¹⁸ *Ibid*.
- ¹⁹ Paul Sommers and Daniel Carlson, *Ten Steps to a High Tech Future: The New Economy in Metropolitan Seattle*, Center on Urban and Metropolitan Policy, Brookings Institution, December 2000.
- ²⁰ See Atkinson and Gottlieb, *op. cit*.
- ²¹ Robert Fishman, *Bourgeois Utopias* (New York: Basic Books, 1987), p. 184.
- ²² A location quotient is calculated as for each polygon or jurisdiction in a region $i=1$ to n , where emp stands for employment count, c denotes an industry subsector, d denotes a denominator industry — typically total employment.
- $$\left(\frac{emp_{ci}}{\sum_{i=1}^n emp_{ci}} \right) \bigg/ \left(\frac{emp_{di}}{\sum_{i=1}^n emp_{di}} \right)$$
- ²³ Richard Bingham and Deborah Kimble, "The Industrial Composition of Edge Cities and Downtowns: The New Urban Reality," *Economic Development Quarterly*, Vol. 9, No. 3 (1995), pp. 259-72; William T. Bogart and William C. Ferry, *op. cit*.
- ²⁴ Alex Anas, Richard Arnott, and Kenneth Small, "Urban Spatial Structure," *Journal of Economic Literature*, Vol. 36 (1998), pp. 1426-64; Genevieve Giuliano and Kenneth Small, "Subcenters in the Los Angeles Region," *Regional Science and Urban Economics*, Vol. 21 (1991), pp. 163-82; Nathan Anderson and William Bogart, "The Structure of Sprawl: Identifying and Characterizing Employment Centers in Polycentric Metropolitan Areas," *American Journal of Economics and Sociology*, v. 60 (2001), pp. 147-169.
- ²⁵ Anderson and Bogart, *op. cit*.
- ²⁶ *Ibid*.
- ²⁷ See Daniel McMillen and John McDonald, "Suburban Subcenters and Employment Density in Metropolitan Chicago," *Journal of Urban Economics*, Vol. 43 (1998), pp. 157-80.
- ²⁸ Michael Porter, *The Competitive Advantage of Nations* (New York: Free Press, 1990); Michael Porter, "The Competitive Advantage of the Inner City," *Harvard Business Review*, May/June 1995, pp. 55-71.
- ²⁹ William T. Bogart, *The Economics of Cities and Suburbs* (Upper Saddle River, NJ: Prentice-Hall, 1998); Bogart and Ferry, *op. cit.*; Anderson and Bogart, *op. cit*.
- ³⁰ Bogart and Ferry, *op. cit*.
- ³¹ We are of course overstating the distinction between comparative advantage and agglomerative models, since firms located in a sectoral agglomeration presumably enjoy a comparative advantage by virtue of that very fact — leading to specialization and trade. The key distinction is really whether the *initial* economic advantage relates to the fixed attributes of a place or to interfirm relationships. Hence our use of the word "transactional" to describe agglomerative explanations for observed clustering.
- ³² See Edward Hill and John Brennan, "A Methodology for Identifying the Drivers of Industrial Clusters: The Foundation of Regional Competitive Advantage," *Economic Development Quarterly*, Vol. 14, No. 1 (February, 2000), pp. 65-96. Our use of so-called "driver industries" for this analysis decreases the extent to which all relevant customers and



suppliers are included, but at least the industries have been identified as concentrated at the regional scale.

³³ See Sommers and Carlson, *op. cit.*; Kotkin, *op. cit.*; Florida, *op. cit.*

³⁴ Jeff Stacklin, "Tech Giants Take a Liking to Independence," *Crain's Cleveland Business*, February 19-25, 2001, pp. 23,27.

³⁵ Sommers and Carlson, *op. cit.*, p. 15. Agile Software is a regional sales office of a Silicon Valley company located in Bellevue, WA. In both Seattle and Cleveland, these kinds of companies cite transportation access in choosing an edge city location. In both cities, however, the central business district lies on the water, and therefore sits at the edge of the metropolitan area. In a city like Indianapolis or Atlanta, the CBD could easily be regarded as the point most accessible to the market these firms must serve.

³⁶ This, indeed, is the fundamental premise of Michael Porter in *Harvard Business Review*, *op. cit.*

³⁷ Luis Suarez-Villa and Wallace Walrod, "Operational Strategy, R&D and Intra-metropolitan Clustering in a Polycentric Structure: The Advanced Electronics Industries of the Los Angeles Basin," *Urban Studies*, Vol. 34, No. 9, August 1997, pp. 1343-80.

³⁸ McMillen and McDonald, *op. cit.*

³⁹ A reference in the paper to economies in shopping would presumably not apply to a non-retail cluster, while references to improved inter-firm communication presumably apply only to firms in the same supply chain. Outside of infrastructure, therefore, the paper includes no explanation for the observed clustering of *unrelated* firms in Chicago's suburban subcenters.

⁴⁰ See Allen J. Scott, *Metropolis: From Division of Labor to Urban Form* (Berkeley: University of California, 1988).

⁴¹ Scott, *op. cit.* (1988), pp. 91-118.

⁴² Allen J. Scott, "The Technopoles of Southern California," *Environment and Planning A*, Vol. 22 (1990), pp. 1575-1605.

⁴³ Scott, *op. cit.* (1988), p. 117.

⁴⁴ Suarez-Villa and Walrod, *op. cit.*

⁴⁵ *Ibid.*

⁴⁶ Bennett Harrison, Maryellen Kelley, and Jon Gant, "Innovative Firm Behavior and Local Milieu: Exploring the Intersection of Agglomeration, Firm Effects, and Technological Change," *Economic Geography*, Vol. 72, No. 3 (July 1996), p. 233-53.

⁴⁷ Scott (1998), *op. cit.*, pp. 99-100.

⁴⁸ Sommers and Carlson, *op. cit.*; Kotkin, *op. cit.*

⁴⁹ See Florida, *op. cit.*; Manuel Glynnias, "How Cleveland Could Build a Downtown Technology District," *Cleveland's Path to Regional Economic Advantage*, Proceedings from a Policy Forum of the Center for Regional Economic Issues, January 1999.

⁵⁰ Kotkin, *op. cit.*, p. 63; Mark Rosentraub (forthcoming monograph).

⁵¹ Gary Brooten, "New Urbanism," *Innovation for Regional Advantage*, Vol. 2 (2000), pp. 30-35.

⁵² *Communities of Place: The Interim State Development and Redevelopment Plan for the State of New Jersey* (Trenton: New Jersey Office of State Planning, July 1991).

⁵³ Atkinson and Gottlieb, *op. cit.*; *A Region at the Crossroads*, Cleveland Tomorrow's Strategic Plan (2000).

⁵⁴ See *A Region at the Crossroads*.

⁵⁵ James Wheeler, Yuko Aoyama, and Barney Warf, eds., *Cities in the Telecommunications Age: The Fracturing of Geographies* (New York: Routledge, 2000). See especially the chapter by Moss and Townsend on "How Telecommunications Systems are Transforming Urban Spaces." A similar point is made by Stephen Graham and Simon Marvin, *Telecommunications and the City: Electronic Spaces, Urban Places* (New York:

Routledge, 1996), p. 39. Finally, see *The New Spatial Order? Technology and Urban Development*, Annual Roundtable of the Lincoln Institute of Land Policy, Cambridge, Massachusetts, 2001.

⁵⁶ One example of the urban renaissance that is little discussed outside academic circles is the reversal in the 1980s of the 1970s phenomenon of greater growth in nonmetropolitan than metropolitan areas. See Larry Long and Diana DeAre, "U.S. Population Redistribution: Perspective on Non-Metro Turnaround," *Population and Development Review*, Vol. 14, No. 3 (September 1988), pp. 433-50; P. Schaeffer, "Nonmetropolitan Manufacturing in the United States and Product Cycle Theory: A Review of the Literature," *Journal of Planning Literature*, Vol. 8, No. 2 (November 1993), pp. 124-39.

⁵⁷ Kotkin, *op. cit.*, p. 11.

⁵⁸ In the Greater Cleveland area, the example often given is Charles Schwab's pension management facility in Richfield, Summit County.

⁵⁹ Interview with Cleveland developer Kerry Klotzman, August 6, 2001.

⁶⁰ This is one policy thrust of a statewide commission; see the 2001 annual report of *Ecom Ohio: Assessing Ohio's Readiness for Global Electronic Commerce* (www.ecom-ohio.org).

⁶¹ Last-mile access in the central city may depend on whether you prefer a wired or wireless solution. There is a lot of cable beneath the ground, on average, but some tech companies avoid the heart of downtown because skyscrapers interfere with the lines of sight necessary for ground-based wireless or satellite communication (see Sommers and Carlson, p. 25).

⁶² Graham and Marvin, *op. cit.*, p. 3.

⁶³ See *Ecom Ohio*, *op. cit.*

⁶⁴ Graham and Marvin write that "many city planners and managers do not even know what the telecommunications infrastructure is in their cities; very few have the power, influence, or conceptual tools to reshape it to have desired impacts" (p. 51).

⁶⁵ Examples were drawn from Rachael Hedgcoth, "Businesses Board the Fiber-optic Train," *Expansion Management* (February 2001), pp. 23-30; Jay Jeyapalan, "Fiber Optics in City Sewers? An Idea Whose Time Has Come," *Trenchless Technology* (March 2001), pp. 46-48; August Grant and Lon Berquist, "Telecommunications Infrastructure and the City," in James Wheeler, Yuko Aoyama, and Barney Warf, *op. cit.*

⁶⁶ Grant and Berquist, *op. cit.*

⁶⁷ Robert Jaquay, *Telecommunications and Economic Development in Cuyahoga County and Northeast Ohio*, Cuyahoga County Planning Commission, 1993.

⁶⁸ Graham and Marvin, *op. cit.*

⁶⁹ See, e.g., Paul D. Gottlieb and Michael Fogarty, *Educational Attainment and Metropolitan Growth*, Center for Regional Economic Issues, Case Western Reserve University, 1999; Michael Fogarty, *Cleveland's Emerging Economy*, Center for Regional Economic Issues, Case Western Reserve University, 1998; Atkinson and Gottlieb, *op. cit.*

⁷⁰ The society tends to attract civil engineers and those interested in networking, including some who may not hold degrees in engineering.

⁷¹ *Women, Minorities, and Persons with Disabilities in Science and Engineering*: 1998. National Science Foundation Report NSF 99-87 (February 1999).

⁷² Paul D. Gottlieb, "Neighborhood Development in the Metropolitan Economy: A Policy Review" *Journal of Urban Affairs* Volume 19, No. 2 (Summer 1997).

⁷³ Paul D. Gottlieb, "Residential Amenities, Firm Location, and Economic Development" *Urban Studies*, Volume 32, No. 9 (November 1995); Paul D. Gottlieb, "Amenities as an Economic Development Tool: Is There Enough Evidence?" *Economic Development Quarterly* Volume 8, No. 3 (August 1994).

⁷⁴ Atkinson and Gottlieb, *op. cit.*



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