

U.S. Metro Economies:

Leading America's New Economy



PREPARED FOR:

The United States Conference
of Mayors and the National
Association of Counties

PREPARED BY:

STANDARD
& POOR'S
DRI



THE UNITED STATES
CONFERENCE
OF MAYORS

NACO

National Association of Counties



June 6, 2000

Published by the Standard & Poor's *DRI* division of The McGraw-Hill Companies.
Executive and Editorial Offices: 24 Hartwell Avenue, Lexington, MA 02421

© 2000 by The McGraw-Hill Companies. Reproduction in whole or in part prohibited
except by permission. All rights reserved.

Information has been obtained by Standard & Poor's *DRI* from sources believed to be
reliable. However, because of the possibility of human or mechanical error by our sources
Standard & Poor's *DRI* does not guarantee the accuracy, adequacy, or completeness of
any information and is not responsible for any errors or omissions or for the results
obtained from the use of such information.

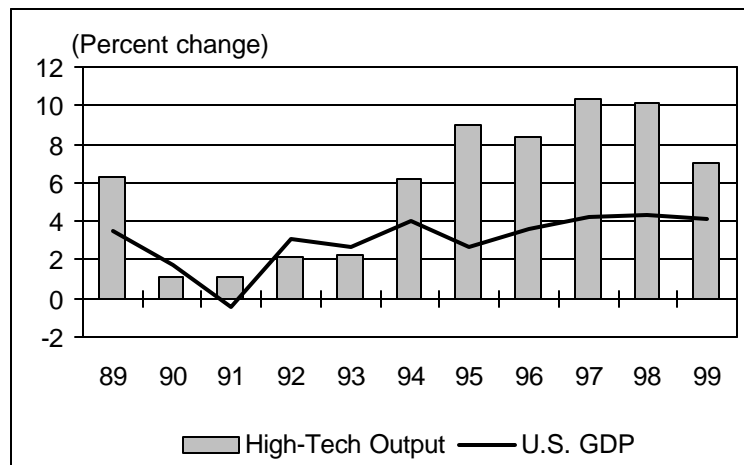
1 U.S. Metro Areas: Economic Engines in the New Economy

As the focal points of economic activity, cities and counties within metropolitan areas are essential to the nation's economic development. The geographic concentration of business and people in metro areas creates unique economic conditions that generate new industries, speed the diffusion of knowledge, spur technological innovation, and increase productivity. Metro areas have larger markets for goods and services, more specialized labor pools, and more extensive and sophisticated transportation and telecommunications networks than non-metro areas. These competitive advantages make metro areas the engines of U.S. economic growth and the source of new high-technology industries. Today, metro areas generate more than 80% of the nation's employment, income, and production of goods and services and 94% of high-tech jobs and output.

1.1 Technology and Economic Growth

A nation's economic growth rate is determined by increases in labor supply and improvements in productivity, which allow more goods and services to be produced using the same amount of labor. Until recently, it was assumed that the potential growth rate of real U.S. Gross Domestic Product (GDP) was limited to approximately 2.5% per year (1% labor force growth + 1.5% productivity growth). Since 1995, however, productivity has improved substantially and GDP has been redefined to include software, suggesting that trend GDP growth will average 3.6% over the next five years. Although it is still too early to identify all of the factors responsible for rising productivity, it is likely that investments in high-tech capital goods, especially information technology such as computers and telecommunications equipment, are boosting the rate at which workers are able to increase their production of goods and services.

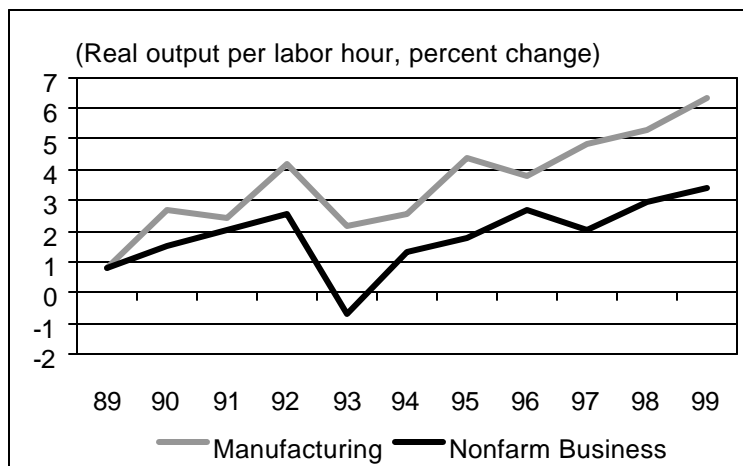
Figure 1 - High-Tech Boomed in the Second Half of the 1990s



Spending on high-tech goods and services surged in 1995, as businesses and consumers rushed to acquire computers, communications equipment, and software. Between 1995 and 1999, nominal high-tech output growth has averaged 10.6% annually, nearly double the rate for all goods and services. Furthermore, over the same period, it is estimated that gains in the sales of high-tech goods and services *directly* added 1.5 percentage points to real GDP growth each year.

The most important effects of an expanding high-tech sector may be *indirect*, however. The level of economic activity in the U.S. depends on the number of transactions that can be made between individual households and firms. Investments in high-tech equipment, especially technologies used to increase the exchange of information (e.g., the Internet, computers, and wireless telephones), are reducing the costs of economic transactions, and, as a result, are boosting productivity and GDP growth. As Figure 2 shows, labor productivity growth started to increase steadily in 1995, coinciding with the boom in spending on high-tech products. Although the connection between high-tech spending and rising productivity has not been proven, Figures 1 and 2 imply that the indirect gains (through increases in productivity) of rapidly expanding high-tech industries could be even more substantial than their direct contribution to the nation's output.

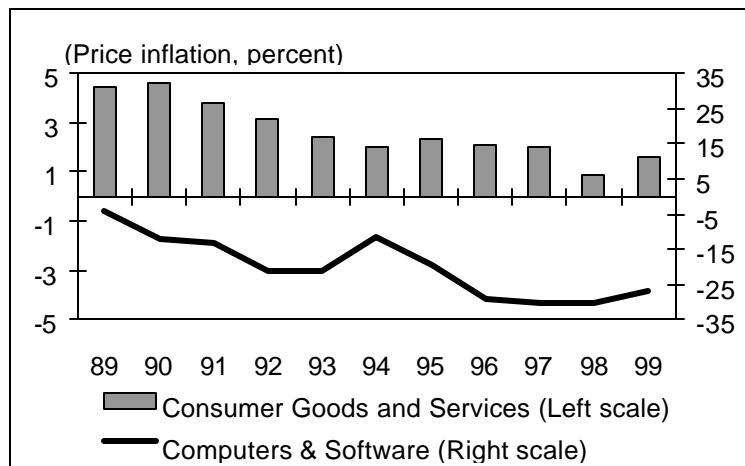
Figure 2 - Productivity Has Climbed Steadily Since 1995



Furthermore, because many information technologies reduce transactions costs, increasing high-tech investment may be restraining price inflation. As with productivity, the *direct* effects of the booming high-tech sector on inflation are evident in macroeconomic data. Figure 3 plots the overall rate of inflation, as well as the rate for computer hardware and software. These measures of inflation are quality-adjusted, so that if the quality of products increases (e.g., the average processing speed of computers rises) faster than their prices, inflation can actually be negative. This explains the dramatic deflation in computer and software prices over the last decade. Plummeting

(quality-adjusted) prices for computers and software and increases in productivity (which constrain increases in labor costs) have restrained inflation during the current economic expansion. But again, these direct benefits may not be as large as the *indirect* and long-term effects that information technology has on inflation. More ubiquitous price information allows consumers (both households and businesses) to compare prices more easily, limiting the ability of companies to raise prices. Companies also benefit from the high-tech boom, however, since they are able to manage their production and inventory processes more efficiently, enabling them to maintain or increase profitability in an environment where they are unable to increase prices.

Figure 3 - Falling Computer Prices Have Contributed to Subdued Inflation



1.2 Metro Areas Are the Source of High-Tech Industries

With few exceptions¹, most major industries in the United States started in cities, including automobile manufacturing (Detroit), television broadcasting (New York), and personal computer manufacturing (San Jose). Metro areas provide new industries with amenities--a diverse and ample supply of labor, financial and physical capital, access to national and international markets, a local base of technical knowledge--that are essential for their initial development and eventual success. As an industry matures, technological advances often allow companies within that industry to move to non-urban locations. As a consequence, newer, faster-growing industries tend to cluster within metro areas, while older, slower-growing industries are less bound to urban locations.

The emerging high-tech industries of the new economy are also being created in metro areas, following the geographic pattern of development that, in the past, produced many

¹ The major exceptions are resource-extraction industries (e.g., forestry, coal mining, oil drilling) which are tied to the geographic location of a particular natural resource.

of today's largest industries. The creation of new high-tech manufacturing and services industries²--including computer hardware, computer software, telecommunications equipment, and scientific and management consulting—is almost entirely concentrated within metro areas. In 1999, metro area economies employed over 7 million high-tech workers who produced 94% of the nation's high-tech output. The geographic concentration of high-tech employment and production within metro areas exceeds that for all economic activity, highlighting the importance of metro areas as the source for the nation's newest and most innovative industries. Furthermore, the majority of new high-tech jobs are being created in metro areas. During the past seven years, high-tech companies located in metro areas created 1.6 million jobs, while only 103,000 high-tech jobs were added outside of metro areas.

Table 1 – Nearly All High-Tech Industry Is Located in Metro Areas

Shares of U.S. Totals (1999)		Metro Areas	Rest of United States	United States
High-Tech Industries	Employment (Thousands)	7,162	490	7,652
	Percentage	94%	6%	
	Output (Millions)	\$921,833	\$59,290	\$981,122
	Percentage	94%	6%	
All Industries	Employment (Thousands)	107,904	20,753	128,657
	Percentage	84%	16%	
	Output (Millions)	\$7,651,574	\$1,374,810	\$9,026,385
	Percentage	85%	15%	

The contribution of individual metro areas to the high-tech economy is even more striking.³ The twenty metro areas with the most high-tech production account for nearly one-half of the national output of high-tech goods and services. If they were states, the Boston, San Jose, and Los Angeles metro areas would rank 5th, 6th, and 7th in high-tech output. Taken together, the high-tech output of the ten largest metro areas exceeds the combined high-tech production of the 39 smallest states. In 1999, the six metro areas with the most high-tech production produced more technology goods and services than California: \$2.3 billion compared with \$2.1 billion.

In the computer hardware, computer software, and telecommunications industries, the concentration of employment in metro areas is even greater than the average for all high-tech industries. For companies within these industries, the competitive advantages of metro areas (see Section 3), especially access to diverse labor market pools and networks of individuals with highly specialized knowledge, are essential for developing the

² The industries that Standard & Poor's DRI defines as high-technology are listed in Section 7.

³ See Table 10 at the end of this report for a listing of high-tech output by state and metro area.

innovative technologies that propel their growth. In many instances, for a specific industry, as the pool of labor and technical knowledge deepens within an individual metro area, that locality becomes the dominant center for that industry. San Jose is the center of the computer hardware industry, accounting for 15% of U.S. industry employment, compared with its 0.8% share of total national employment.⁴ More than 18% of employment in the aircraft industry is located in the Seattle metro area. The Rochester, New York metro area is home to more than one-half of the nation's employment in the photographic equipment and supplies industry.

Table 2 - Metro Area Shares of High-Tech Employment

Shares of U.S. Employment (Thousands, 1999)	Metro Areas	Rest of United States	United States
Guided Missiles	57.9	0.0	57.9
Percentage	100%	0%	
Plastic & Synthetic Materials	103.6	28.5	132.1
Percentage	78%	22%	
Pharmaceuticals	273.2	22.1	295.3
Percentage	93%	7%	
Computers & Office Equipment	270.4	14.1	284.5
Percentage	95%	5%	
Electrical Equipment	100.8	20.1	120.9
Percentage	83%	17%	
Audio, Video, & Telecommunications Equipment	286.0	14.5	300.5
Percentage	95%	5%	
Electronic Components	547.1	65.4	612.5
Percentage	89%	11%	
Aircraft, Engines, & Parts	482.0	30.4	512.4
Percentage	94%	6%	
Scientific & Control Instruments	636.7	67.7	704.4
Percentage	90%	10%	
Photographic Equipment & Supplies	74.9	4.2	79.1
Percentage	95%	5%	
Computer Processing & Software	1,665.7	48.9	1,714.6
Percentage	97%	3%	
Engineering & Consulting Services	2,631.6	170.4	2,802.0
Percentage	94%	6%	

1.3 Investment Strategies for a New Economy

Public and private-sector investment aimed at promoting national economic growth should be focused on metro areas, since they contain the bulk of the nation's productive

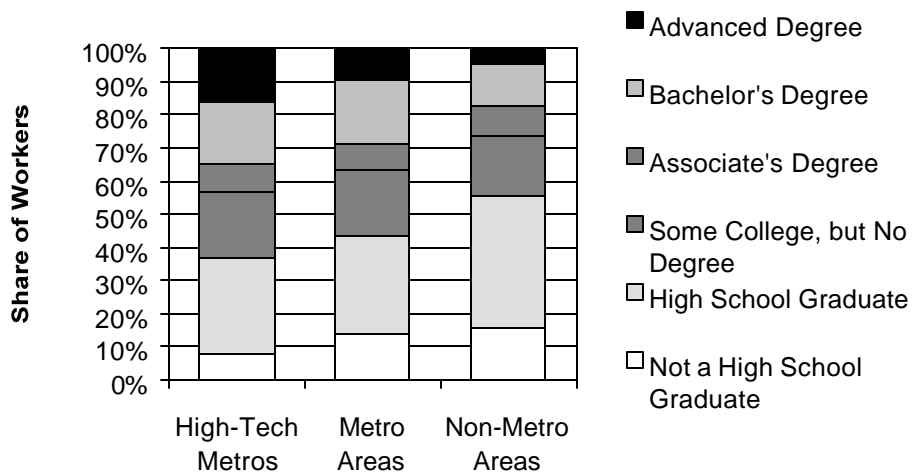
⁴ See Tables 11-23 for more detailed listings of high-tech employment by industry and metro area.

assets (e.g., labor, physical capital, and infrastructure) and most of its high-tech economic activity. The unique attributes of metro areas, including extensive backward and forward linkages between businesses, dense and diversified consumer markets, highly efficient labor markets, and superior telecommunications and transportation networks, create an economic environment that spawns the country's most productive industry clusters. In order to maximize macroeconomic growth, economic development and private-sector initiatives should aim to promote and maintain these industry clusters and the supporting social, economic, and physical infrastructure of metro areas.

1.4 The Importance of Workforce Development

High-tech industries require workers with specialized skills and higher levels of educational attainment. Figure 4 shows the educational attainment levels of workers in metro areas with large concentrations of high-tech industries⁵, all metro areas, and non-metro areas. In the metro areas with the most concentrated high-tech employment activity, 92% of workers have earned at least a high school diploma, compared with 86% in all metro areas and 84% in non-metro areas. Workers in these metro areas are also more likely to have a college degree: 43% compared with an average of 37% in all metro areas and only 26% in rural areas. These percentages highlight the importance of a well-trained and educated workforce in supporting the development of high-tech industry clusters.

Figure 4 - High-Tech Economies Require More Educated Workers



As more of the nation's economic activity shifts into high-tech industries, the demand for skilled and educated workers will increase rapidly. According to projections from the

⁵ In Figure 4, "High-Tech Metros" are the ten metro areas with the largest percentages of workers employed in high-tech industries relative to total employment: Medford, OR; San Jose, CA; Boulder, CO; Wichita, KS; Melbourne, FL; Huntsville, AL; Binghamton, NY; Rochester, NY; Seattle, WA; and Washington, DC.

Bureau of Labor Statistics, the five fastest-growing occupations between 1998 and 2008 will be computer engineers, computer support specialists, systems analysts, database administrators, and desktop publishing specialists—all high-tech professions. Each of the occupations requires specialized sets of skills and education levels ranging from advanced degrees (computer engineers), to high school and associate's degrees (desktop publishing and systems analysts). Consequently, metro areas that develop superior training and educational facilities will be in a better position to attract and retain high-tech industries.

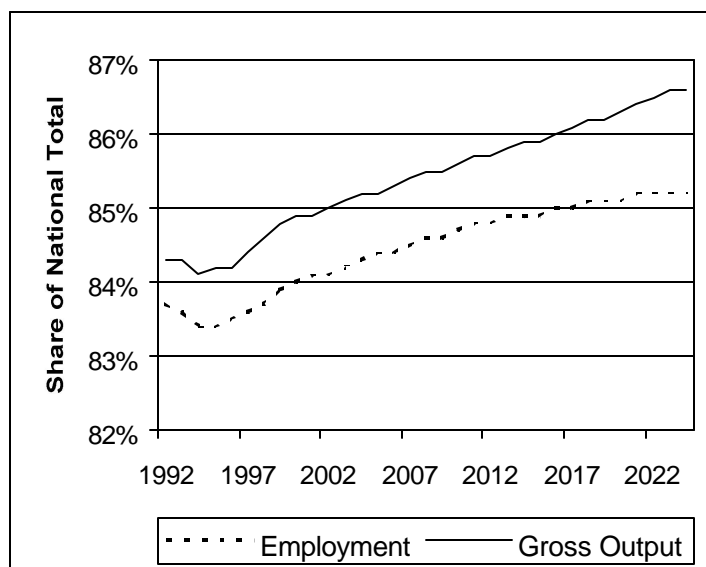
2 The Contribution of Metro Areas to the U.S. Economy

Because of the development of high-tech industry clusters and the competitive advantages described in the previous section, metro areas make a disproportionately large contribution to the U.S. economy. Metro areas generate most of the nation's jobs, income, and output. Furthermore, starting with the recovery of the U.S. economy in the early 1990s, the relative contribution of metro areas has been increasing, a trend that DRI expects to continue over the next twenty-five years.

2.1 The Recent Performance of Metropolitan Area Economies

As the national economy enters the tenth year of its current expansion, the contribution of metro areas to economic growth continues to expand. Metro area employment increased 2.3% during 1999, the sixth consecutive year of more than 2% gains. Over the past three years, the value of goods and services produced in metro areas increased by \$1,228 billion, the largest three-year gain ever. Because of this acceleration in economic growth, the contribution of metro areas to the national economy has increased sharply over the last three years, a trend that is expected to continue over the next 25 years.

Figure 5 - The Contribution of Metro Areas to the National Economy Will Continue to Grow



In 1999, metro area economies compare even more favorably with international economies than in 1997, the first year that Standard & Poor's DRI compared metro area and international economic output levels.⁶ The ranking of Los Angeles's gross output

⁶ See the March 1998 edition of *The Role of Metropolitan Areas in the National Economy* for the 1997 rankings of gross product for metro areas, states, and nations.

among international economies has jumped from 19th to 17th, as its economy overtook those of Argentina and Russia. The economy of the Chicago metro area moved ahead of Taiwan and Russia, while the economy of the Dallas metro area surpassed that of Saudi Arabia's. Philadelphia's ranking increased from 34th to 30th, as it produced more than the economies of Thailand and Norway.

Many other key indicators of the contribution of metro areas to the national economy also increased sharply in 1999. Metro area employment in the financial services and transportation and utilities sectors, two of the nation's highest value-added industries, increased 2.7% and 2.9%, respectively. Metro area business services payrolls rose by 5.4%, extending a six-year trend of over 5% annual growth in this industry. Finally, metro area per capita income increased by more than \$1,350, the fifth straight year of four-digit gains.

2.2 The Scope of Metro Area Economies

The size of metro area economies illustrates their importance to the nation. If they were counted as a single country, the gross product of the ten largest U.S. metropolitan areas (\$2,200 billion) would rank third among the world's economies, trailing only the U.S. (\$9,300 billion) and Japan (\$4,400). In terms of the dollar value of output, the New York City metro area economy produces more than Argentina, the Chicago metro area economy produces more than Taiwan, and the Atlanta metro area economy produces more than Indonesia. Taken together, the fifty largest metro areas produce \$560 billion more than Japan.

The importance of metro area economies can also be illustrated by their size relative to the output of U.S. states. The gross product of the ten largest U.S. metro areas exceeds the combined output of the 31 smallest states. In 1999, the five largest metro areas produced more goods and services than California; \$1,400 billion compared with \$1,200 billion.

Within a particular state, a single metropolitan area often dominates the state's economy. For example, the Atlanta metro area provides 55% of Georgia's employment and 56% of gross state product. In Minnesota, the Minneapolis-St. Paul metro area produces 65% of the state's output and employs 64% of the work force. In highly urbanized states, almost all economic activity occurs in metro areas. In Pennsylvania, 88% of employment and 91% of labor income is generated within metro areas.

2.3 Employment and Output

Most of the economic activity in the United States occurs within metro area cities and counties. Over 108 million workers were employed in metro areas in 1999, or 84% of national employment. The total value of goods and services produced in metro areas during 1999 was \$7,650 billion, more than 85% of U.S. gross domestic product. For their size, metro areas contribute more to the national economy than non-metro areas. The

metro area percentages of national employment and gross domestic product both exceed metro area shares of population and land area, highlighting the geographic concentration of economic activity within urban and suburban areas.

Table 3 - Most Economic Activity Occurs in Metro Areas

Shares of U.S. Economy (1999)		Metro Areas	Rest of United States	United States
Size	Population (Millions)	219	54	273
	Percentage	80%	20%	
	Land Area (Square Miles, 000s)	725	2,862	3,586
	Percentage	20%	80%	
Jobs & Output	Employment (Millions)	108	21	129
	Percentage	84%	16%	
	Gross Domestic Product (Billions)	\$7,652	\$1,375	\$9,026
	Percentage	85%	15%	
High Value Added Employment Sectors	Financial Services (Thousands)	6,845	720	7,566
	Percentage	90%	10%	
	Transportation & Utilities (Thousands)	5,885	913	6,797
	Percentage	87%	13%	

The clustering of two of the nation's highest value added sectors in urban locations magnifies the metro area contribution to the national economy. The financial services sector had the highest level of output per employee in 1999, \$237,000, while the transportation, communications, and utilities sector (TCPU) had the third highest level at \$106,000.⁷ In 1999, 90% of financial services employment and 87% of TCPU employment was located within metropolitan areas. Financial services companies choose to locate in metro areas for proximity to major securities and commodity markets and access to highly skilled workers. Companies maximize the efficiency of their transportation and communications networks by locating hubs and distribution centers in metro areas, taking advantage of extensive road, rail, shipping, and communications infrastructure.

From 1992 to 1999, most of the economic gains made in the United States were generated within cities and counties in metro areas. Over this period, 16.8 million new jobs were created in metropolitan areas, over 85% of the national increase of 19.7 million. The contribution of metro areas to gross domestic product increased by over \$2.4 trillion from 1992 to 1999, representing 86% of the national gain.

⁷ The mining sector had the second highest level of output per worker, \$196,000, but accounts for only 1.2% of gross domestic product.

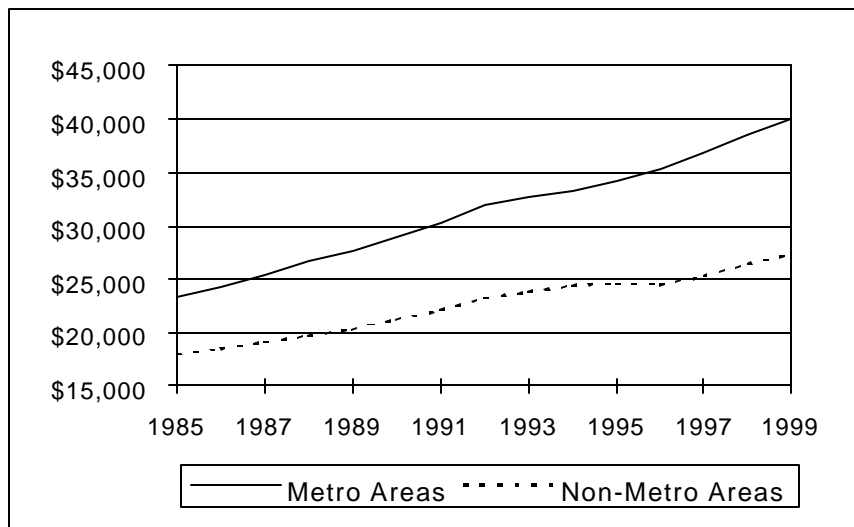
Table 4 - Most Economic Gains Were Made in Metro Areas

Additions to U.S. Economy (1992 to 1999)		All Metro Areas	Rest of United States	United States
Size	Population (Millions)	14.8	3.1	18.0
	Percentage	83%	17%	
Jobs & Output	Employment (Millions)	16.8	3.0	19.7
	Percentage	85%	15%	
	Gross Domestic Product (Billions)	\$2,483	\$410	\$2,893
	Percentage	86%	14%	
High Value Added Employment Sectors	Financial Services (Thousands)	887	104	992
	Percentage	89%	11%	
	Transportation & Utilities (Thousands)	970	110	1,080
	Percentage	90%	10%	

2.4 Income Creation

Most of the nation's labor income is generated by metro area economies. In 1999, metro area workers earned \$4.324 trillion, while non-metro area workers earned \$568 billion. Metro area economies also create more income per person than non-metro areas. In 1999, the average metro area worker collected \$40,000 in wages and benefits, while the average non-metro area worker earned \$27,300, a difference of \$12,700 per worker. The gap between metro and non-metro area workers has grown consistently since 1985, when the difference between metro area and non-metro area earnings was only \$5,300.

Figure 6 - Metro Area Workers Earn More Than Non-Metro Area Workers



In most labor markets, earnings are directly related to labor productivity--workers that are more productive receive higher wages and benefits. Figure 6, therefore, provides an indirect measure of the higher labor productivity in cities and counties within metro areas. Metro area workers are able to produce more goods and services than non-metro area workers because of the clustering of specialized industries within urban areas, access to superior training and educational facilities, and a greater degree of knowledge-transfer and interaction between companies.

3 The Competitive Advantages of U.S. Metro Economies

Metropolitan areas provide essential economic, social, institutional, and physical infrastructure that promotes the growth of firms and industries. Metro areas provide large, diverse, and easily accessible markets for companies that provide goods and services to both consumers and businesses. The nation's largest and most diverse labor markets are located in metro areas. Businesses also benefit from the geographic concentration of transportation activity in metro areas, which allows them to obtain inputs less expensively and sell products more easily in other regions and nations. Because they generate substantial internal demand for goods and services, provide easier access to international markets, and have larger markets for inputs (including labor) metro areas are the primary location for new business creation and the development of clusters of closely-integrated and highly-productive industries.

3.1 *Market Density and Diversity*

3.1.1 Business-to-Business Markets

The geographic concentration of businesses within metro areas creates a large internal market for intermediate goods and services (i.e., inputs used by businesses to produce goods and services sold to households or other businesses). Because companies that sell to other businesses have access to a large local market within a metro area, they are able to produce goods and services in larger quantities, realizing gains in efficiency from increased scale. Direct access to large numbers of companies lowers transportation and marketing costs. Companies are able to become more specialized, since markets for individual products are larger than in non-metro areas. Larger internal markets also provide a better environment for the creation of new businesses, which initially cannot afford to market products to companies in geographically dispersed markets.

The importance of diversified business-to-business markets is increasing as the U.S. economy shifts towards services-providing and high-technology industries. Manufacturers that employ “just-in-time” and “just-in-sequence” production methods require an extensive network of highly specialized suppliers located close to their assembly plants. The advantages of large, diversified supplier markets are not limited to manufacturers, however, services-providing companies also benefit. The headquarters operations of nearly all of the largest U.S. companies are located in metro areas, where they have direct access to large concentrations of business services industries—management consultants, accounting and legal firms, advertising and media companies, and computer services providers. The co-location of business services companies and their clients in metro areas facilitates responsive customer service and face-to-face meetings, which remain essential despite rapid improvements in telecommunications technology.

The nation's largest and most diverse markets for intermediate goods and services are located in metro areas. The relative sizes of metro area and non-metro area business-to-business markets are illustrated in Table 5.⁸

Table 5 - Business-to-Business Markets Are Larger in Metro Areas

Shares of U.S. Total		Metro Areas	Rest of United States	United States
Business-to-Business Markets	Establishments (Millions, 1996)	5,450	1,288	6,739
	Percentage	81%	19%	
	Establishments per Square Mile	7.58	0.45	1.88
	Employment (Millions, 1999)	108	21	129
	Percentage	84%	16%	
	Employment per Square Mile (Thousands)	149	7	36

The number and geographic concentration of business establishments is far greater within metro areas than in non-metro areas. In 1996, the average number of establishments per square mile was 7.6 in metro areas, compared with 0.5 in non-metro areas. Because of this geographic concentration of business establishments, producer-oriented companies located in metro areas have lower marketing and transportation costs and are able to sell goods and services to a greater number of businesses. The diversity of metro area business-to-business markets also makes it easier for companies to develop specialized products targeted at specific types of firms.

3.1.2 Consumer Markets

Most U.S. households choose to reside in metro areas, because urban locations have the deepest and most diversified labor markets and offer the widest range of cultural, educational, and social amenities. This geographic concentration of households is beneficial to consumer-oriented businesses that locate within metro areas, because it provides them with immediate access to thousands of potential customers with minimal distribution and marketing costs. Because of this access to large consumer markets, companies in metro areas can produce goods and services more efficiently than companies located in non-metro areas, resulting in lower prices for households.

Businesses located in metro areas also benefit from the diversity of local markets, since they are able to sell more specialized goods and services to a wider range of households. The diversity of metro area consumer markets makes it easier for businesses to target households belonging to specific socioeconomic groups. Consequently, metro area markets are able to support a greater number and broader range of consumer goods and services companies.

⁸ Table 5 uses establishment counts and total employment as indirect measurements of market size because direct measurements of business expenditures are not available for metro areas.

The relative sizes of metro area and non-metro area consumer markets are shown in Table 6.⁹ In 1999, metro area residents earned \$6.5 trillion in personal income, more than 85% of national income. Because metro area residents earn more, on average, than non-metro area residents and live in more densely settled cities and towns, the geographic concentration of household purchasing power is far greater inside metro areas. In metro areas, the average business has access to more than \$27.5 million in household income within a one-mile radius, compared with \$1.2 million in non-metro areas.¹⁰

Table 6 - Consumer Markets Are Larger in Metro Areas

Shares of U.S. Total (1999)		Metro Areas	Rest of United States	United States
Consumer Markets	Personal Income (Billions)	\$6,451	\$1,111	\$7,562
	Percentage	85%	15%	
	Personal Income per Square Mile (Thousands)	\$8,901	\$388	\$2,109
	Population (Millions)	219	54	273
	Percentage	80%	20%	
	Persons per Square Mile	302	19	76

3.1.3 Export Markets

Businesses in metro areas also have greater access to international markets. Metro areas serve as transshipment points (e.g., locations where goods are transferred from trucks to rail, rail to ships, ships to trucks, etc.) in the nation's transportation network. Consequently, most of the nation's exports are shipped from airports, seaports, trucking facilities, and rail terminals located in metro areas. According to the U.S. Department of Commerce, \$567 billion of merchandise exports was shipped from metro areas in 1998, accounting for over 83% of total United States goods exports. Table 27, which appears at the end of the report, lists the value of exports shipped from each metro area in 1998.

Metropolitan areas also provide a gateway between the nation's non-urban areas and the global economy. Agricultural products and commodities produced in non-metro areas along the Mississippi River account for over 60% of exports from New Orleans and Kansas City and nearly 50% of exports from Memphis, Tennessee. On the West Coast, over 35% of exports from Portland, Oregon are unprocessed commodities from non-metro areas.

⁹ Table 6 uses personal income and population as indirect measurements of market size because direct measurements of consumer expenditures are not available for metro areas.

¹⁰ This calculation assumes that income is evenly distributed across households and that within metro areas and non-metro areas the geographic distribution of households is uniform. Of course, the actual density of household income in different metropolitan and non-metropolitan areas can be much higher or lower than these average calculations.

3.2 Labor Market Pooling

Well-developed labor markets are a competitive advantage that makes metro area economies more attractive locations for both households and businesses. In general, workers prefer to reside in metro areas because larger labor markets provide a greater number of employment opportunities and more diverse labor markets provide jobs that closely match their specialized skill sets. As the number of two-earner families have increased, access to large and diversified labor markets has become even more important. Furthermore, working residents of metro areas face less risk during economic downturns, since a large and diversified labor market increases the likelihood of finding a new position if they lose their job. Metro area labor markets provide businesses with similar advantages: access to workers with highly specialized skills and a steady supply of potential employees for growing companies or those with uncertain hiring plans.

As more business and households locate in a metro area, the advantages of the local labor market intensify. If the demand for workers in a specific industry is sufficiently large, specialized education and training programs are often developed for these industries at local universities and colleges, ensuring a steady stream of entry-level workers. Informal networks between industry employees and business are created, which allow information about open positions to be transmitted effectively to potential job candidates. Formal industry associations are also formed, which further increases the efficiency of the metro area labor market. As industry labor pools grow, workers move more easily from firm to firm and gain enough experience to form start-up companies.

3.2.1 Labor Supply

Businesses located in metro areas have access to larger and more diverse labor markets. In 1999, nearly 114 million workers lived in metro areas, more than 81% of the nation's total labor force. Because labor force participation is slightly higher in metro areas, this share of the national total is larger than the metro area share of population. Between 1992 and 1999, over 10.2 million workers joined the metro area labor force, nearly 87% of the national increase of 11.7 million workers.

3.2.2 Immigration

The immigration of workers from foreign countries is one reason that metro areas maintain a competitive advantage in labor supply. In 1998, the majority of the 660,500 legal immigrants to the U.S. stated that they intended to reside in a metro area. As the natural increase (i.e., births minus deaths) of the U.S. population slows, immigration will become an increasingly important source of labor force growth. Between 1992 and 1998, legal immigration accounted for one-third of the nation's population growth, a share that will certainly increase if current immigration policy is maintained. Consequently, population and labor force will increase more rapidly in metro areas than non-metro areas.

New entrants to the U.S. have a broad range of skills: some are highly educated professionals who immediately enter the labor market, others have little education and

have difficulty finding employment. In general, however, foreign-born residents make the same contribution to the labor market as native-born U.S. citizens.¹¹ The labor force participation rate of foreign born residents (66%) is only slightly lower than the rate for native born residents (67%). The unemployment rate of immigrant residents is higher (5.2%) than that of native born residents (4.4%), but among naturalized foreign born residents the rate is lower (4.1%), which indicates that given sufficient time most immigrants adapt well to the U.S. labor market. The earnings of foreign-born residents follow a similar pattern: non-U.S. citizens earn an average of \$460 per week, compared with \$581 for natural born U.S. citizens, while foreign-born U.S. citizens earn more than their native born counterparts (\$600 per week).

3.2.3 Labor Skills and Specialization

Metro area workers have access to superior training, college, and university facilities, and, on average, have more skills and education than workers in non-metro areas. Within metro areas, larger proportions of workers have graduated from high school, completed college, or earned advanced degrees.

Metro area workers also have more specialized skills than non-metro areas workers. This is partly because metro area schools and universities are able to offer programs aimed at a broader range of occupations, but also because larger product and labor markets allow for a greater degree of occupational specialization. Table 28, which appears at the end of this report, lists the numbers of metro area and non-metro area workers by occupation. A disproportionate number of workers in highly-skilled occupations, including computer science and operations, technology, engineering, science, law, and health care, reside in metro areas.

Because they have access to superior training and educational facilities, have more diverse skill sets, and work in clusters of specialized industries, metro area workers are able to produce more goods and services than non-metro area workers. This higher level of labor productivity is reflected in the wages received by metro area workers. Table 7 lists the average weekly earnings of metro area and non-metro area workers by the level of education attainment. Metro area workers that continued their education beyond high school earn at least 20% more than their non-metro area counterparts.

¹¹Because data regarding the employment status of new immigrants is not available, this discussion refers to data from the U.S. Census Bureau's Current Population Survey for foreign born U.S. residents. These residents may have entered the U.S. at any time before March 1999, so this data is not completely representative of the employment status of recent immigrants. It is an accurate representation of the long-term contribution of immigrants to the U.S. labor market, however.

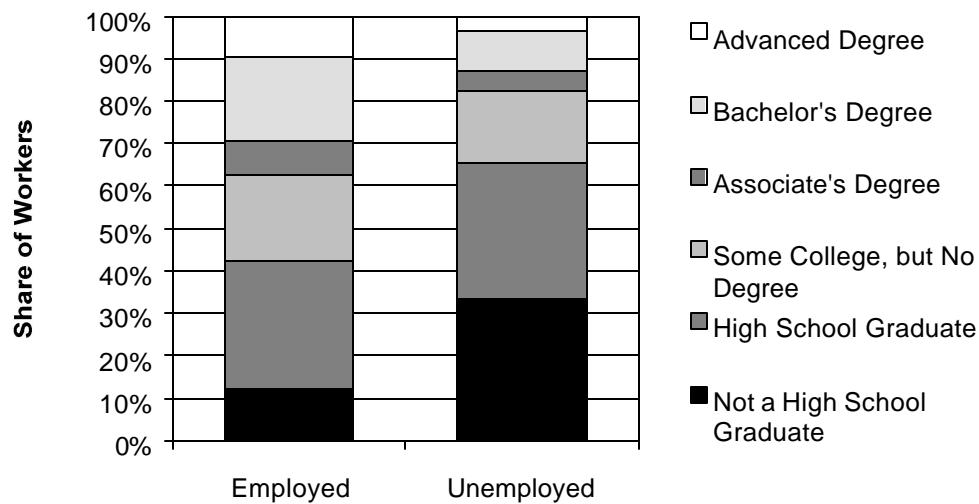
**Table 7 - Educational Attainment is Higher
Among Metro Area Workers**

Educational Attainment	Metro Areas	Non-Metro Areas
Not a High School Graduate	15,488	4,118
Percentage	14%	16%
Average Weekly Earnings	\$308	\$298
High School Graduate	33,594	10,400
Percentage	30%	40%
Average Weekly Earnings	\$508	\$485
Some College, but No Degree	23,004	4,718
Percentage	20%	18%
Average Weekly Earnings	\$533	\$475
Associate's Degree	8,883	2,372
Percentage	8%	9%
Average Weekly Earnings	\$631	\$517
Bachelor's Degree	22,206	3,206
Percentage	20%	12%
Average Weekly Earnings	\$881	\$696
Advanced Degree	10,705	1,251
Percentage	9%	5%
Average Weekly Earnings	\$1,101	\$866
Total	113,879	26,065

3.2.4 Untapped Labor Pools

Although they contain the largest and most specialized labor markets, metro areas are also the home for the majority of the nation's unemployed workers. In November 1999, over 4.2 million metro area workers were unemployed. Differences in education and job skills are the major determinants of whether metro area workers are employed or unemployed. As Figure 7 illustrates, compared with employed workers, much larger percentages of unemployed metro area workers never completed high school or attended college.

Figure 7 - Unemployed Metro Area Workers Have Lower Levels of Educational Attainment



Pools of unemployed workers are underutilized, but potentially productive assets for all metro areas. Since the competitive advantages of metro area labor markets (i.e., access to larger and more varied employment opportunities, informal and formal networks for transmitting industry and employment information, superior educational and training facilities) are also available to the unemployed, investments in job training and educational facilities can have large returns. Low skilled metro area workers also have access to more extensive transportation and communications infrastructure, more sophisticated physical capital (i.e., machinery and equipment), and aggregations of specialized companies, so workforce development programs are likely to be more beneficial in metro areas than non-metro areas.

3.3 Transportation Infrastructure

Most transportation services activity in the United States is geographically concentrated within metro area cities and counties. The metro area share of transportation services employment exceeds its share of total employment. Over 3.2 million transportation workers were employed in metro areas in 1999, or 86% of national transportation employment. The metro area share of transportation infrastructure exceeds its share of land area. Although they occupy only 20% of the nation's land area, metro areas contain more than 53% of the national highway system, 39% of the nation's railroads, 51% of the inland and ocean ports, and 50% of public-use airports.

**Table 8 - Most Transportation Activity
Is Located in Metro Areas**

Shares of U.S. Total		Metro Areas	Rest of United States	United States
Highways	National Highways (Miles, 1995)	82,448	74,533	156,981
	Percentage	53%	47%	
	Passenger Transportation (Employment [000s], 1999)	402	65	467
	Percentage	86%	14%	
	Motor Freight (Employment [000s], 1999)	1707	354	2061
	Percentage	83%	17%	
Railways	Railways (Miles, 1995)	75,521	119,412	194,933
	Percentage	39%	61%	
	Railroad Transportation (Employment [000s], 1999)	177	39	216
Airports	Public-Use Airports (1995)	2,697	2,718	5,415
	Percentage	50%	50%	
	Air Carriers (Employment [000s], 1999)	825	33	858
	Percentage	96%	4%	
Water Ports	Major Water Ports (1997)	110	107	217
	Percentage	51%	49%	
	Water Transportation (Employment [000s], 1999)	162	27	189
	Percentage	86%	14%	
Land Area	Land Area (Square Miles, 000s)	725	2,873	3,586
	Percentage	20%	80%	
Employment	Employment (Millions, 1998)	108	21	129
	Percentage	84%	16%	

An efficient passenger and freight transportation system must provide connections between all parts of the nation and all transportation modes. However, it is usually more efficient for regional transportation centers and inter-modal transportation facilities to be located in metropolitan areas. The costs of intra- and inter-modal passenger and cargo transfers decrease as the volume of transportation activity increases. Concentrating passenger and merchandise transfers within metro areas lowers transportation costs and allows for the inter-connection of a greater number of transportation networks. Efficient transportation networks and transfer facilities within metro areas reduce the costs of business operations, in both urban and non-urban areas, allowing more goods and services to be produced per person and per acre of land.

Businesses benefit from the concentration of transportation activity and infrastructure in metro areas because lower transport costs mean that production inputs are less expensive and providing goods and services to customers is cheaper. Transportation networks, such as highways, railroads, airports, harbors and ports are especially important for industries that export goods and services to other regions or nations. Because they serve large

markets and are more specialized, industries that are engaged in international or inter-regional trade generally form stronger forward and backward linkages with other industries within a metro area. These linkages are especially pervasive among high-tech industries, and ultimately lead to the formation of productive economic clusters and the generation of new businesses. Economies of scale in transportation also imply that greater volume of use of the network will lower the average user cost. This means that large numbers of firms are generally inclined to use the same transportation networks, thereby further lowering unit transportation costs as the number of companies in a metro area increases.

3.4 Telecommunications Infrastructure

Like transportation, it is more efficient to provide telecommunications infrastructure and services in metro areas rather than non-metro areas. Communications networks can be built less expensively in areas with dense geographic concentrations of households and businesses. As a result, most communications services activity in the United States is located in metro area cities and counties. Over 1.4 million communications services workers were employed in metro areas in 1999, or 90% of national communications employment.

**Table 9 - Most Communications Activity
Is Located in Metro Areas**

Shares of U.S. Total		Metro Areas	Rest of United States	United States
	Telecommunications Services (Employment (000s), 1999)	1,059	105	1,164
	Percentage	91%	9%	
	Radio & Television Broadcasting (Employment (000s), 1999)	391	64	456
	Percentage	86%	14%	
	Internet Domains (000s, 1997)	1,197	118	1,316
	Percentage	91%	9%	

The deployment of new communications technologies almost always occurs in metro areas, since they have a high concentration of information industries, like finance, insurance, and computer software and processing, that demand sophisticated communications services. Furthermore, the construction of new communications networks is less expensive in metro areas, since dense concentrations of households and businesses minimize the cost installing wire, fiber optic, or cellular connections. As a result, nearly all telecommunications technologies—cable television, cellular telephone, Internet services, broadband digital transmission (digital subscriber loop (DSL) and cable modem)—were initially introduced in metro areas.

Sophisticated communications infrastructure can, in turn, attract more companies, especially those that use information intensively, to a metro area. In many metro areas, commercial real estate developers install fiber optic networks in their buildings to attract

computer software and Internet media companies as tenants. Many high-tech and “new-media” companies will only consider locating in areas with high-speed Internet connections and buildings pre-wired for high-bandwidth computer networks.

3.5 Industry Clusters

Metropolitan areas generate growth because they create industry clusters. Clusters are groups of related businesses that have built a strong set of linkages, allowing them to specialize and innovate at rates far higher than more geographically and operationally dispersed firms. The best example of an industry cluster in the United States is the Silicon Valley, where close links between computer hardware, software, and consulting companies in the San Jose and San Francisco metro areas created one of the nation’s fastest-growing and most profitable industries. DRI’s extensive work in economic development strategy reveals the importance of clusters to both regional and national economies.

The clustering of businesses and households in metropolitan areas reduces the operating costs of the suppliers of warehousing, transportation, communications, and utilities. All of these services have large fixed costs, so unit costs are minimized as the number of customers for these services increases. The costs of these services are also minimized when the geographic extent of a supplier’s service area is small. Metro areas provide a large, geographically concentrated customer base that allows transportation, communications, and utilities services to be supplied more efficiently.

The concentration of industries in metropolitan areas also increases knowledge and technology transfers between companies, increasing the rate of innovation, regional economic growth, and the expansion of economic clusters. When firms are located close to each other, ideas diffuse rapidly through neighboring firms. Knowledge-sharing is particularly effective in metropolitan areas, where communication between people is more extensive and less costly. Metro area workers have access to superior training, college, and university facilities, and, on average, have more skills and education, which further accelerates the diffusion of knowledge and technology through an industry cluster.

Metro areas also generate demand for an economic cluster’s output, ensuring its success. Part of this demand is internal, created by local businesses and consumers. But a large portion of this demand is external--exports to other regions and countries. As a consequence, most regional and international exports travel through a metro area before reaching their final destinations. Companies located in metro areas have direct access to these export markets, as well as large internal markets.

Metropolitan areas also provide important economic, social, institutional, and legal infrastructure for firms and industries. The economic infrastructure consists of human resources, financial and technological capital, and physical infrastructure such as

transportation, communications, and utilities networks. Of equal importance, however, are the social and institutional linkages that bind together a metro area's residents and businesses. These linkages allow cities and counties in metro areas to create new industries, increase the diffusion of knowledge, spur technological innovation, and generate regional and national economic growth.

4 Bibliography

- Ciccone, Antonio, and Robert E. Hall (1993) "Productivity and the Density of Economic Activity," *National Bureau of Economic Research Working Paper No. 4313*. Cambridge, Mass.
- Glaeser, Edward L., Jose A. Scheinkman, and Andrei Shleifer (1995) "Economic Growth in a Cross-Section of Cities," *National Bureau of Economic Research Working Paper No. 5013*. Cambridge, Mass.
- Glaeser, Edward L., Hedi D. Kallal, Jose A. Scheinkman, and Andrei Shleifer (1992) "Growth in Cities," *Journal of Political Economy*, vol. 100, no. 6.
- Henderson, Vernon (1988) *Urban Development: Theory, Fact, and Illusion*. New York: Oxford University Press.
- Henderson, Vernon, Ari Kuncoro, and Matt Turner (1995) "Industrial Development in Cities," *Journal of Political Economy*, vol. 103, no. 5.
- Jacobs, Jane (1984) *Cities and the Wealth of Nations*. New York, NY: Vintage Books.
- Jaffee, Adam B., Manuel Trajtenberg, and Rebecca Henderson (1993) "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations," *Quarterly Journal of Economics*, vol. 108.
- Krugman, Paul (1991) *Geography and Trade*. Cambridge, MA: MIT Press.
- Lucas, Robert E. (1988) "On the Mechanics of Economic Development," *Journal of Monetary Economics*, vol. 3, no. 4.
- Moss, Mitchell (1998) "Technology and Cities," *Cityscape: A Journal of Policy Development and Research*, vol. 3, no. 3.
- Piore, Michael and Charles Sabel (1984) *The Second Industrial Divide*. New York: Basic Books.
- Porter, Michael E. (1990) *The Competitive Advantage of Nations*. New York: Free Press.
- Porter, Michael E. (1995) "The Competitive Advantage of the Inner City," *Harvard Business Review*, May-June 1995.

Romer, Paul (1986) “Increasing Returns and Long Run Growth,” *Journal of Political Economy*, vol. 94.

5 Definitions

The United States Office of Management and Budget (OMB) defines metropolitan areas (metro areas) according to published standards that are applied to Census Bureau data. The general concept of a metro area is that of a core area containing a large population nucleus, together with adjacent communities having a high degree of economic and social integration with that core. Currently defined metro areas are based on application of 1990 standards (which appeared in the Federal Register on March 30, 1990) to 1990 decennial census data and to subsequent Census Bureau population estimates and special census data. Current metro area definitions were announced by OMB effective June 30, 1996.

The current standards provide that each newly qualifying metro area must include at least:

- one city with 50,000 or more inhabitants, or
- a Census Bureau-defined urbanized area (of at least 50,000 inhabitants) and a total metropolitan population of at least 100,000 (75,000 in New England).

Under the standards, the county (or counties) that contains the largest city becomes the "central county" (counties), along with any adjacent counties that have at least 50 percent of their population in the urbanized area surrounding the largest city. Additional "outlying counties" are included in the metro area if they meet specified requirements of commuting to the central counties and other selected requirements of metropolitan character (such as population density and percent urban). In New England, the metro areas are defined in terms of cities and towns rather than counties.

As of June 1999, according to OMB definitions, there were 319 metro areas in the United States. DRI's Top-114 includes the one hundred most populous metro areas, plus fourteen additional metro areas in states that do not contain one of the most populous metro areas.

See <http://www.whitehouse.gov/omb/inforeg/msa99.pdf> for the 1999 list of metro areas and their constituent counties.

6 Data Sources

Population:	U.S. Census Bureau and Standard & Poor's DRI
Land Area:	U.S. Census Bureau
Employment:	Bureau of Labor Statistics, U.S. Department of Labor and Standard & Poor's DRI
Gross Metro Product:	Standard & Poor's DRI
Gross State Product:	Bureau of Economic Analysis, U.S. Department of Commerce and Standard & Poor's DRI
Gross Domestic Product: (United States)	Bureau of Economic Analysis, U.S. Department of Commerce
Gross Domestic Product: (International)	Standard & Poor's DRI
Labor Income:	Bureau of Economic Analysis, U.S. Department of Commerce and Standard & Poor's DRI
Transportation Infrastructure:	Bureau of Transportation Statistics, U.S. Department of Transportation and Standard & Poor's DRI
Household Income:	Current Population Survey (March, 1999), U.S. Census Bureau
Labor Force Characteristics:	Current Population Survey (March, 1999), U.S. Census Bureau
Immigration:	Immigration and Naturalization Service, U.S. Department of Justice
Internet Domains:	Impertive!
Exports: (U.S. and World)	Various, Standard & Poor's DRI
Exports: (Metro Areas)	International Trade Administration, U.S. Department of Commerce

7 High-Technology Industries

Industry	SIC Codes
GUIDED MISSILES	3761
PLASTIC & SYNTHETIC MATERIALS	
Plastic Materials & Resins	2821
Synthetic Rubber	2822
Synthetic Fibers	2823-4
PHARMACEUTICALS	283
COMPUTER & OFFICE EQUIPMENT	
Electronic Computers	3571
Computer Peripheral Equipment	3572, 3575, 3577
Calculating & Other Office Machinery	3578-9
ELECTRICAL EQUIPMENT	
Switchgear & Switchboard Equipment	3613
Relays & Industrial Controls	3625
AUDIO, VIDEO, & TELECOMMUNICATIONS EQUIPMENT	
Telephone & Telegraph Equipment	3661
Radio & TV Broadcasting Equipment & Communications Equipment, N.E.C.	3663, 3669
ELECTRONIC COMPONENTS	
Electron Tubes	3671
Semiconductors	3674
Miscellaneous Electronic Components	3672, 3675-9
AIRCRAFT, ENGINES, & PARTS	
Aircraft	3721
Aircraft & Missile Engines & Parts	3724, 3764
Aircraft & Missile Parts & Equipment, N.E.C.	3728, 3769
SCIENTIFIC & CONTROL INSTRUMENTS	
Search, Detection, & Navigation Equipment	3812
Measuring & Controlling Instruments	382 excl. 3825-7
Electricity Measuring Instruments	3825
Laboratory & Optical Instruments	3826-7
Medical Instruments & Supplies	3841-3
Electromedical & X-Ray Equipment	3844-5
PHOTOGRAPHIC EQUIPMENT & SUPPLIES	386
COMPUTER PROCESSING & SOFTWARE	737
ENGINEERING & CONSULTING SERVICES	
Engineering, Architectural, & Surveying Services	871
Management & Consulting Services	874
Testing & Research Labs	873 excl. 8733