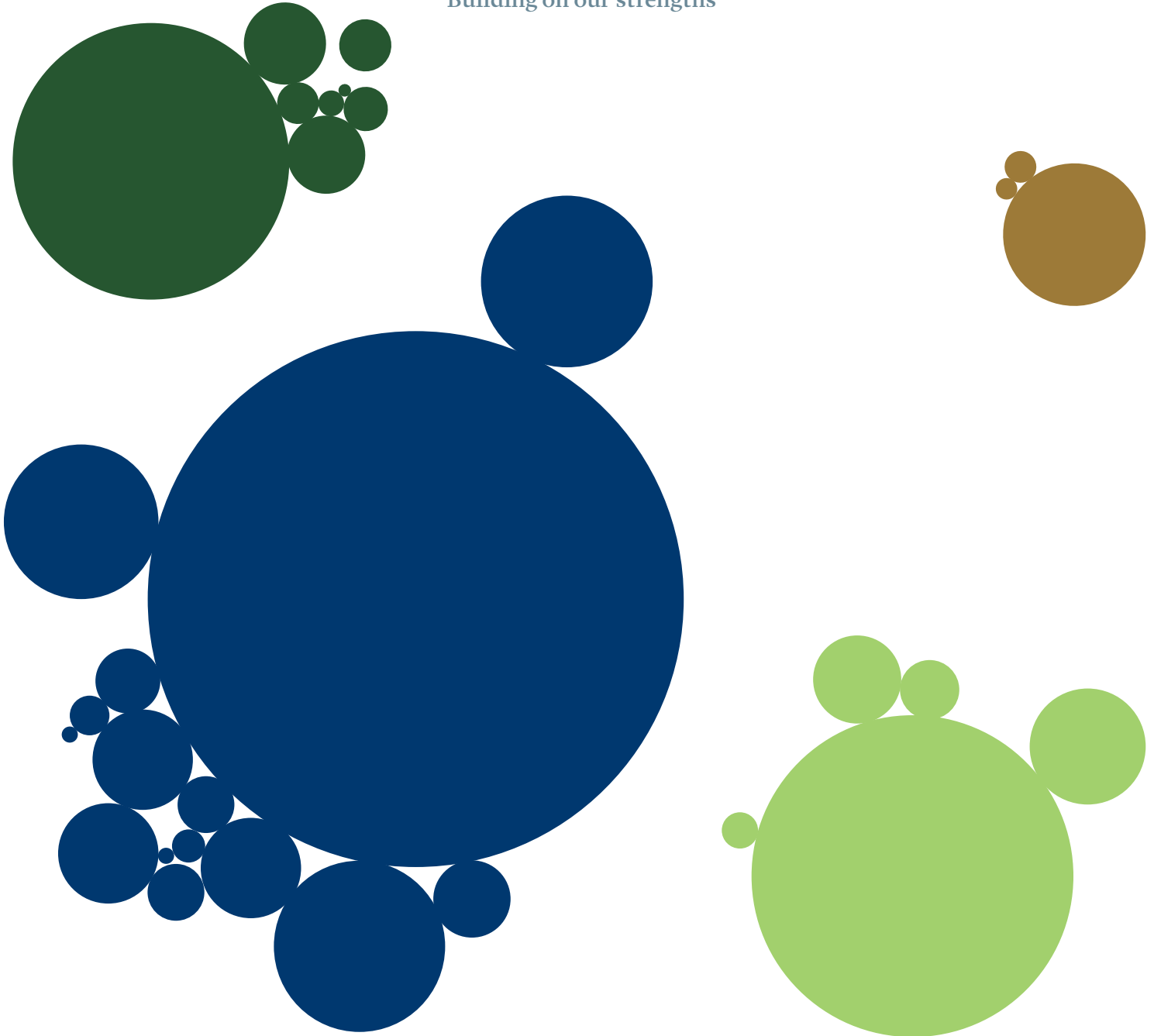


Regional Economy and Clusters

Building on our strengths





Regional Economy and Clusters

Building on our strengths

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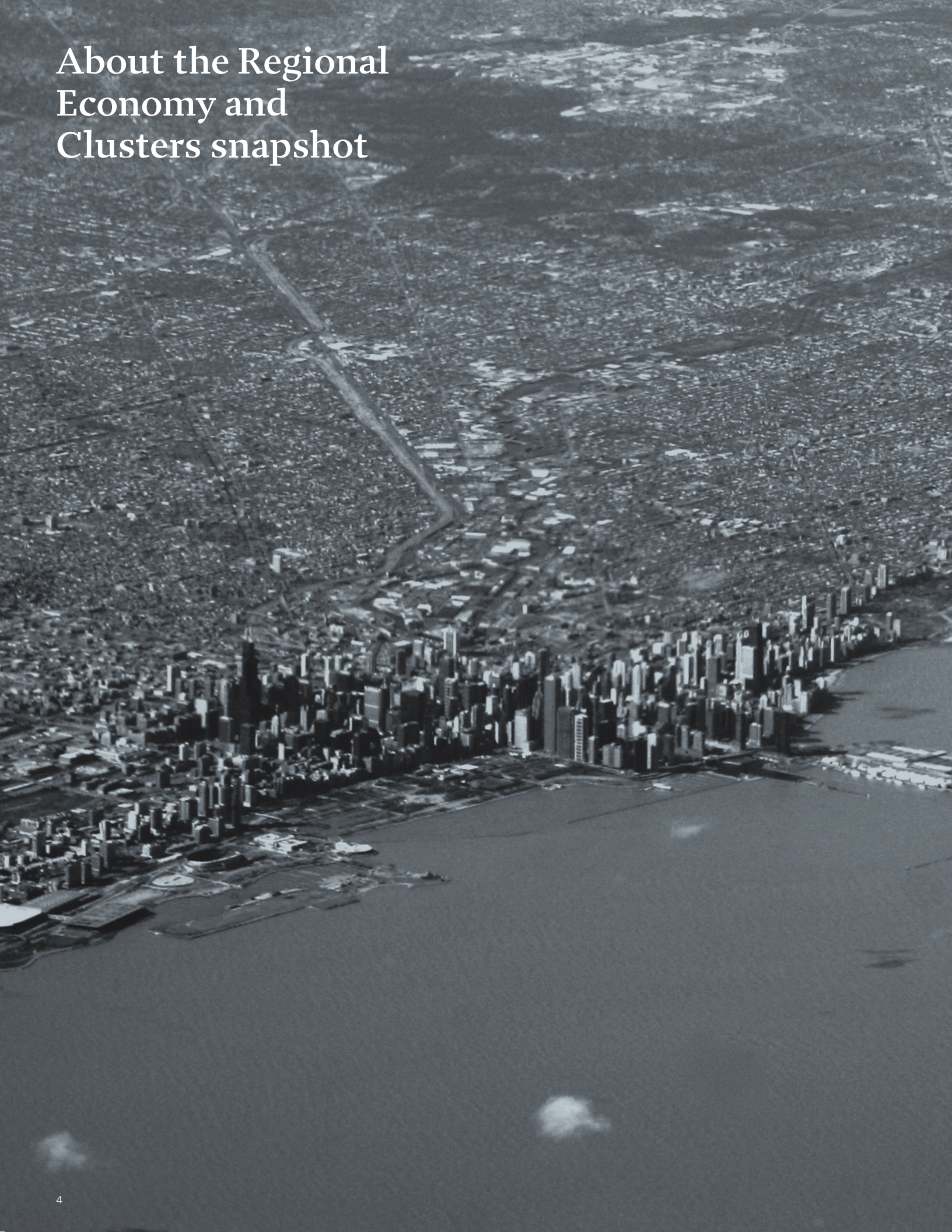
Transportation and logistics

Business services

Metalworking technology

34 **Local industry clusters**

About the Regional Economy and Clusters snapshot



Metropolitan Chicago is one of the world's economic centers. The region is at the crossroads of the country's rail, road, and air transportation infrastructure. Economic specializations in traditional strengths like manufacturing and emerging industries like logistics contribute to a diverse economy that attracts investment and talent.


But the national and regional economies have changed significantly since the region's previous comprehensive plan, GO TO 2040, was adopted unanimously in 2010 by leaders from across the seven counties. Collaborative efforts for economic development at the local, state, and federal levels have helped to implement GO TO 2040 recommendations, yet difficult realities persist even as new challenges continue to emerge. To better understand the challenges and opportunities within the region's economy, CMAP continues to apply findings about industries' needs by studying specialized clusters where industries share commonalities and connections.

Metropolitan Chicago's economy maintains some significant specializations and a large, diverse, and talented workforce, but its economic recovery lags behind other large metropolitan regions. Understanding our major industry clusters' trends and needs can reveal strategies to support broader economic success. Going forward, the region has the opportunity to better leverage its built-in strengths by differentiating its economic development efforts and focusing on the drivers of economic prosperity.

The region's next comprehensive plan, ON TO 2050, will build on GO TO 2040 to provide clear, focused recommendations to support industry clusters. This brief, data-driven snapshot illustrates the current conditions to inform CMAP and its partners as they work to develop the new plan. The report focuses on clusters that tend to trade products and services nationally and internationally because of their outsized potential to grow the region's economy.

This snapshot is divided into multiple sections. First, an overview of the region's economic performance. Second, a look at key regional economic specializations. This section explains what an industry cluster is and why we chose to examine the region's economy by looking at them. It also breaks down the important differences between traded and local clusters. This is followed by a look at trends in our region's clusters. The next section takes a closer look at traded clusters — particularly transportation and logistics, business services, and metalworking technology. Finally, the last section looks at local industry clusters and the role they play in the region's economy.





Traded clusters in metropolitan Chicago are globally competitive thanks to rapidly changing technologies that help the region's industries reach global markets and drive innovation.

Development of the ON TO 2050 comprehensive regional plan will explore a holistic approach to leverage and strengthen regional clusters.

This snapshot report echoes findings from previous analysis but provides more depth on the drivers of the region's economy.

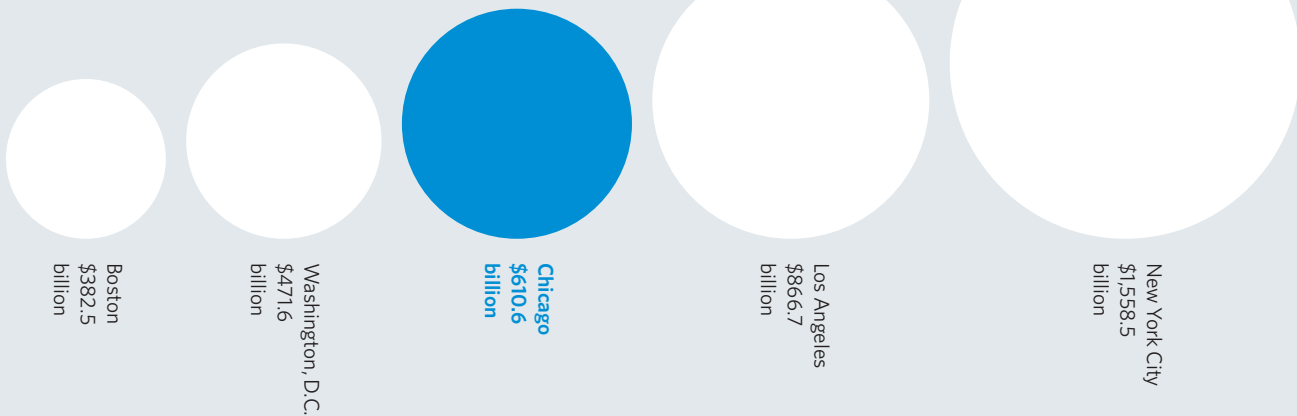
Overview of the region's economic performance

Metropolitan Chicago's economy is large and diverse

Total gross regional product of metropolitan Chicago and select peer metropolitan statistical areas, 2014

Source: Chicago Metropolitan Agency for Planning analysis of U.S. Bureau of Economic Analysis data.

3rd Largest Economy in the U.S.



But our region's recovery is lagging behind our peers

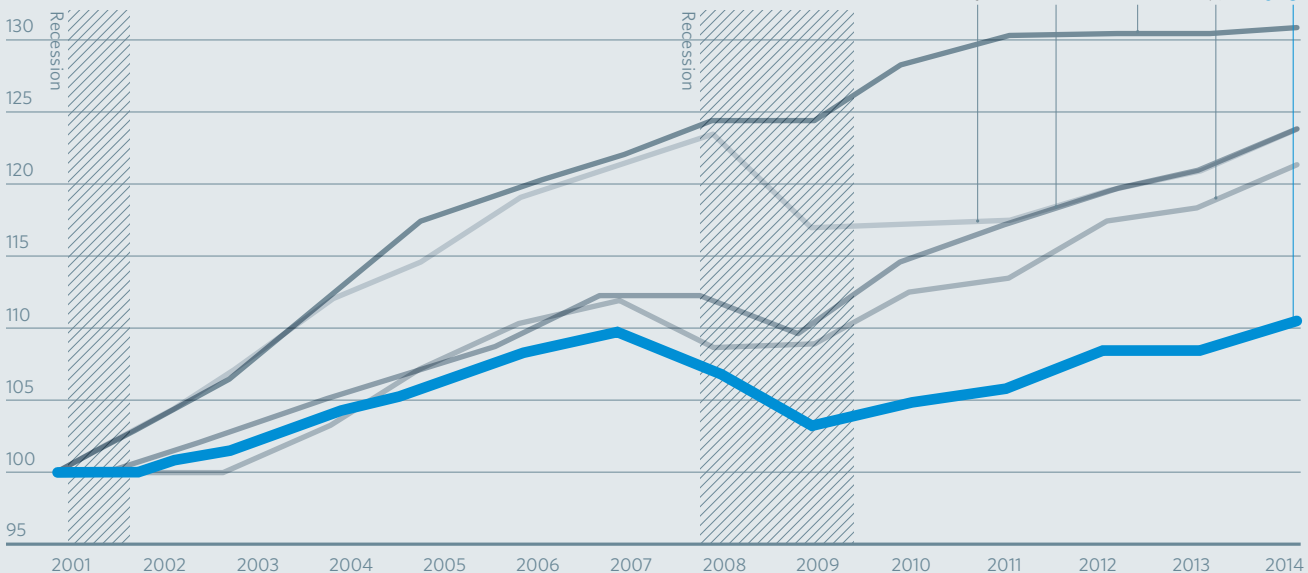
Real gross regional product growth by region, 2001-14

Note: 2001 equals 100.

Source: Chicago Metropolitan Agency for Planning analysis of U.S. Bureau of Economic Analysis data.

-2.1%

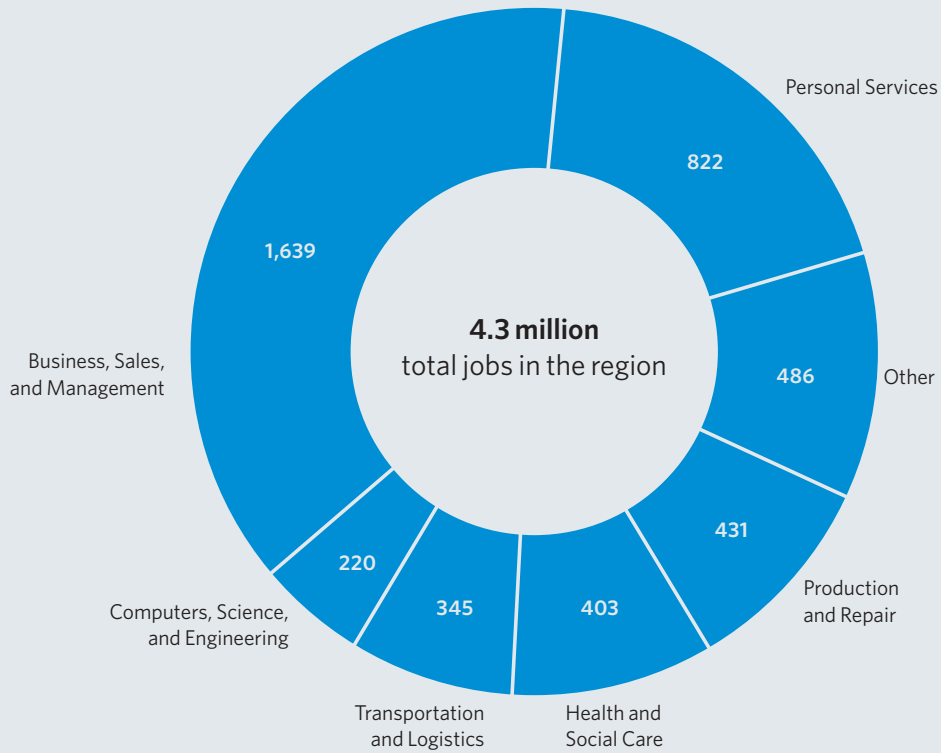
Below National Average



The region's labor market features a broad array of jobs

2015 jobs, in thousands

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data.



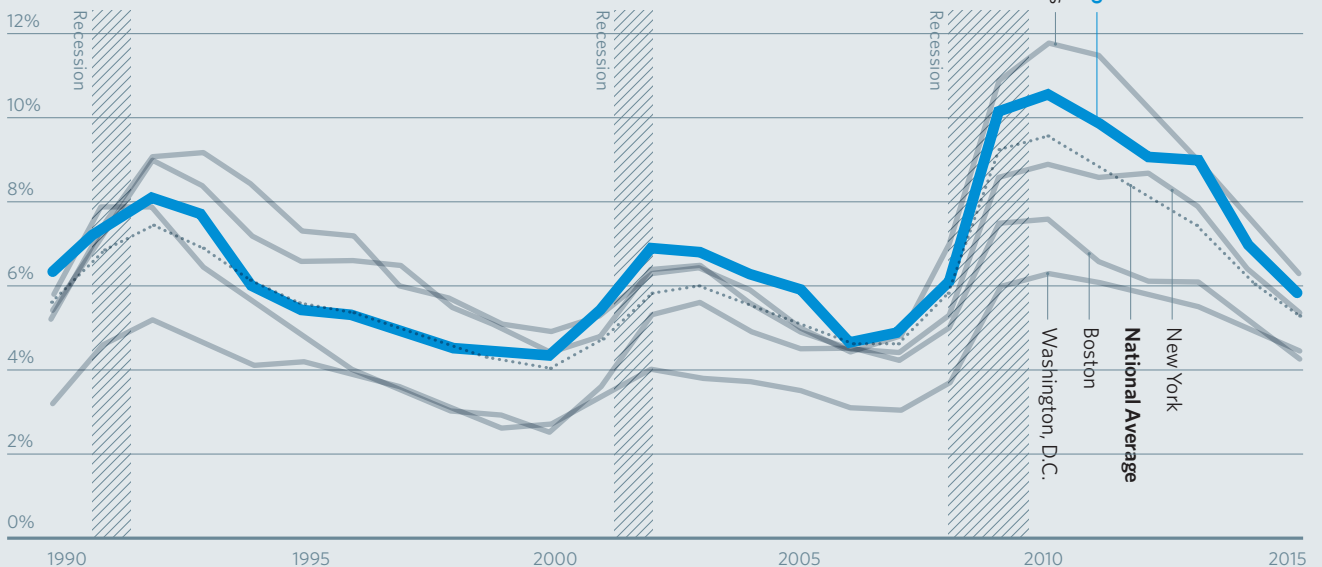
Unemployment is declining but still above the national average

Unemployment rate in select metropolitan statistical areas, 1990-2015

Source: U.S. Bureau of Labor Statistics.

+0.3%

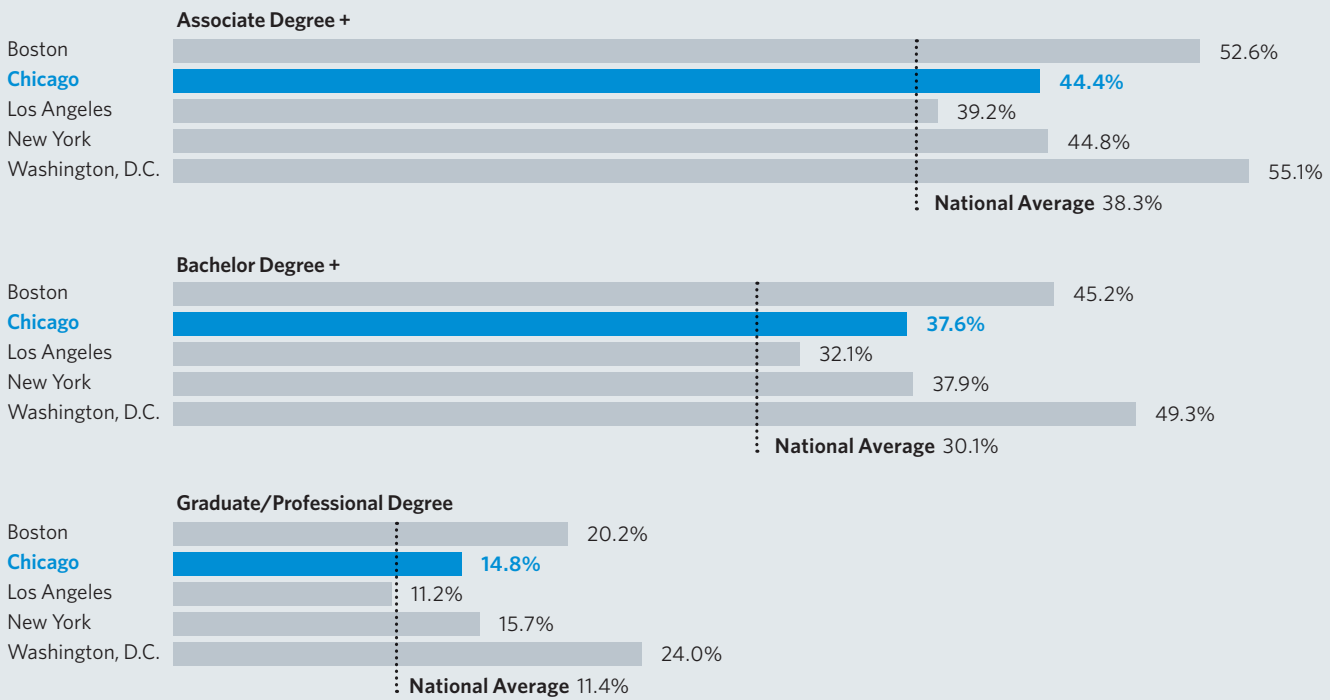
Above National Average



Our region's educational attainment is above average

Population age 25+ with academic degrees in select metropolitan statistical areas, 2014

Source: Chicago Metropolitan Agency for Planning analysis of U.S. Census Bureau data.

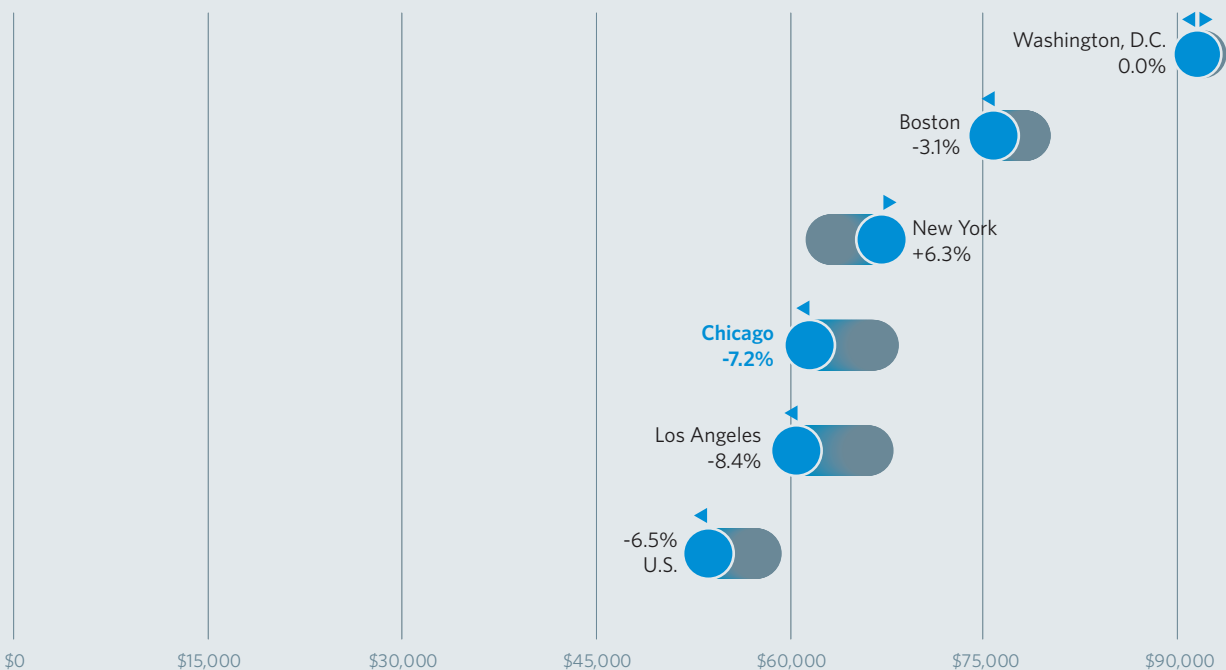


But median household income is declining

Change in real median household income in select metropolitan statistical areas, 1989-2014

Note: Historical data is inflation-adjusted.
Source: Chicago Metropolitan Agency for Planning analysis of U.S. Census Bureau data.

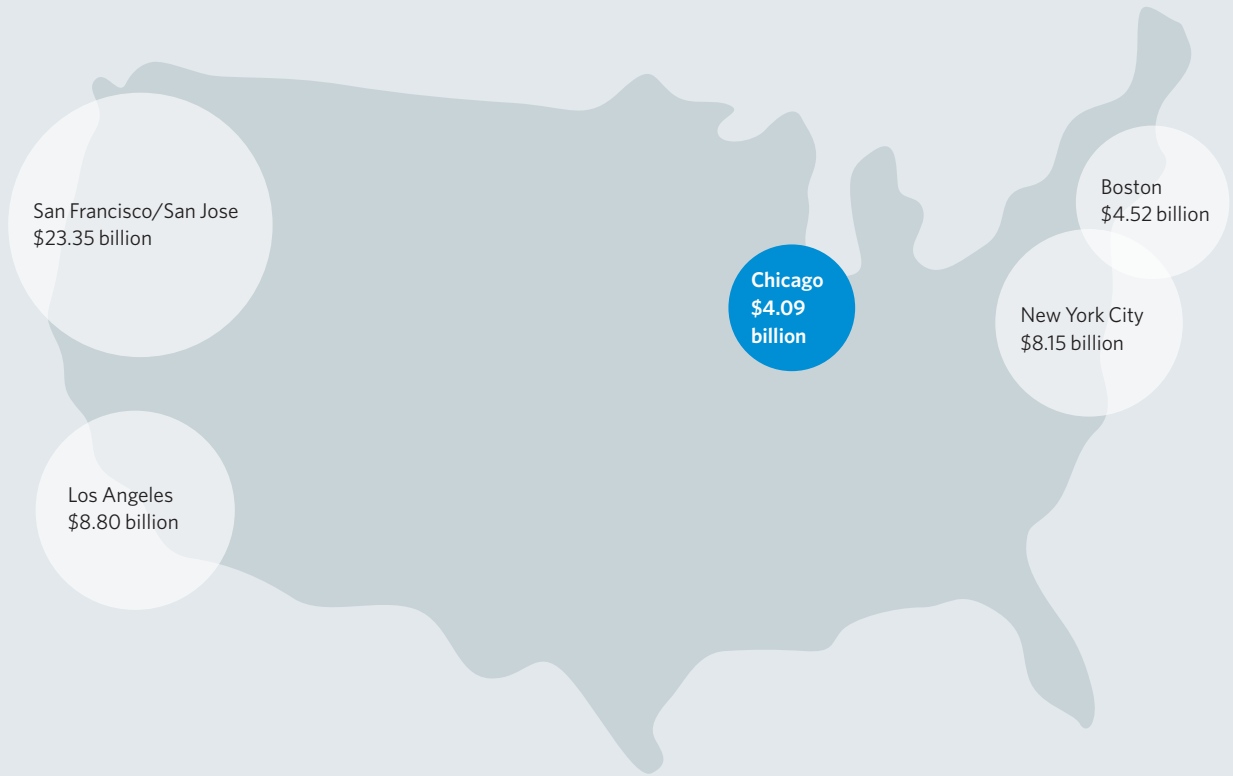
- 1989
- 2014



Compared to our peers, the region is lagging behind in investments in research and development (R&D)

R&D spending in select metropolitan statistical areas, 2011

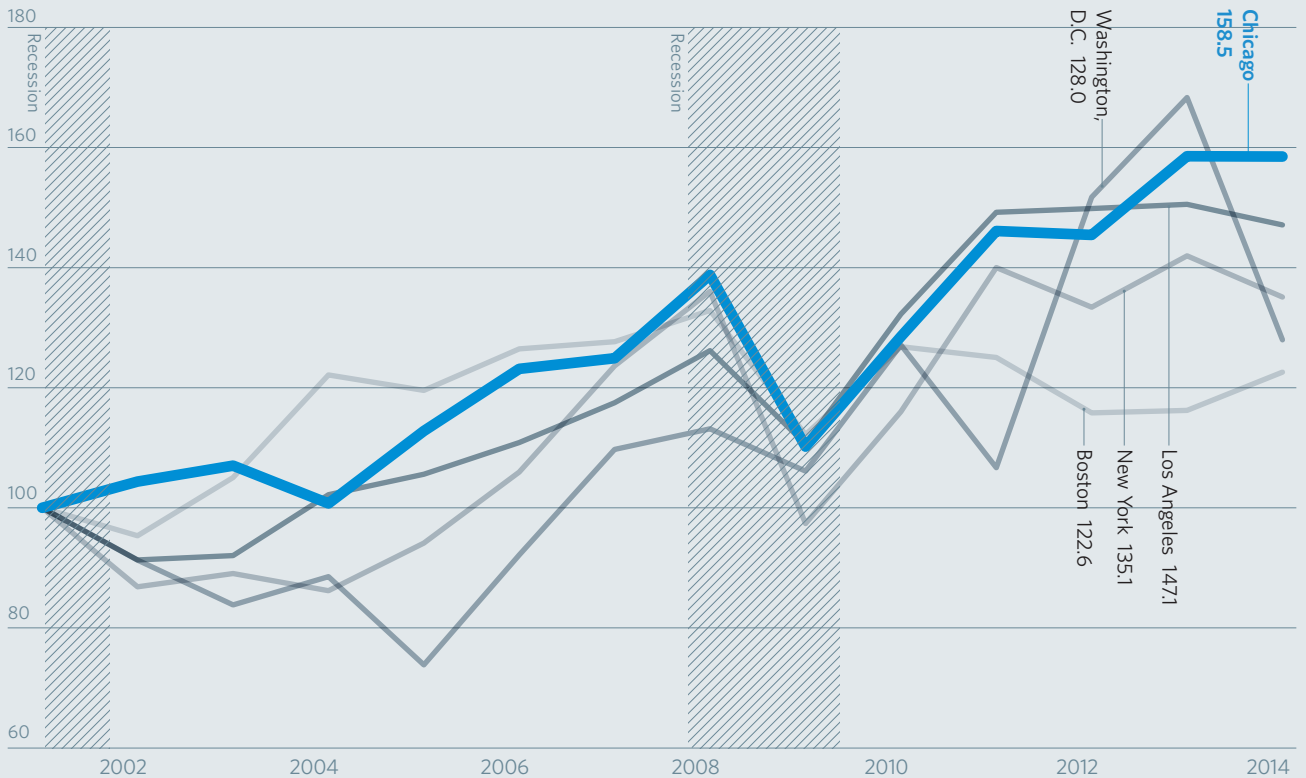
Source: Chicago Metropolitan Agency for Planning analysis of National Science Foundation data.



A bright spot for the region is growth in manufacturing exports, which is consistent with national trends and faster than our peer regions


Manufacturing export growth in select metropolitan statistical areas, 2001-14

Note: 2001 equals 100.
Source: Chicago Metropolitan Agency for Planning analysis of U.S. Census Bureau data.





Changes in policies could retain, grow, and attract businesses



Our region can take steps that will improve our long-term economic health including:

Support human capital development through increased coordination between industry and educational and training institutions.

Resolve uncertainty in state fiscal policy so it does not prevent the region from reaching its full economic development potential.

Reorient economic development towards metropolitan-wide strategies to compete globally.

Regional economic specializations

Analysis of the region’s specializations, challenges, and opportunities in infrastructure, workforce, and innovation will enable metropolitan Chicago to better compete with other regions for good jobs and skilled workers.¹ Our region enjoys a diverse mix of industries and retains particular areas of specialization. These specialized clusters of interdependent firms are linked through complementary relationships, share common needs, and draw a productive advantage in being located near each other.²

This section of the snapshot explores the varied roles that specialized industry clusters play, focusing on the industry groupings that tend to compete nationally and globally and highlighting several clusters where metropolitan Chicago’s businesses play an outsized role in the global market place. As a large and complex economy, our region has a variety of industries with global reach. This section includes an overview of three such “traded” clusters: business services, transportation and logistics, and metalworking technology. The discussion concludes with a brief analysis of “local” clusters that provide vital services and goods for local businesses and residents.

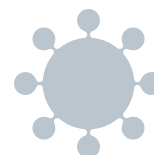
Figure 1 What is a cluster?



Sector
A broad set of similar economic activities
e.g., Transportation



Industry
Narrower than a sector
e.g., Trucking



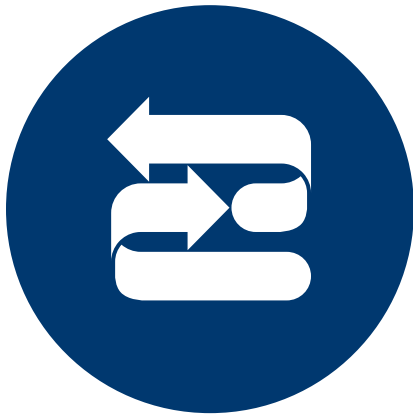
Cluster
Interdependent groups of firms and related institutions that gain benefits from their proximity and interactions
e.g., Transportation & Logistics

Clusters and why they matter

Clusters include industries that have buyer-seller relationships, manufacturers of complementary products, and industries related by skills, technologies, common materials, or related services.³ Businesses in clusters benefit from this agglomeration, with better access to talent, consumers, resources, and infrastructure. Clustering also leads to increased competition, collaboration, and sharing of knowledge on a variety of levels among workers and businesses. For instance, knowledge and ideas can be transferred or expanded as workers change jobs or participate in relevant industry organizations, or when businesses collaborate or compete to improve products and processes.⁴

Figure 2 Benefits of clustering

Sources: Chicago Metropolitan Agency for Planning and U.S. Cluster Mapping project.



Input-Output

Industries tend to purchase and consume one another's products in the process of transforming goods and services from raw materials to final products.



Labor Pooling

Many of the industries require workers with related skills, which can result in a strong labor pool for employers and good job prospects for workers.



Knowledge Spillover

Because of labor pooling, supportive entities, and related industries, ideas and innovation can flourish through formal and informal associations, worker movement, and creation of related businesses.

Traded and local clusters

The U.S. Cluster Mapping Project classifies clusters into two broad categories based on the benefits industries derive from agglomeration and whether their products or services are consumed locally or traded outside of the area where they are produced.⁵ Both types are vital for a region's economy but do not require or derive the same benefits from clustering.

Local clusters account for the majority of employment and fulfill daily shopping and service needs for residents and businesses. In the Chicago region, almost two-thirds of jobs are held in local clusters.

Traded cluster industries, which require specialized talent, infrastructure, or inputs, benefit substantially from clustering and tend to concentrate in select regions, though their customer bases extend globally. Overall, traded cluster industries tend to pay higher wages than their local cluster counterparts. Traded clusters account for approximately one-third of the region's employment but provide almost half the income.

Much of this snapshot focuses on traded clusters and developing strategies to help the region's economy compete globally and nationally. But local clusters do have important impacts on a variety of planning topics such as land use, mobility, and human capital development and are discussed in the last section of this report.

Traded clusters account for approximately one-third of the region's employment but provide almost half the income.

Figure 3 Chicago regional traded and local cluster employment, 2001-15

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data.

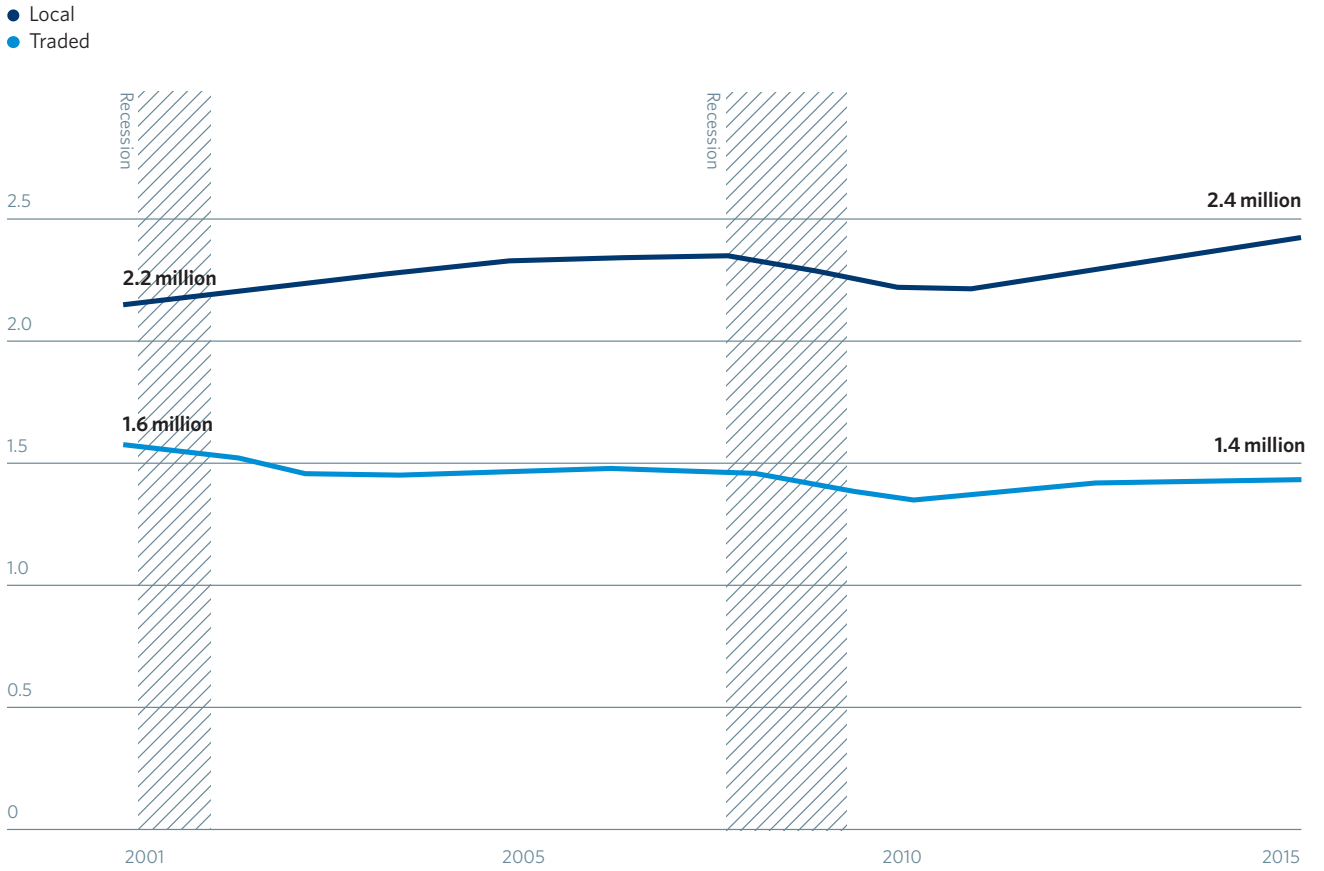
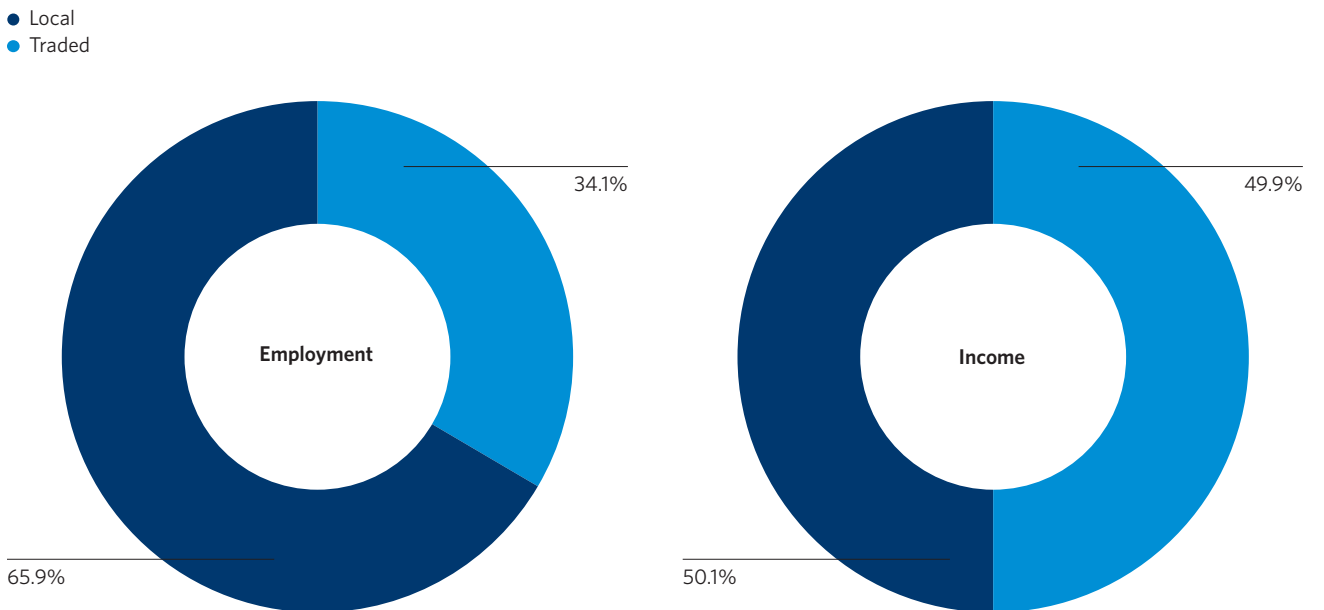


Figure 4 Traded and local share of the economy, 2015

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data.

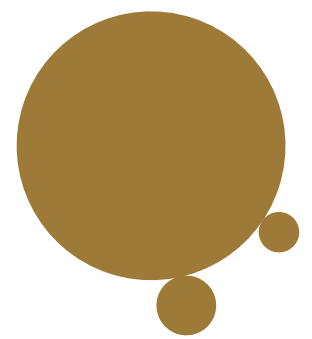


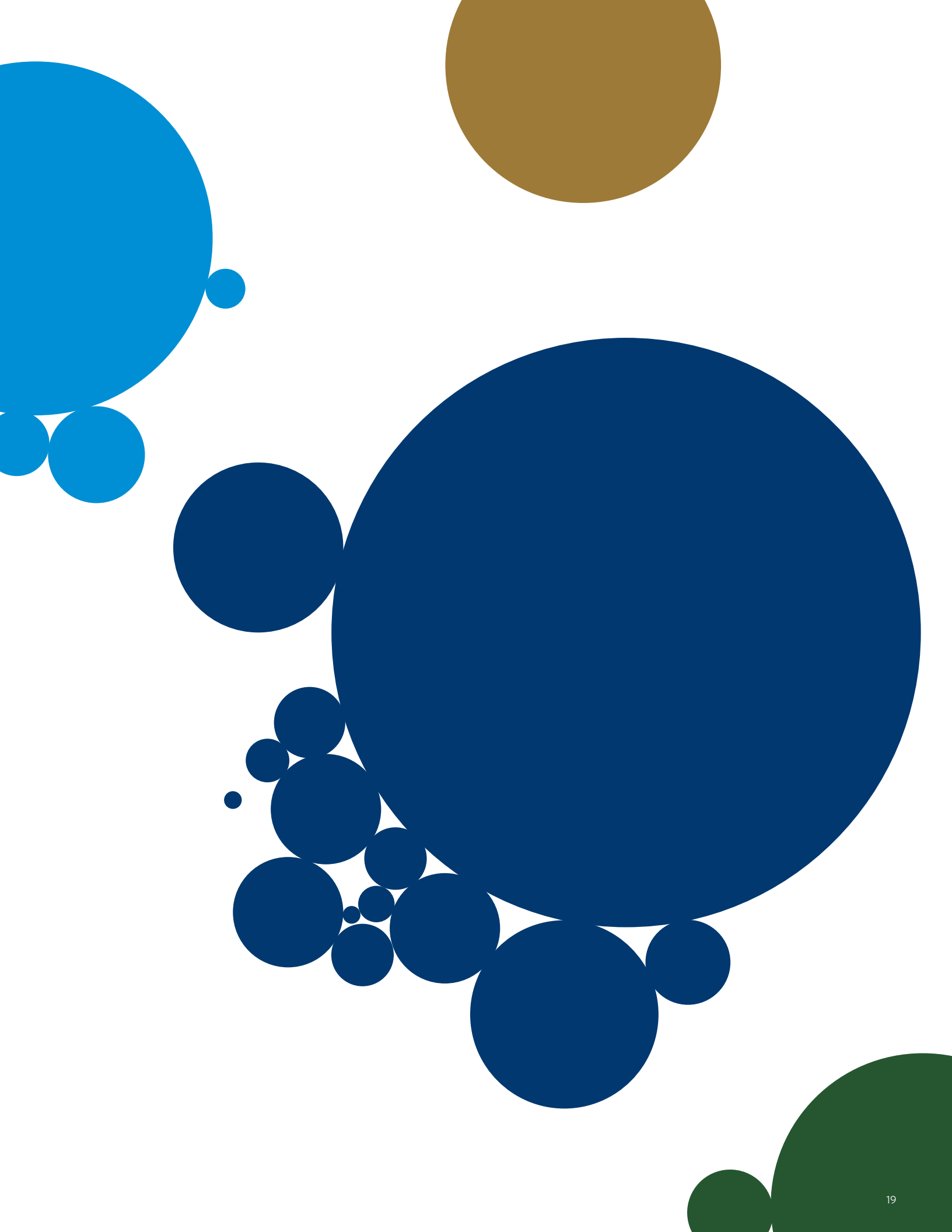
Trends in the region's traded clusters

In a number of ways, the changing sizes of our region's industry clusters can be measured over time. At the most basic level, changes in total employment show job gains or losses over time. While this metric is straightforward, it does not capture the effects that broader national economic trends have on our region's clusters. Measuring changes in employment concentration, known as location quotient, over time controls for national trends and isolates unique changes happening in the region.

Growth in cluster location quotients suggests that those clusters are performing better than the national average, while declining location quotients suggest that those clusters' performance lags behind the rest of the nation. A region's cluster can lose jobs over time, but if job losses in the cluster are less severe than the national average, the cluster location quotient increases.

In metropolitan Chicago, there have been large shifts and declines in employment and specialization in many traded clusters since 2001. In that same period of time, the region has seen growth in clusters such as transportation and logistics that leverage the region's built-in advantages. Overall, since 2001, employment trends have shifted, with local clusters employing a greater share of the region's workers.





Location quotient and clusters

Large metropolitan areas like Chicago have employment in most of the 51 traded clusters identified nationwide. However, few regions are home to traded clusters with high concentrations of employment.⁶ Clusters of strength are traditionally identified by measuring a cluster's regional employment concentration compared to employment concentrations nationwide. This measure is commonly referred to as a "location quotient" or LQ.

A cluster is considered an economic strength when the proportion of regional employment in a cluster exceeds the national average. It is not considered a strength when regional employment concentrations match or fall below national employment concentration levels.

Cluster location quotients are measured on a scale with a minimum score of zero, which indicates no cluster employment in a region, and an average score of 1.0, which indicates similar employment concentrations between a region and the nation. An LQ above 1.0 indicates cluster specialization. For example, one of the region's most specialized traded clusters is biopharmaceuticals, which has an LQ of 2.10. In metropolitan Chicago, 23 traded industry clusters have an LQ above 1.0. Together, these 23 clusters contain 1.2 million jobs, or 28 percent of the region's total employment.

In addition to LQ, it is also important to take into account the total employment of each cluster. Some clusters in a region might be relatively large and important but may not have a high employment concentration. This is common in larger metropolitan economies that have numerous areas of strength.

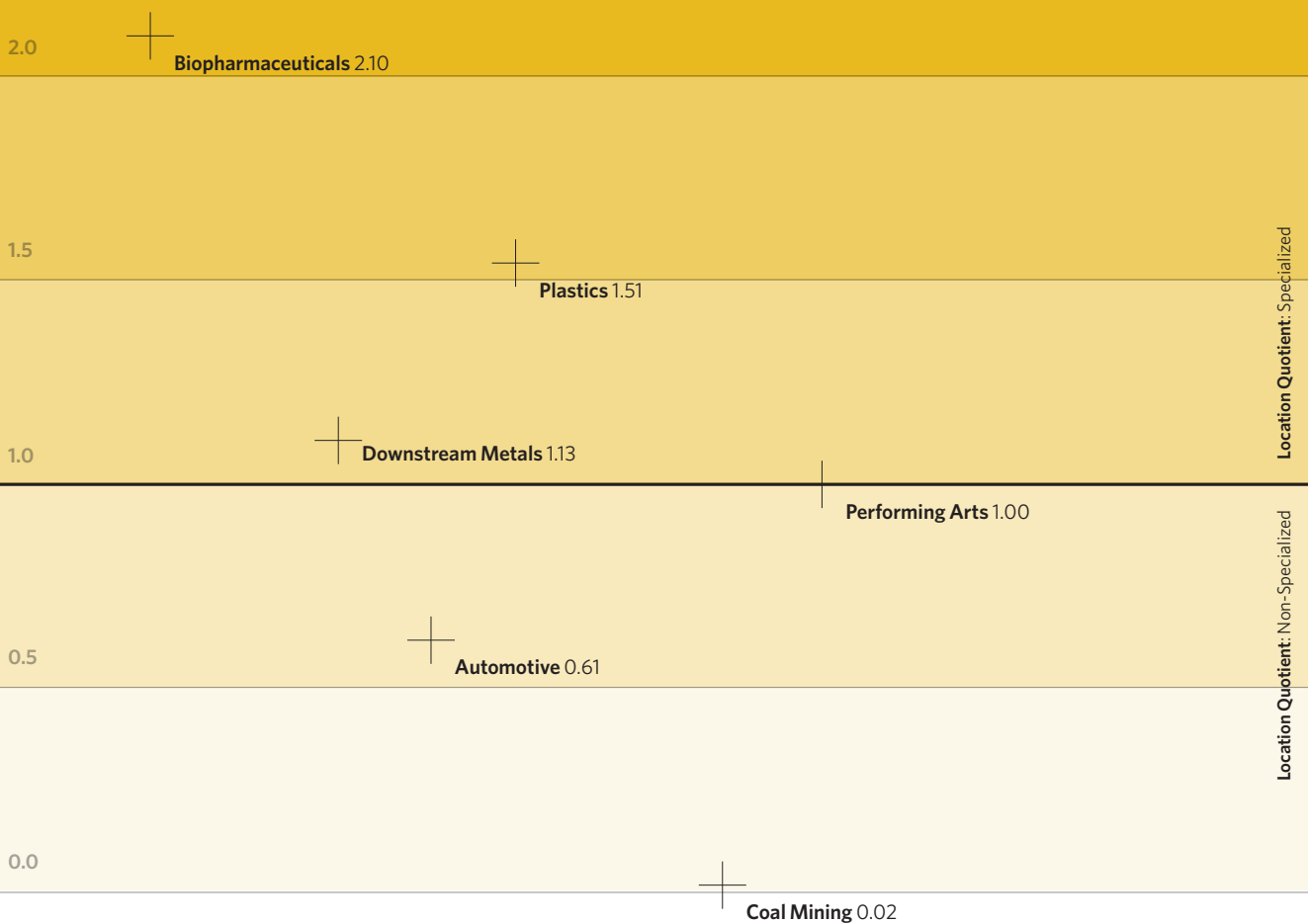
What is a location quotient?

A location quotient measures employment concentration in a region compared to the national average. A location quotient of 1.0 indicates “average” regional employment concentration.

Clusters with a location quotient above 1.0 are generally considered economic strengths.

Figure 5 Location quotient of select clusters in the Chicago metropolitan region

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data.



Chicago region traded industry clusters
**Regional performance vs national average,
 2001-15**

What do these circles signify?

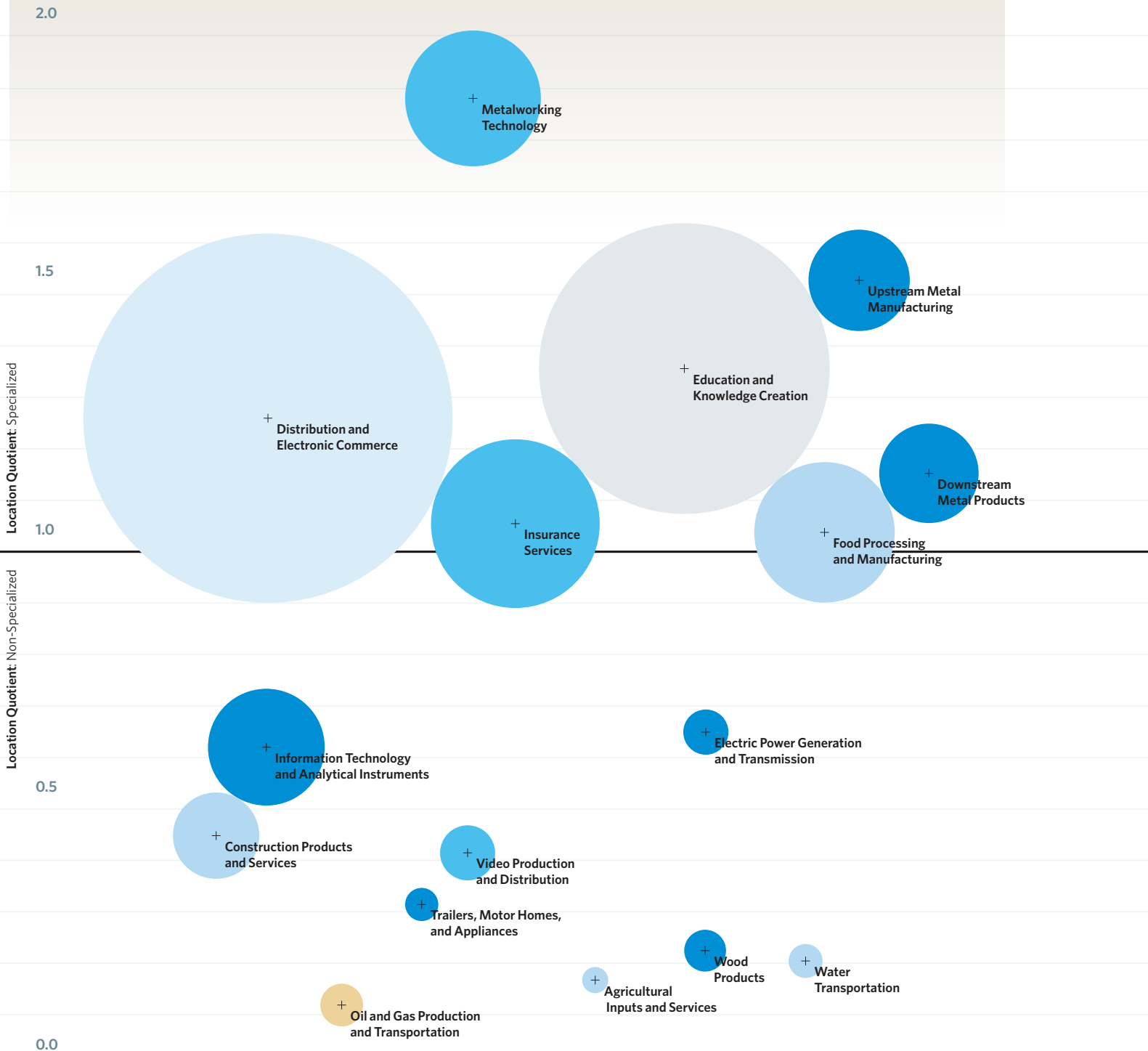
The region is home to dozens of traded clusters, and each has been impacted by the changing global economy.

This chart is organized into several sections, based on specialization and employment. Each cluster circle is located in one of six sections based on their 2015 location quotient and location quotient change from 2001-15.

Below average LQ change

These clusters experienced employment changes that lagged behind the national average between 2001-15, resulting in an LQ decline of greater than ten percent between 2001-15.

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data.



What does position signify?

The region's non-specialized clusters (those with an LQ less than 1.00) are shown at the bottom of the chart. Specialized clusters appear at the top of the chart.

What does size signify?

The size of a cluster indicates the relative number of people employed as of 2015.

What does color signify?

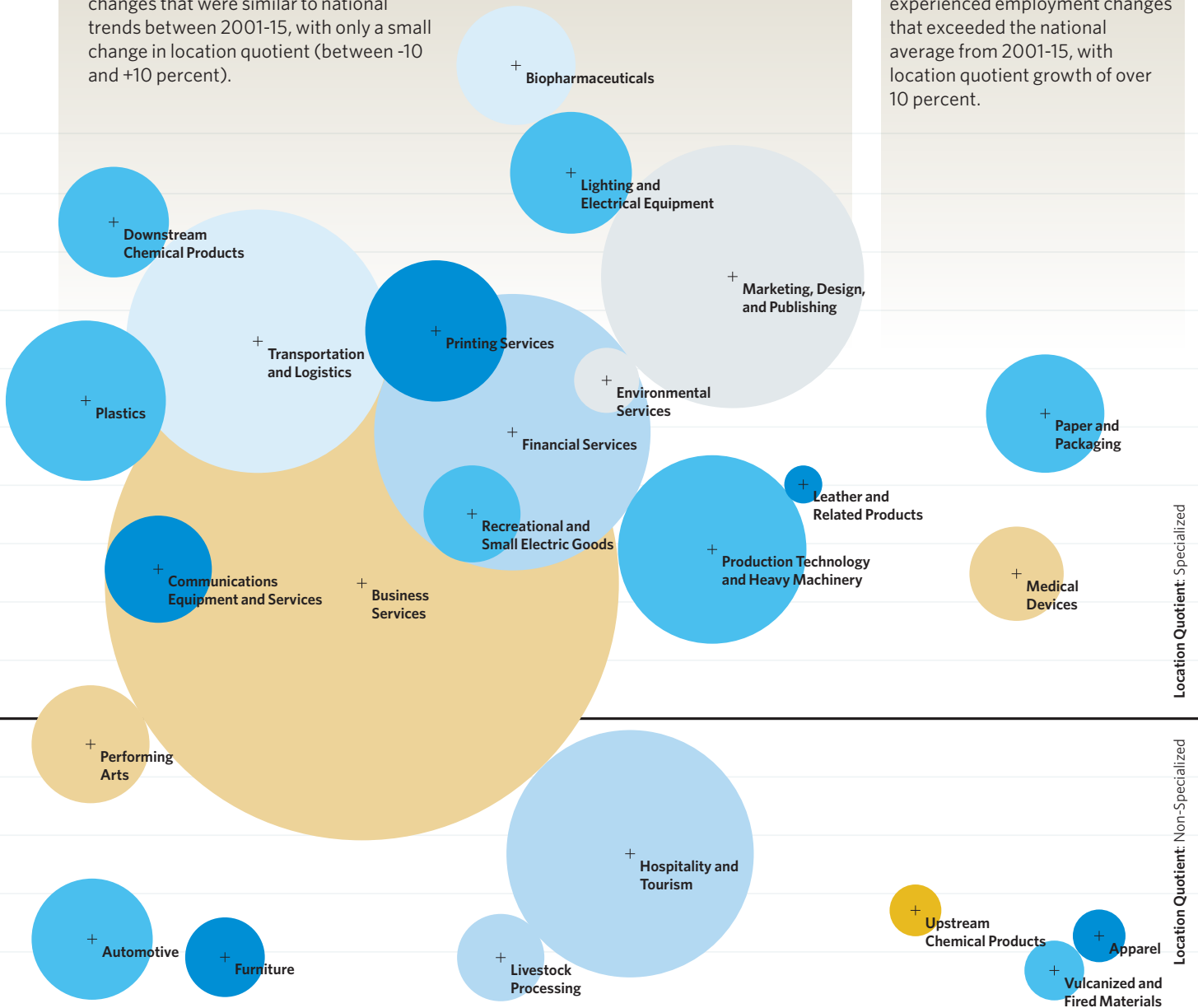
In addition to showing each cluster's performance compared to the national average, the chart also shows each cluster's net employment change between 2001-15. Clusters in beige experienced employment growth, while clusters in blue experienced employment decline.

Average LQ change

These clusters experienced employment changes that were similar to national trends between 2001-15, with only a small change in location quotient (between -10 and +10 percent).

Above average LQ change

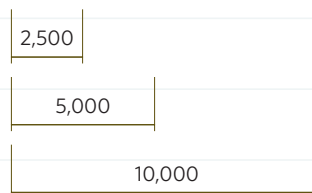
Clusters in this column experienced employment changes that exceeded the national average from 2001-15, with location quotient growth of over 10 percent.



Employment Change, 2001-15

- -65% to -40%
- -40% to -25%
- -25% to -10%
- -10% to 0%
- 0% to +10%
- +10% to +20%
- +20% to +30%

Employment, 2015




Location Quotient: Specialized

Location Quotient: Non-Specialized



The development of ON TO 2050 is still in early stages, but some areas of focus are already clear:

A close-up photograph of a laboratory pipette dispensing a clear liquid into a multi-well plate. The pipette is in sharp focus, with a small droplet of liquid hanging from its tip. The multi-well plate is filled with many wells, each containing a small amount of yellowish liquid. The background is a soft, out-of-focus blue and white, suggesting a laboratory environment.

Support human capital, ensuring high-quality educational opportunities.

Invest in infrastructure to better move goods and people through the region.

Develop regional and sub-regional strategies to support all of the region's clusters.

A closer look at traded clusters

Following a slow recovery from the recession as well as broader economic shifts, many of the region's traded clusters are experiencing declining employment and/or LQ. But the region maintains significant specializations.

To highlight the diversity of metropolitan Chicago's economic strengths, three traded clusters are examined on the following pages.

Transportation
and Logistics

Business
Services

Metalworking
Technology

Transportation and Logistics

The region's transportation and logistics (T&L) cluster provides essential services by connecting the region to the rest of the world and is particularly germane to CMAP's transportation planning work. It has experienced significant growth in recent years, with employment changes matching or exceeding national trends each year since 2008. The T&L cluster encompasses freight and limited interurban passenger transportation, along with services that support these operations, such as maintenance and repair, inspections, and loading/unloading services.

Transportation and logistics is one of the key economic strengths of the Chicago region. Past CMAP research has shown that the region is a major hub for the movement of freight by truck, rail, and air, with an estimated \$1.3 trillion in freight moved into and out of the region in 2012.⁷ Our T&L cluster contains roughly 92,000 jobs, making it the region's fourth largest traded industry cluster after business services, distribution and e-commerce, and education.

Between 2001-15 the T&L cluster experienced a small net loss of approximately 560 jobs. Hit hard by the 2001 and 2007-09 recessions, freight movement slowed nationally and worldwide. The cluster has seen strong growth since 2010, however, adding over 12,000 jobs between 2010-15 and growing its location quotient from 1.55 to 1.65. Among the ten largest metropolitan areas, Chicago's transportation and logistics cluster is the second largest in terms of total employment (trailing only New York) and the third most specialized (after Atlanta and Dallas).

Cluster job growth has been driven by increased logistics to optimize freight routing as well as by long-distance trucking employment. New logistics technology and processes have helped shippers reduce freight costs and generated growing demand for logistics services. The long-distance trucking industry has benefited from a post-recession rebound in manufacturing and retail activities that have created demand for trucking services.

Nearly 70 percent of jobs in the T&L cluster require a high school degree or less, making cluster employment accessible to a large portion of the region's workforce.

2001-15 Employment performance

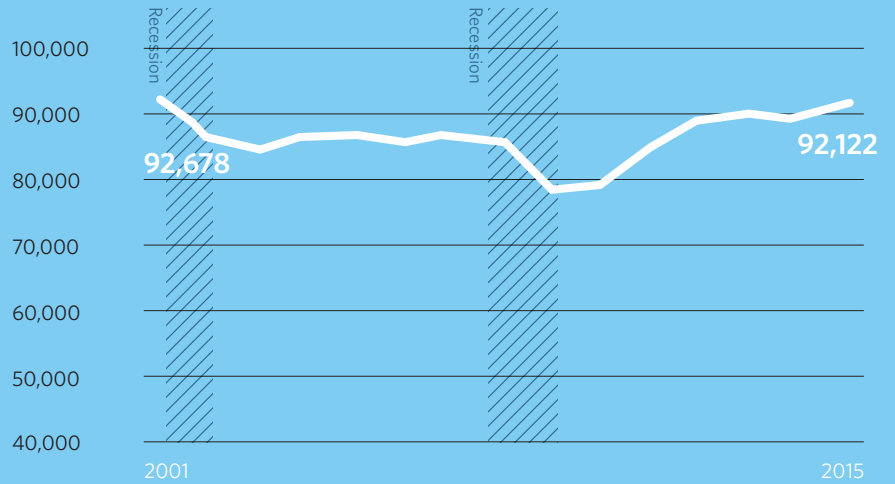
Overall Change

Jobs Lost

-0.6% **-556**

Cluster employment

Transportation and logistics cluster employment, 2001-15

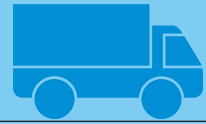


Common occupations and compensation

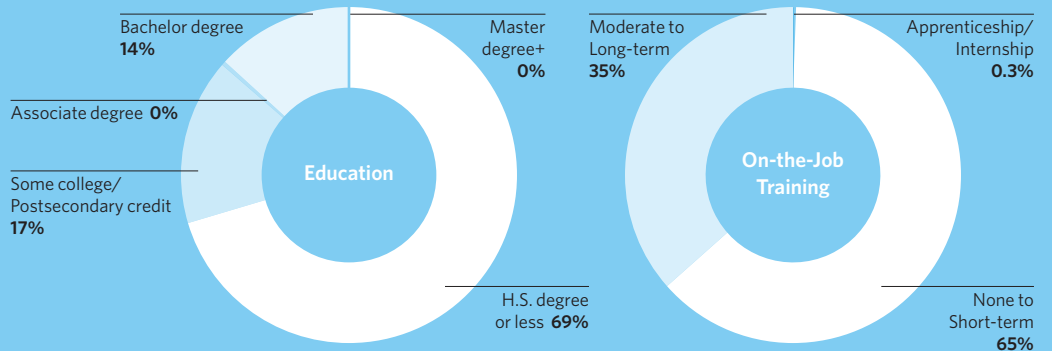
Flight attendant
\$18.18/hour

Aircraft mechanic
\$32.26/hour

Truck driver
\$21.15/hour



Entry-level job requirements



Regional competitiveness measured by location quotient

2001

1.51

2015



1.65

Business Services

The business services cluster grew the fastest among the region's traded clusters, adding over 51,000 jobs since 2010. Growth of business services reflects a larger, ongoing trend of growth in service sectors of the economy.⁸ The business services industry cluster includes businesses whose primary function is providing services to other businesses on a national and global scale. These include legal services, consulting, computer services, engineering and architectural services, and job recruitment and placement services.

With over 310,000 jobs, the business services cluster is the region's largest traded cluster. The cluster has seen a strong resurgence since the 2007-09 recession, with employment growing at 3.7 percent per year between 2010-15, exceeding the region's overall job growth rate of 1.3 percent per year.

Metropolitan Chicago is home to the fourth largest business services cluster in the nation, trailing New York, Los Angeles, and Washington, D.C. Cluster growth in the region has closely mirrored national averages, with the region's cluster LQ remaining at or near 1.24 since 2001. Large metropolitan areas in the U.S. tend to agglomerate specialized business services, with concentration levels in the Chicago region exceeding that of New York and Los Angeles, but trailing Washington, D.C. and Boston. Cluster growth in recent years has been driven by increased rates of outsourcing services which often helps businesses decrease costs and increase their focus on core competencies.⁹

This cluster generates significant demand for postsecondary degree holders. Today, more than half of all business services jobs require a postsecondary education. Nearly 90 percent of jobs added to the cluster since 2001 have had education requirements of an associate degree or higher.

Business services are also one of only a handful of clusters in the region to have higher employment totals today than in 2001.

2001-15 Employment performance

Overall

Jobs Change

+12.5% **+34,443**

Cluster employment

Business services cluster employment, 2001-15



Common occupations and compensation

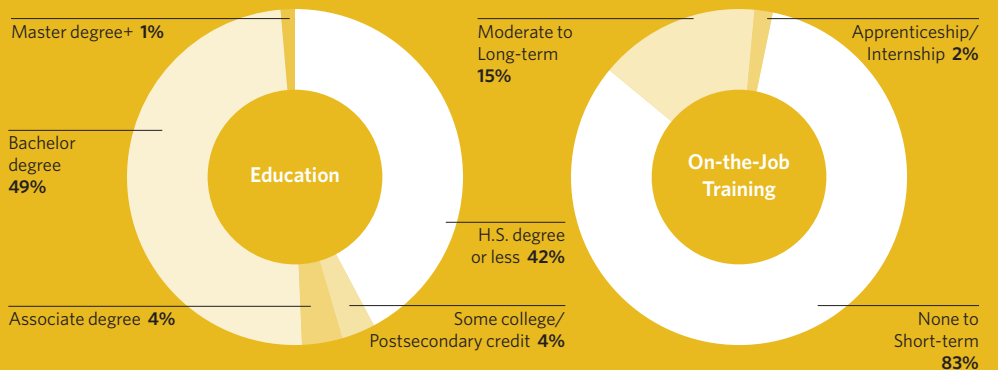
Customer service representative
\$18.18/hr

Software developer
\$32.26/hr

Human resources specialist
\$21.15/hr



Entry-level job requirements



Regional competitiveness measured by location quotient

2001

1.24

2015

↔ 1.23

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data.

Metalworking Technology

Metropolitan Chicago is home to a number of strong manufacturing clusters, although manufacturing now counts for a smaller portion of our region's employment than in prior decades. For example, despite a significant concentration of metalworking technology jobs, this cluster's employment has declined significantly in recent years. The metalworking technology cluster is comprised of businesses that manufacture machine tools and process metal for use in metalworking. Machine tools are machines that shape, form, cut, and bend metal into processed pieces that are often used in the construction of other machines. The cluster also contains businesses that manufacture hand tools and metal fasteners, such as screws, nuts, bolts, or washers.

The region's metalworking technology cluster contains roughly 26,000 jobs and is highly specialized with an LQ of 1.89. Despite this high level of specialization, the region has seen significant cluster job loss since 2001, with employment shrinking by 35 percent between 2001-15. National employment in the cluster has declined at a slower rate of 21 percent, leading to a decrease in the region's location quotient from a peak of 2.14 in 2001 to 1.89 today. Among the ten largest metropolitan areas in the U.S., only four have strong metalworking technology specializations (Chicago, Detroit, Houston, Los Angeles), and only one (Houston) has seen employment growth since 2001. It is not clear what is driving above-average cluster job losses in the region. Nationally, employment declines in the cluster may be attributed to increased levels of automation in metals processes and growing competition from foreign imports.

More than 80 percent of jobs in the metalworking technology cluster have entry-level education requirements of a high school degree or less. New workers in the cluster tend to undergo longer periods of on-the-job training than in other clusters. Nearly two-thirds of metalworking technology jobs require moderate- to long-term on-the-job training, which entails a significant investment by employers. The growing use of technology in manufacturing is driving demand for a more skilled and technologically advanced workforce. A growing number of manufacturing occupations, for example, are now computer-driven and require complex math or programming skills, which has made it more difficult for employers in the cluster to find workers in recent years.

2001-15 Employment performance

Overall

Jobs Change

-35.0% -13,812

Cluster employment

Metalworking technology, 2001-15

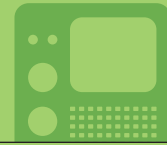


Common occupations and compensation

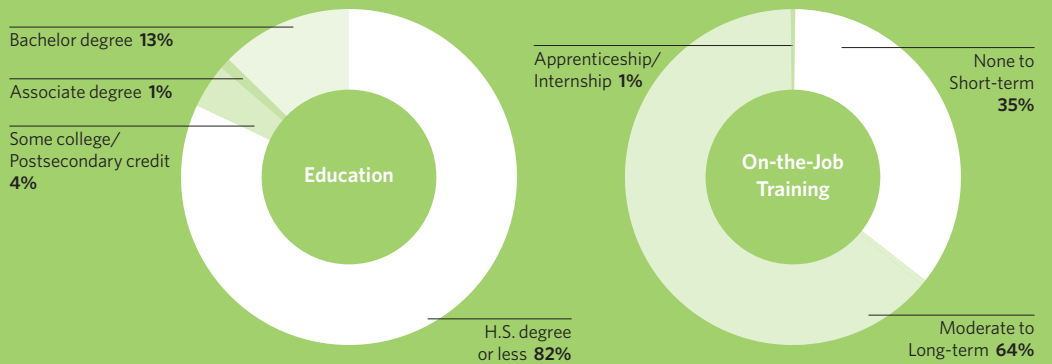
Machinists
\$18.09/hr

Tool and die maker
\$25.05/hr

Computer numerically controlled tool operator
\$17.78/hr



Entry-level job requirements



Regional competitiveness measured by location quotient

2001

2015

2.14

↓ 1.89

Local industry clusters

Local clusters support traded clusters and provide key goods and services for residents and regional businesses. Because of their growth potential and status as economic drivers, traded industry clusters generally garner the most attention on a regional level. While local industry clusters do not experience clustering benefits on the same scale as traded clusters, they still play a significant role in the metropolitan Chicago economy, accounting for two-thirds of our region's jobs.

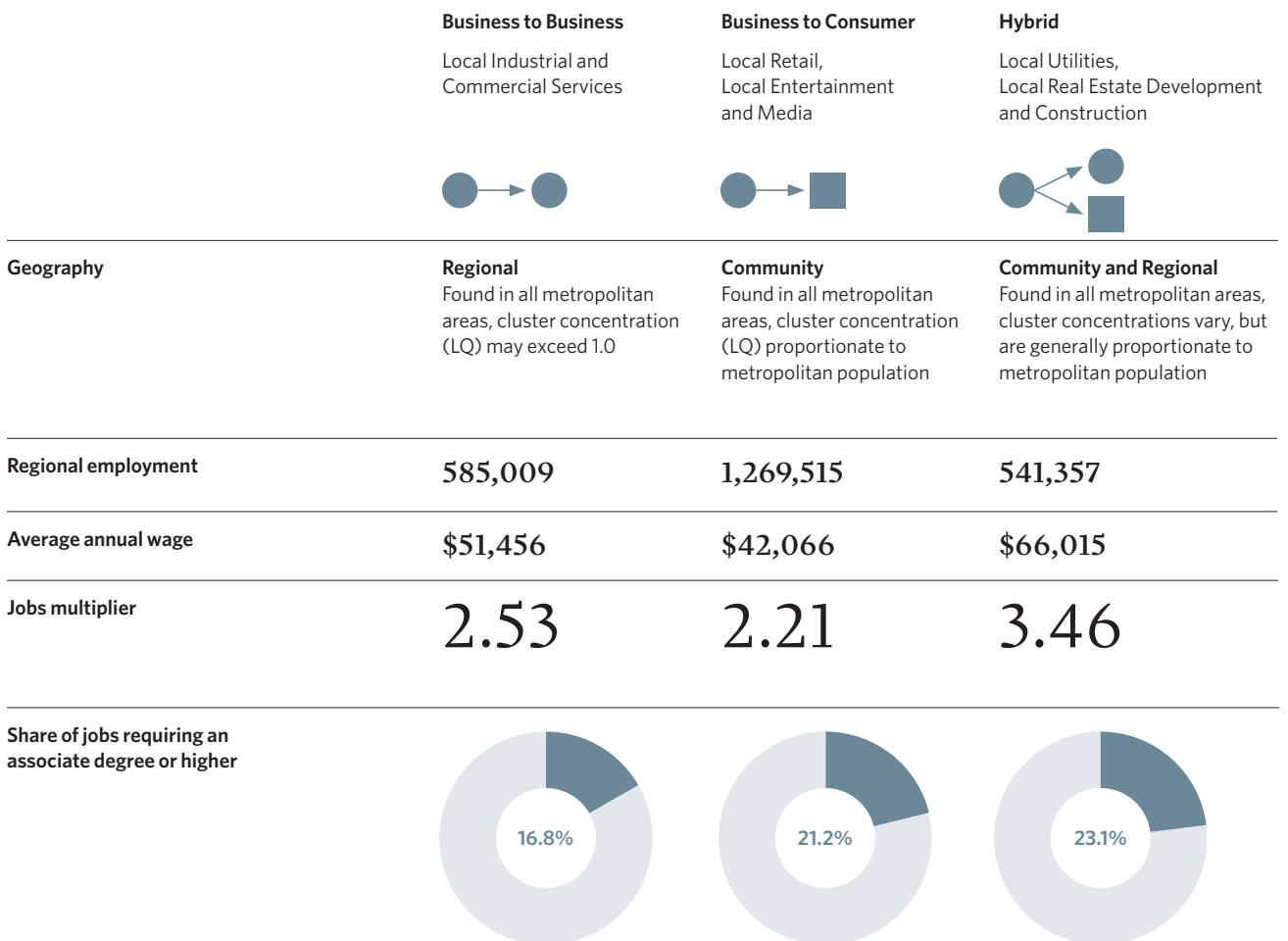
Local clusters can be categorized based on the customers they serve. Business-to-consumer clusters — such as health care or local retail — provide goods and services to the region's residents and typically have an LQ of 1.0.

Local clusters account for two-thirds of our region's jobs.

Local business-to-business clusters provide goods and services to the region’s businesses and can often have specialization if there is a high demand for services from a region’s traded industry clusters. The region’s local industrial products and services cluster, for example, has a location quotient of 1.14, which is predominantly driven by a concentration of machine shops. These shops provide valuable machining services to the region’s traded metals clusters, and would not otherwise exist here in a high concentration without the presence of traded metals clusters. Likewise, the region’s metals clusters depend on these machine shops and would not be able to grow in regions with low concentrations of industrial service providers. It is important to understand the relationships that business-to-business clusters have with our region’s traded clusters because traded clusters will not grow without the presence of underlying local services.

Figure 6 Local cluster types

Source: Chicago Metropolitan Agency for Planning analysis of U.S. Cluster Mapping and Economic Modeling Specialists International data, 2015.



The implementation of GO TO 2040 illustrated the critical role of coordination and collaboration among the many stakeholders needed to reorient economic development practices on a regional scale.

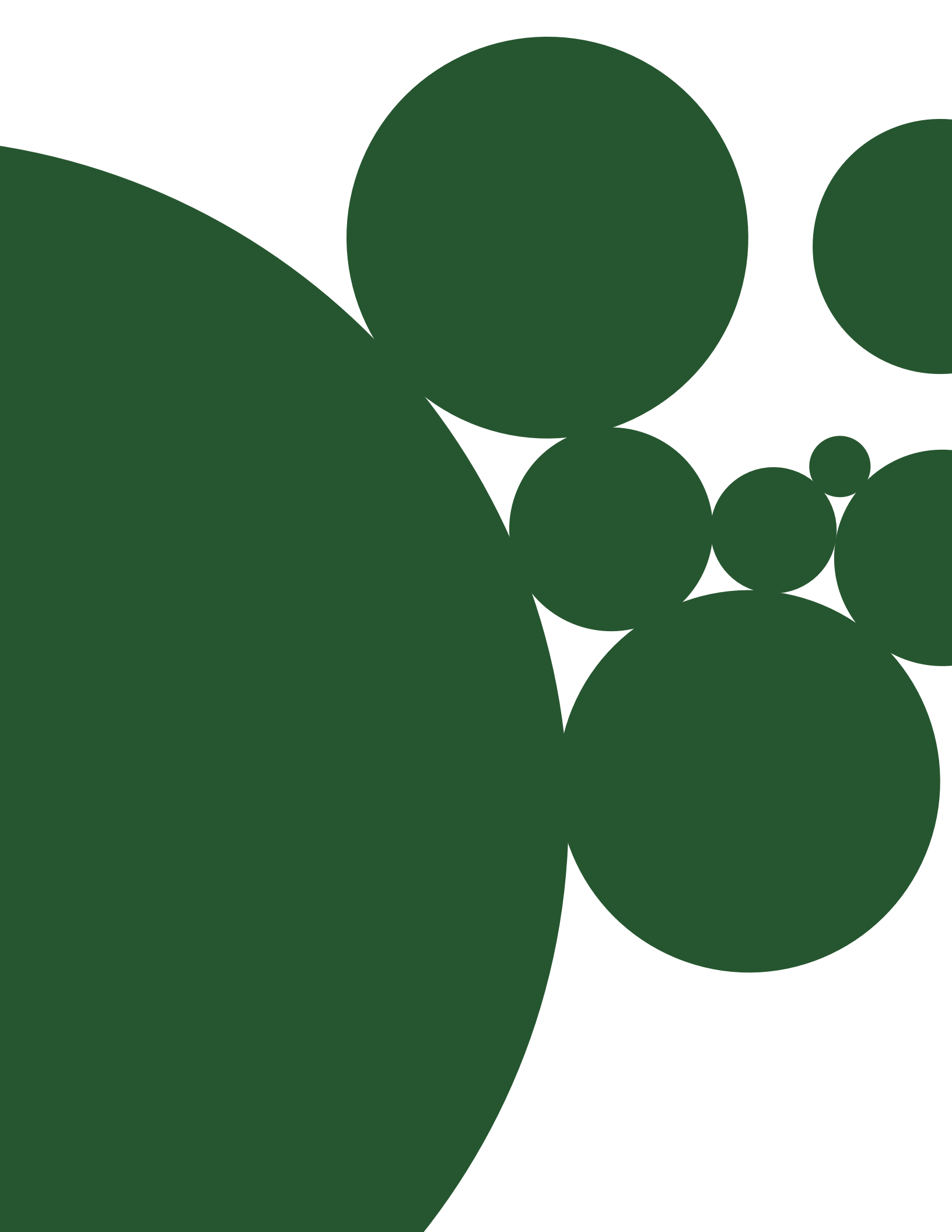


As ON TO 2050 is developed over the next two years, CMAP will work with experts and stakeholders from the public and private sectors to identify appropriate strategies that foster sustainable and robust economic growth.



Endnotes

- 1 Recent national research formalized by the U.S. Cluster Mapping Project provides a refined methodology to identify and study metropolitan regions' economic specializations. While the methodology provides a firm foundation for understanding our region's economy, the new cluster groupings are not definitive. The compositions of industry clusters vary between regions, and, where appropriate, this will be taken into account in future CMAP analysis of the performance of our region's clusters.
- 2 Michael Porter et al. "Clusters and the New Economics of Competition," Harvard Business Review, November-December 1998. See http://clustermapping.us/sites/default/files/files/resource/Clusters_and_the_New_Economics_of_Competition.pdf.
- 3 Ibid.
- 4 Researchers used a variety of data to identify clusters throughout the U.S. The U.S. Census Bureau's County Business Patterns data revealed locational patterns of employment and industry establishments. The national input-out data provided by the Bureau of Economic Analysis facilitated the study of buyer-seller relationships across industries. Finally, Bureau of Labor Statistics data provided insight into correlations in occupational skills and requirement. (Mercedes Delgado, Michael E. Porter, and Scott Stern, "Defining Clusters of Related Industries" Working Paper 20375, National Bureau of Economic Research, 2014.)
- 5 To date cluster research tends to focus on traded clusters, but some work has begun to explore the role and needs of industry clusters that serve local businesses and residents. These clusters are found in metropolitan areas across the U.S. at concentration levels proportionate to a region's population and the composition of traded businesses. (Mercedes Delgado, Richard Bryden, and Samantha Zyontz, "Categorization of Traded and Local Industries in the US Economy," Cluster Mapping Methodology, 2014. See <http://clustermapping.us/content/cluster-mapping-methodology>.)
- 6 Chicago Metropolitan Agency for Planning analysis of U.S. Cluster Mapping and Economic Modeling Specialists International (EMSI) data, 2016.
- 7 CMAP analysis of Freight Analysis Framework data, 2015.
- 8 Anthony Carnevale and Stephen Ross, "The Economy Goes to College: The Hidden Promise of Higher Education in the Post-Industrial Service Economy," Georgetown Press Center on Education and the Workforce, 2015.
- 9 Ibid.



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The Chicago Metropolitan Agency for Planning (CMAP) is our region's official comprehensive planning organization. The agency and its partners are developing ON TO 2050, a new comprehensive regional plan to help the seven counties and 284 communities of northeastern Illinois implement strategies that address transportation, housing, economic development, open space, the environment, and other quality-of-life issues. See www.cmap.illinois.gov for more information.

ON TO 2050 snapshot reports will offer data-driven summaries of regional trends and current conditions. These documents — as well as strategy papers — will define further research needs as the plan is being developed prior to adoption in October 2018.

