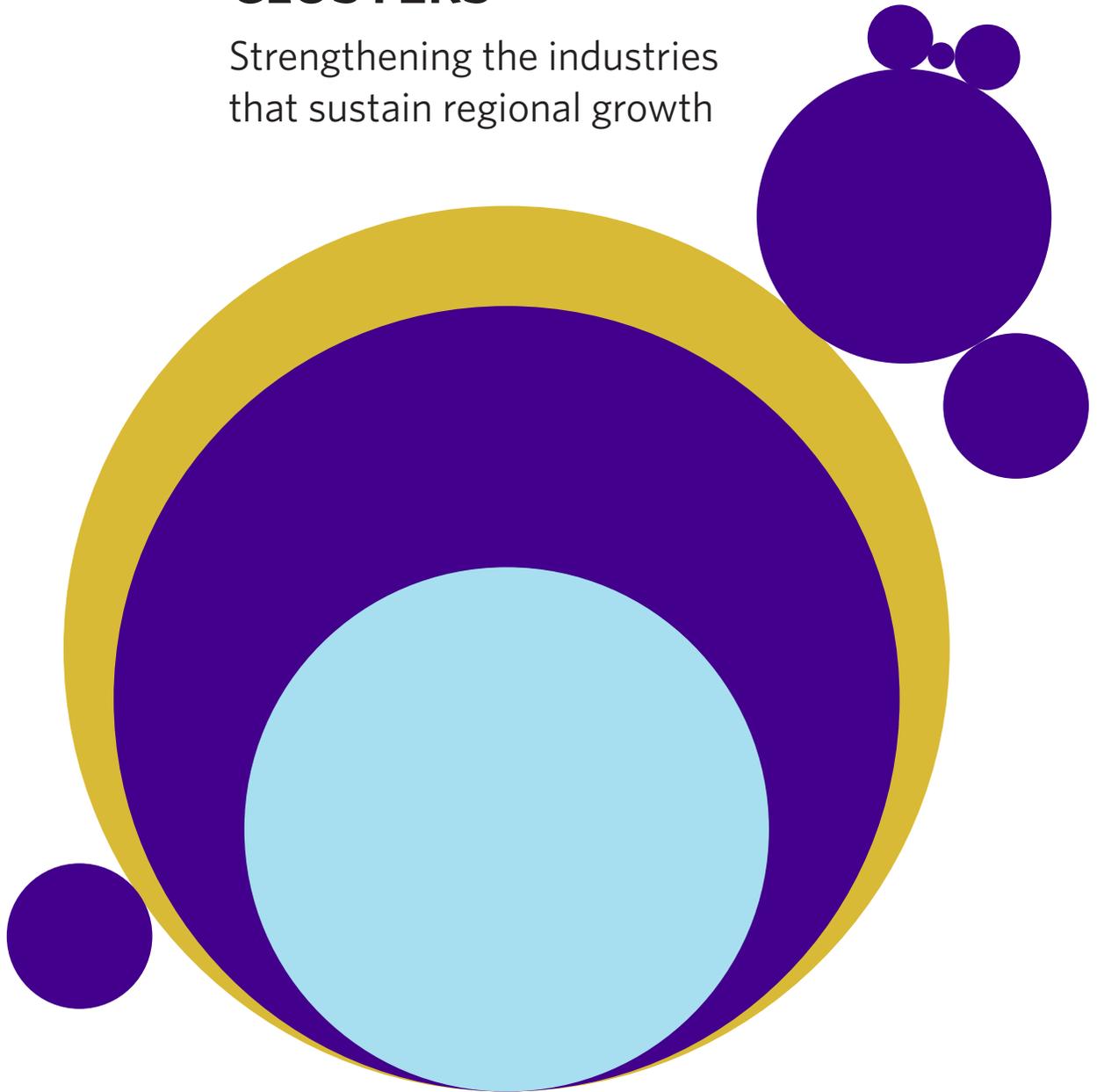


METROPOLITAN CHICAGO'S TRADED INDUSTRY CLUSTERS

Strengthening the industries
that sustain regional growth



TECHNICAL REPORT

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Introduction

Metropolitan Chicago has significant industry strengths that, if fully tapped, would allow it to outcompete peer regions economically. However, its recent performance has not lived up to this potential. During 2001-17, regional economic production grew just 0.9 percent annually, or half the national average, and employment grew just 0.2 percent per year, one-third the national average.¹ New job growth has concentrated at the bottom and top ends of the earning spectrum, while middle-skill occupations now make up 41 percent of total employment in the region – down from 56 percent in 1980.² This trajectory reflects both regional and global economic shifts that have major implications for public policy and planning.

To restart broad economic growth that benefits the entire region, research suggests focusing on growing our traded industry clusters – groups of interlinked businesses that sell goods and services in markets outside the region.³ Together, these clusters account for around one-third of the region’s total jobs but more than half of its wages, paying on average \$15,200 more each year than industries that serve local customers.⁴ Metropolitan Chicago’s long-range comprehensive plan ON TO 2050 calls for supporting traded clusters through regional economic development.⁵ Historic strengths here – including metals and machinery manufacturing, biomedical products, freight movement and logistics, business services, and others – help drive Midwestern, national, and global markets. To advance the plan’s recommendations, the Chicago Metropolitan Agency for Planning (CMAP) conducts ongoing analysis on industry trends and economic conditions in northeastern Illinois. This report builds on CMAP’s previous work to further examine the region’s clusters and understand the economic opportunities they provide to workers, particularly people of color and those without a college degree.⁶

Policymakers and economic development leaders should create and implement a regional economic strategy that bolsters traded clusters and improves pathways for upward economic mobility. A robust strategy will better position the region to be more resilient in the face of global market forces and climate change. This strategy should reorient policies toward enhancing the region’s competitiveness by preserving and building on its existing strengths. It should address constraints on the growth of globally competitive, export-oriented businesses and ensure they have access to high-quality assets like infrastructure, talent, capital, and research. It should ensure that all residents can fully contribute to and benefit from regional progress. Taking these steps can restart meaningful economic growth.

ON TO 2050 identifies three principles to inform regional policy and planning: *Inclusive Growth*, *Resilience*, and *Prioritized Investment*. Reflecting these principles, a cluster-based approach:

- *Advances inclusive growth* by prioritizing clusters that offer opportunities for upward economic mobility, particularly for people of color and those without a college degree.
- *Advances resilience* by preparing regional industries and the workforce to compete successfully in light of future economic conditions and market shifts.



- *Advances prioritized investment* by using an international framework to better understand the region's economy and target public investments for greater economic benefit.

Despite their economic benefits, traded clusters – metropolitan Chicago's historic sources of growth – shed more than 144,000 jobs (9 percent) from 2001-17.⁷ These declines are concentrated among industries that employ more people of color and middle-skill workers than the region overall. Each traded cluster has a discrete role in sustaining the region's economy and distinct requirements for infrastructure, land use, and the workforce. Supporting their growth requires a deeper understanding of their functional needs and how these assets interact to benefit the economy as a whole. This report presents new evidence and topline conclusions that elected officials and economic developers should incorporate with direct business intelligence to help guide regional economic and industrial policy.

The initial section of this report – **Traded clusters propel regional economies** – provides a brief overview of industry clusters and their use as a way to interpret inter-business interactions and economic impacts. **Our competitive strengths are eroding** uses this lens to review how metropolitan Chicago's economic base and competitive position have evolved since 2001.

The following three sections provides data trends and patterns across traded clusters. **People and skills build robust clusters** identifies who works in the region's traded clusters today and explores the interaction among clusters' skills demand, wages, and economic opportunity. **Business trends reveal shifting conditions** reviews the growth and resilience of specialized clusters during the 2007-09 recession and subsequent recovery, as well as differences in their distributions of establishment age and size. **Freight infrastructure sustains our clusters** analyzes how export-oriented industries draw on the region's extensive, multimodal freight system in distinct ways.

Cluster strategies will reinforce future regional growth then offers recommendations for pursuing a cluster-based approach to industrial and economic development in metropolitan Chicago. Finally, the attached traded clusters snapshots gather and present key data on individual clusters to give a fuller understanding of major regional strengths.

Unless stated otherwise, data reflect economic trends during 2001-17 in the seven counties of northeastern Illinois (Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will). CMAP chose this timeframe to assess the resilience of regional clusters in the face of both periodic business cycles and longer-term macro-issues in the U.S. economy, and in response to data availability and quality concerns. More detailed data and findings on each traded cluster are available for download from CMAP's website at <http://cmap.is/Traded-Clusters>.



Traded clusters propel regional economies

Industries that occupy specialized economic niches do not succeed or fail alone. Businesses are often highly interdependent and thrive when geographic proximity and concentration enable them to make connections across related industries. Regionally co-located networks of firms are called *industry clusters*. CMAP researches these linkages because their presence and strength can mean the difference between economic growth and stagnation.⁸

Since Michael Porter first introduced the concept in 1990, industry clusters have been an increasing focus of academic research and regional economic development.⁹ These clusters occur naturally in the economy as groups of interrelated firms reap tangible, productive advantages from their close interaction and economies of scale. As industries grow and develop, they have the potential to attract shared resources and become “centers of gravity” for new business development. These hubs of related activity foster an environment of balanced competition and collaboration, with partnerships arising among firms that understand their success is tied to the success of others.

What is a cluster?



Clustering benefits businesses, their employees, and the regions in which they reside. Unlike isolated firms, businesses within a cluster experience better access to customers and suppliers, greater knowledge spillovers, common relationships and institutions, a deeper labor pool, and other advantages.¹⁰ Their workers have greater career opportunities to move among similar firms and industries, honing their skills and expertise. And, the regional economy benefits from a self-reinforcing cycle of business and employment growth that research shows boosts total output, wages, patenting, and startup activity.¹¹ Even when economic conditions are uncertain, the competitive advantages of clusters effectively make the case for why a related business should operate in the Chicago region.

Metropolitan economies contain two broad types of clusters: traded clusters that produce goods and services for markets outside of the region, and local clusters that cater primarily to customers within the region – both businesses and households. Traded and local clusters each have discrete market functions and distinct infrastructure, land use, and employment needs.

A significant share of economic development policy and planning for northeastern Illinois focuses on attracting and retaining businesses in local clusters. These businesses provide the economic foundations that residents and traded clusters rely on day to day, such as healthcare services, retail and entertainment, utilities, industrial and vehicle repair, and local commercial and personal services. Their continued success helps to ensure a high quality of life and many

employment opportunities in the Chicago region. However, these local clusters should not be the highest priority for public support because they typically grow only in proportion to a region's population and the traded clusters they service.¹²

Instead, research suggests that focusing on the development and resilience of traded clusters has an outsized potential to fuel inclusive economic growth.¹³ Traded (or export-oriented) clusters constitute metropolitan Chicago's primary industrial assets because they bring in business activity to the region that otherwise would not occur here. Prior analysis shows that traded clusters tend to have greater productivity, innovation, wages, and job quality.¹⁴ In 2017, these clusters accounted for around one-third of the region's employment (36.9 percent) but more than half its wages and earnings (52.5 percent).¹⁵ Taken together, they typically pay \$7.33 more per hour than the region's local clusters, or an additional \$15,200 each year for full-time workers. Approximately 74.4 percent of workers in traded clusters also receive employer-sponsored health insurance – a common proxy for overall job quality – compared with 67.1 percent in local clusters.¹⁶ Because traded clusters have a disproportionate effect on the regional economy, fostering their growth will in turn generate higher demand in local clusters.

Efforts to strengthen and grow key traded clusters – together with those to improve industrial and economic development more broadly – can sustain regional prosperity. Doing so requires removing the barriers that prevent clusters' distinctive benefits from reinforcing the region's competitiveness. So cluster analysis aims to correctly identify the sources of these benefits and the appropriate policies to enhance them. This report provides extensive data on both metropolitan Chicago's economic base overall and individual traded clusters as an initial step in identifying areas of need and priorities for further analysis.

How clustering drives new business activity: an example

High-tech manufacturing – from solar panels to jet engines – depends on small, metal components that must meet the strictest precision, quality control, and design specifications. The Chicago region is one of the few major U.S. metropolitan areas with an entire supply network of specialized metal clusters. As a result, metal machining, engraving, and shipping firms may choose to locate here to capture new business with established manufacturers of precision screws and fasteners. The presence of interrelated firms creates new opportunities for workers, who can move among employers to obtain higher wages, better working conditions, and career development. With deeper labor pools, businesses gain access to workers who already understand the needs and capabilities of their primary customers, suppliers, and partners. New metal manufacturers such as custom steel shape fabricators can develop out of existing firms or be attracted to the region. Proximity creates opportunities for formal cross-firm collaboration like business roundtables or joint training programs, as well as informal interactions among employees of various firms. Together, this interplay spurs innovation, decreases business costs, and reinforces the cluster's competitiveness overall, enabling greater economic growth.



Metropolitan Chicago's clusters

This report uses cluster definitions from the U.S. Cluster Mapping Project to provide an analytical framework consistent with national research.¹⁷ The project – a joint effort by the Harvard Business School and U.S. Economic Development Administration – uses nationwide input-output data to group all industries (at the 6-digit NAICS code level)¹⁸ into 67 distinct industry clusters. These include 51 traded clusters and 16 local clusters. Standard definitions, although imperfect at the regional level, allow for consistent comparison across peer regions.

In this analysis, two traded clusters identified by the U.S. Cluster Mapping Project – Water Transportation and Transportation & Logistics – are combined into a single Transportation & Logistics cluster. In addition to the distinction between clusters that are traded (chiefly serving external markets) and local (mainly selling to local communities), other distinctions are useful for categorizing types of regional business activity:

- **Employment base:** The size of a cluster matters because the regional effect of a cluster's growth or contraction varies dramatically based on the number of workers its businesses employ. A five percent job gain in a very large cluster, for example, would likely improve regional employment and earnings more than a much higher rate of growth in a very small cluster. This report focuses on the 35 traded clusters that employed more than 2,500 workers in the Chicago region in 2017. Altogether, they represented 99.7 percent of regional traded cluster employment, with 1.4 million workers.¹⁹
- **Specialization:** A region is considered specialized in a specific cluster—and therefore can count it as an economic strength—when it has a higher share of workers employed in those industries than the nation overall. Economists call this measure of employment concentration a *location quotient*.²⁰ By incorporating the national context, location quotients can reveal more about the strength of a cluster than its job count alone. For example, the Chicago region's Biopharmaceuticals cluster employed 16,900 workers in 2017 but has a location quotient of 2.07, or more than twice as many jobs here as the U.S. average.²¹ By comparison, the Hospitality and Tourism cluster employs more than four times as many workers but has a location quotient of 0.82, indicating that the region has lower than average employment in the cluster. This report considers any cluster with a location quotient of 1.05 or greater – in other words, those with regional employment at least five percent higher than the national average – as *specialized*. Of the traded clusters that meet the employment threshold, 22 are specialized and 13 are unspecialized.

What is a location quotient?

A location quotient (LQ) measures a region's relative specialization in a particular industry or group of industries. It is calculated by dividing the percentage of total regional employment in a cluster by the percentage of total national employment in the same cluster. When a cluster has an LQ greater than 1.0, the region has a higher concentration of workers employed in the cluster than the national average. LQs below 1.0 indicate lower than average employment.



- Sector:** Cluster analysis also distinguishes between clusters that primarily produce *goods* – including traditional, advanced, and additive manufacturing as well as raw materials (21 clusters) – and those that primarily offer *services*, such as logistics arrangement and accounting (14 clusters). This distinction is useful because the clusters within each sector tend to have similar operating conditions and respond to regional, national, and global economic trends in similar ways.

Taken together, key distinctions among industry clusters by size, specialization, and sector provide a taxonomy of private business activity in the Chicago region.

		Traded clusters		Local Clusters
		Goods-producing	Services	
Specialized		Biopharmaceuticals	Business Services	Commercial Services
		Downstream Chemicals	Communications Inputs	Community Organizations
		Downstream Metals	Distribution and E-Commerce	Local Education
		Electrical Equipment	Education and Research	Entertainment
		Food Processing	Environmental Services	Local Financial Services
		Medical Devices	Finance	Food & Beverage Stores
		Metalworking Technology	Insurance	Health Services
		Paper and Packaging	Marketing and Publishing	Local Hospitality
		Plastics	Printing Services	Household Goods
		Production and Heavy Machinery	Transportation and Logistics	Local Industrial Services
Unspecialized		Recreational Goods		Local Logistics
		Upstream Metals		Motor Vehicle Services
		Aerospace Manufacturing	Construction	Personal Services
		Apparel	Hospitality and Tourism	Real Estate
		Automotive	Performing Arts	Retail
		Computer Technology	Video Production	Utilities
		Furniture		
		Livestock Processing		
		Oil and Gas		
		Upstream Chemicals		
Fewer than 2,500 employees		Vulcanized and Fired Materials		
		Coal Mining	Agricultural Inputs	
		Fishing	Electric Power	
		Footwear	Sound Recording	
		Forestry		
		Jewelry and Precious Metals		
		Leather Goods		
		Metal Mining		
		Nonmetal Mining		
		Textiles		
		Tobacco		
		Trailers and Appliances		
	Wood Products			

Figure 1: Taxonomy of Chicago regional clusters by employment, specialization, and sector, 2017

Note: Specialization refers to employment concentration relative to the national average.

Source: Chicago Metropolitan Agency for Planning analysis of U.S. Cluster Mapping and Economic Modeling Specialists International data (Emsi 2018.4).



Economic diversity

Economic specialization (high concentrations of regional employment in certain clusters) and diversification (the presence of many clusters in the region) can seem to contradict each other as goals.²² Common metrics for these traits place them on opposite ends of a spectrum: a region that specializes in nothing is completely diversified, while a region where all employees work in a single industry is fully specialized. Academic research continues to debate when public officials should pursue specialization or diversification, and metropolitan economies have found success and failure pursuing each.

Metropolitan Chicago should seek to balance both. In an effort to rouse the economy, a cluster-based approach is often oversimplified to becoming “the next Silicon Valley” of a new or trendy industry. Yet, economists generally agree that clusters cannot be built from scratch.²³ Research instead shows that a broad industrial base can be a prerequisite to seizing new opportunities. Metropolitan economies that manage to sustain robust growth do so by effectively specializing, adapting, and re-specializing.²⁴ They tend to have specializations in industries that are related enough to realize the benefits of clustering but diverse enough that they can ensure a broad job market, weather shifting economic and fiscal conditions, and evolve into new activities and industries. Most successful clusters nationally have emerged from industries with longstanding roots and historical strengths in their regions.

The Chicago region has a larger share of workers employed in more specialized clusters than peer regions. Sustaining this diversity is critical to future growth.

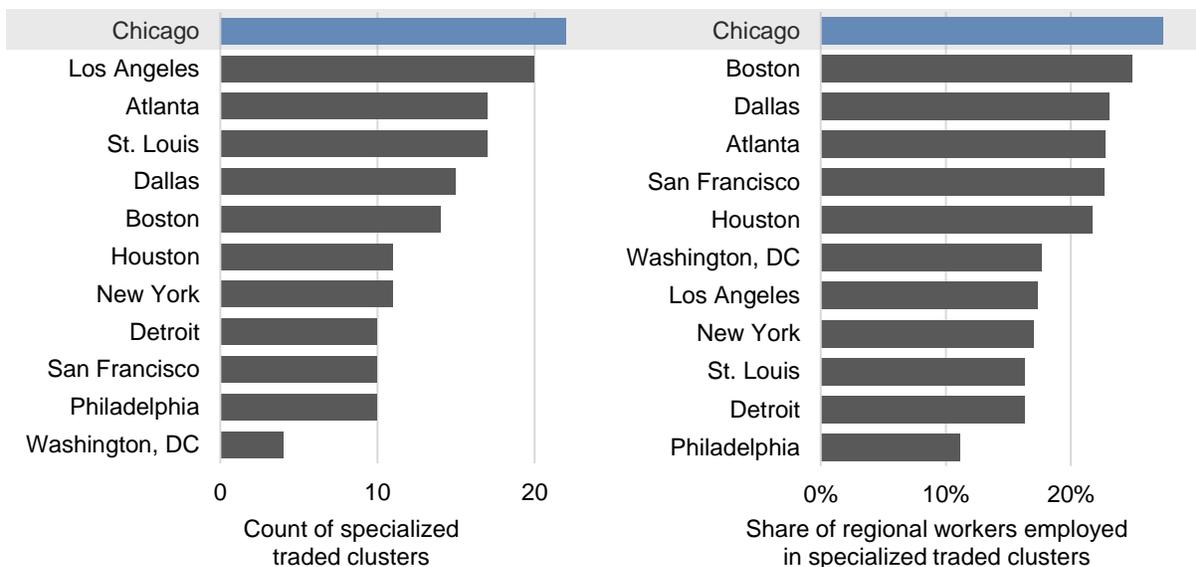


Figure 2: Total jobs and share of regional workers employed in specialized traded clusters, 2017

Note: Specialization refers to employment concentration relative to the national average. Totals include all traded industry clusters, including those with fewer than 2,500 employees in 2017 otherwise excluded from the report.

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).



The Chicago region has highly diversified traded goods-producing and service sectors, with no cluster making up more than 18 percent of their total output.²⁵ This diversity is a defining feature of its economy. The region has a larger number of specialized traded clusters—22 in total—than any other large metropolitan area in the U.S. By comparison, peer regions like New York, Los Angeles, and Houston rely more heavily on fewer industries to power their economies. By sector, metropolitan Chicago also leads its peers with 12 specialized traded goods-producing clusters, and ranks second for specialized traded service clusters (10 clusters), behind Atlanta (11 clusters) and equal to Los Angeles.²⁶

Together, these specialized traded clusters employ more than 1.2 million workers, or 27.4 percent of the region’s total workforce. This workforce is the largest among peer regions as a share of private employment and second only to New York in total jobs. This diversity of specialized traded clusters helps to secure the Chicago region’s other world-class assets, including its skilled workforce, engaged civic and business leadership, institutions of higher education and research, extensive infrastructure, and high quality of life.

Putting subindustry trends into context

Cluster analysis focuses on how well a region competes in aggregate and across various markets, rather than tracking individual businesses or subindustries. The economic trends for particular clusters can therefore run counter to popular perception, demonstrating the need to understand how different clusters come together to drive regional prosperity. For example, online consumer shopping has expanded rapidly in recent years becoming a common area of focus among economic developers. As household spending picked up after the 2007-09 recession, metropolitan Chicago’s Electronic and Mail-Order Houses (NAICS 454110) grew output by 70.9 percent during 2010-17 and regional employment by 28.1 percent to nearly 13,000 jobs.²⁷ Yet these businesses comprise only 6.4 percent of jobs in the region’s substantial Distribution and E-Commerce cluster.

Seizing on emerging opportunities may depend on addressing shared issues in the wider Distribution and E-commerce cluster like freight bottlenecks or transit connections for workers. The remaining 93.6 percent of jobs in the cluster includes a wide array of business-to-business wholesalers, warehouses, packagers and labelers, brokers, and other support services. Like emerging e-commerce businesses, these broader industries benefit from the region’s position as the freight and logistics hub of North America. They rely on its geographic location, extensive freight infrastructure, access to regional suppliers, and distribution and logistics workforce. The presence of strong wholesale industries then benefits other parts of the economy. For instance, merchant wholesalers like metal service centers or industrial machinery brokers connect the region’s manufacturers to customer markets worldwide. With increasing digitization and competition from other distribution hubs as well as slowdowns in some regional goods-producing clusters, metropolitan Chicago has seen sharp declines in its location quotients for most business-to-business wholesale industries. Recognizing these connections can lead to strategies that reinforce historic strengths, reflect growing e-commerce trends, and offer co-benefits in key manufacturing clusters.



Our competitive strengths are eroding

While the Chicago region benefits from the most diversified large U.S. metropolitan economy, global trends are interacting with regional issues to constrain economic growth. The region's traded clusters—the engines of its economy—have lost ground relative to peers and national averages in recent years. Other clusters have emerged, but they are less likely than their predecessors to provide broad employment or an alternative source of regional growth. This section explores data on the region's traded clusters in aggregate to discuss overall patterns in its economic base.

Whether measured by change in population, jobs, or total output, metropolitan Chicago is lagging behind other large economies including the Boston, Los Angeles, New York, and Washington, D.C. metropolitan areas.²⁸ Although regional employment expanded slightly between 2001-17, it did so at a slower rate than most peer regions due in large part to setbacks in its traded sectors. Northeastern Illinois has a long history as a global center for goods production and movement – activities that have changed significantly in recent decades. Like other regions, our economy has shifted to be more service-based, but the related job gains in local and traded service clusters have not made up entirely for declines in manufacturing.

Metropolitan Chicago is experiencing slower job growth than other large economies because its traded clusters have not kept pace with peer regions.

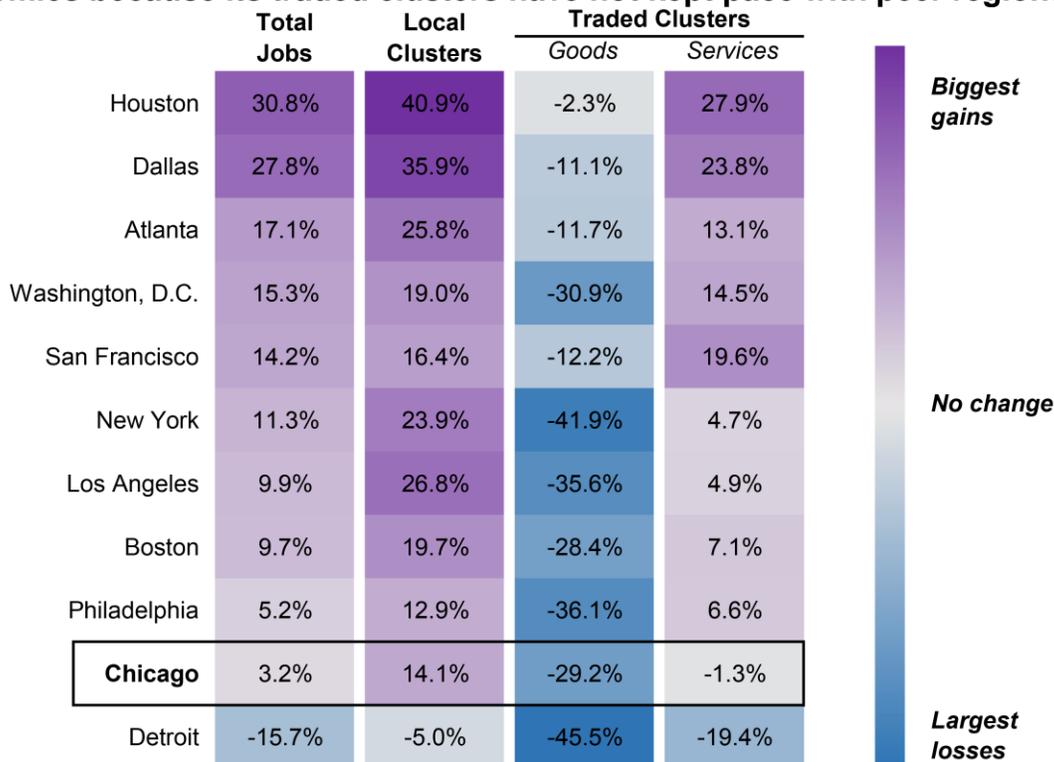


Figure 3: Employment change in the Chicago region and select peer metropolitan areas, 2001-17

Note: Totals include all traded industry clusters, including those otherwise excluded from the report.

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).



Taken together, metropolitan Chicago’s traded clusters shed more than 144,000 jobs (9.0 percent) during 2001-17.²⁹ Continued slow growth in the region’s traded clusters will limit the growth of our overall economy. By selling goods and services in other markets, these businesses bring new economic activity to the region and thereby fuel new job growth and industry demand in local clusters.

The figure below shows traded goods-producing and traded service clusters as a share of all private business activity in the region. The traded sectors have declined from 42.3 percent of regional jobs and 54.6 percent of real earnings in 2001 to 36.9 percent and 52.5 percent in 2017, respectively. This slow erosion has contributed heavily to the region’s lackluster growth over the past two decades.

Recent declines among traded clusters – particularly goods-producing clusters – have narrowed the region’s economic base.

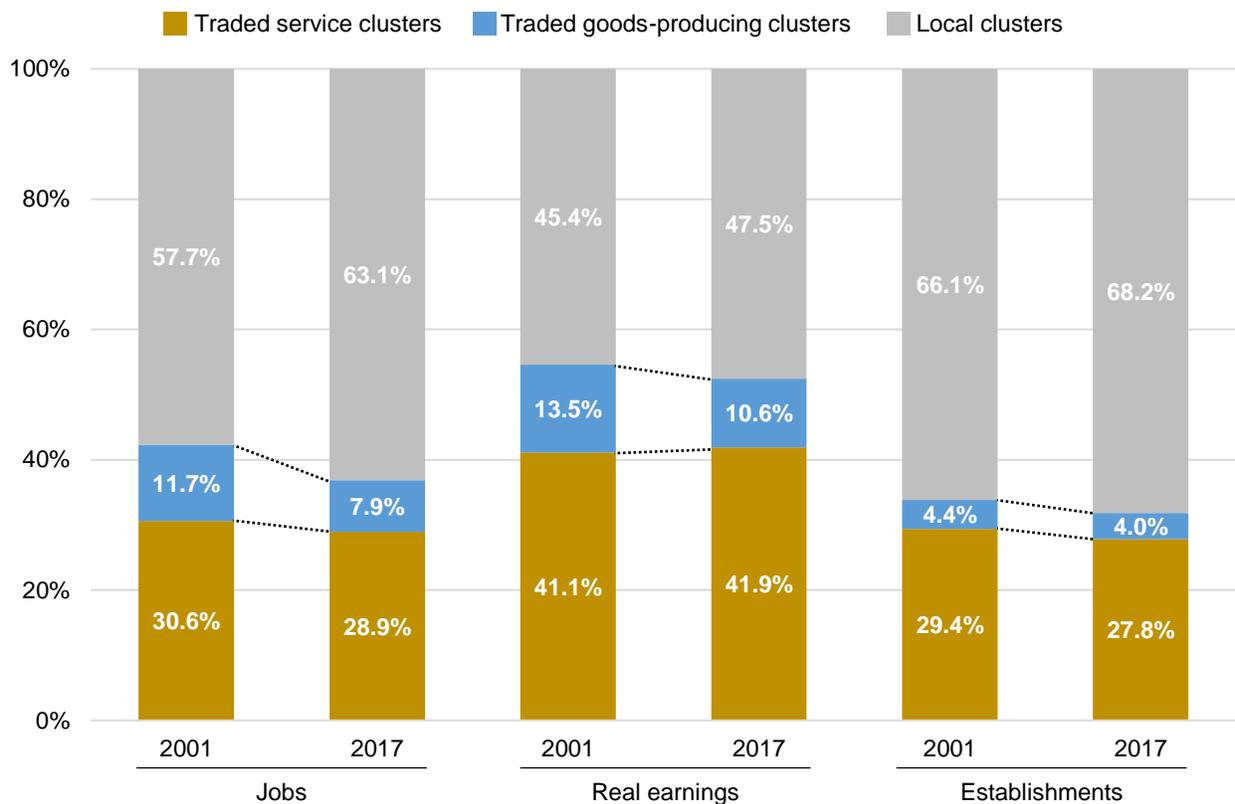


Figure 4: Local and traded sectors as a share of regional private business activity, 2001-17
 Note: Totals include all traded industry clusters, including those otherwise excluded from the report.
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

One telling trend is how job declines in manufacturing nationally are compounding metropolitan Chicago’s shift away from export-oriented industries. Deindustrialization and the transition to a more service-dominated economy was the defining U.S. economic narrative of the late 20th century. Today, goods-producing industries employ fewer people nationwide than in past decades, but remain a core driver of the Midwest’s economy.³⁰ Available data suggest



the U.S. has less than half the number of manufacturing jobs today as in 1975, and that manufacturing has declined sharply as a share of Chicago regional jobs – from roughly one-third of workers in 1975 to around 17 percent in 1990 to near 8 percent in 2017.³¹

Industrial restructuring is a dynamic process with multiple forces playing out at once. While the bulk of deindustrialization occurred in the 1980s-90s, metropolitan Chicago has continued to see job declines in recent years. The region’s goods-producing sector shed 129,000 jobs and more than \$4 billion in annual real earnings for workers during 2001-17.³² Its slow recoveries from recent recessions in 2001 and 2007-09 contributed to these longer-term trends. Several traded goods-producing clusters have struggled to shake off the effects of the 2007-09 recession in terms of employment, while the local and traded service sectors have largely recovered. Yet, even among traded service clusters, only Transportation and Logistics grew jobs at a greater rate than the national average between 2010-17. As metropolitan Chicago’s economic base evolves, many workers increasingly rely on local industries – those that primarily sell goods and services within the region – for their work, wages, and wellbeing.

Regional job growth has varied widely by sector and specialization, due in part to how different segments have responded to past economic recessions.

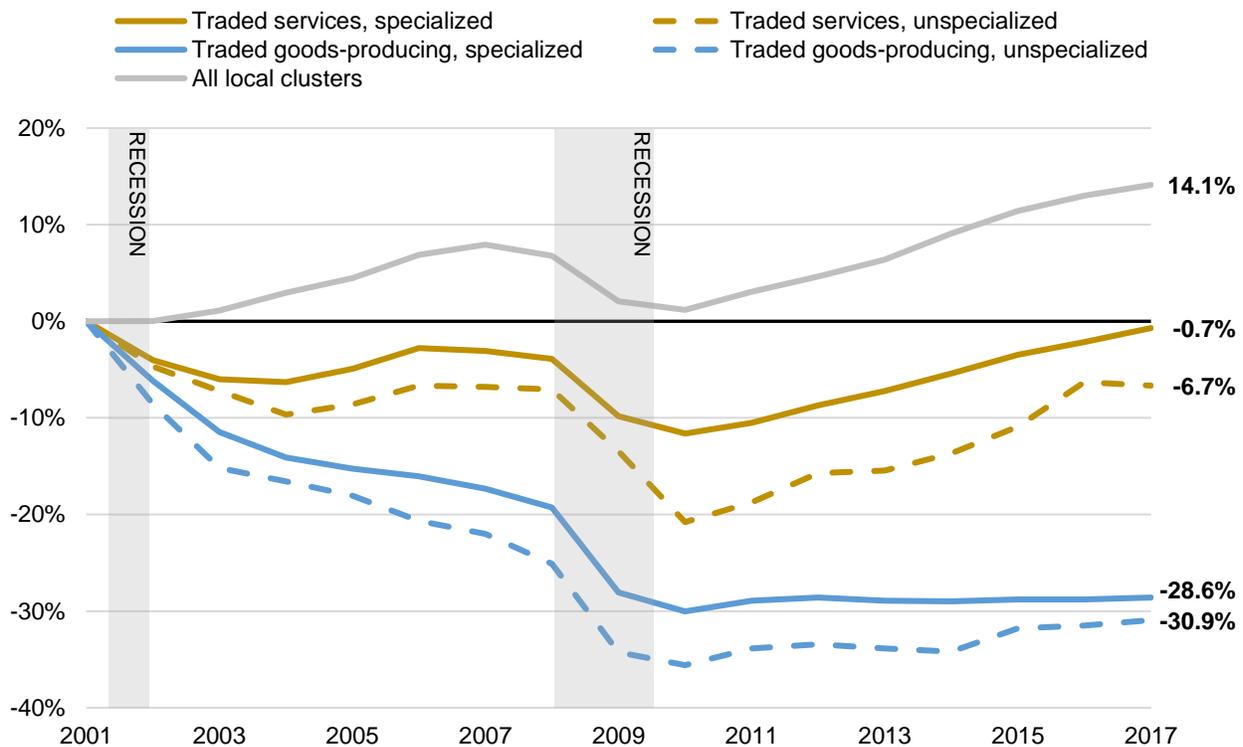


Figure 5: Cumulative change in Chicago regional employment in local and traded sectors, 2001-17
 Note: Specialization refers to employment concentration relative to the national average. Totals include all traded industry clusters, including those otherwise excluded from the report. Index year 2001.
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Trends in the goods-producing sector are partially obscured by aggregate data that confuse growth in specific segments for overall growth. Instead, employment and output trends have varied significantly across these clusters. During 2007-17, the region’s manufacturers shrank their workforce by 13.1 percent but grew total annual output by 15.0 percent and foreign exports by 27.4 percent.³³ On first blush, these trends might be attributed to technological change that augments or automates the productivity of human labor. However, all goods-producing clusters are not the same, and their performance has not been uniform. Just two clusters – Biopharmaceuticals and Food Processing – accounted for nearly three-quarters of the sector’s growth in total output from 2007-17, while experiencing essentially flat employment.³⁴ These clusters added a combined \$6.8 billion more to the region’s economy in 2017 than in 2007.

By comparison, the rest of the goods-producing sector did not regain its 2007 pre-recession peak in total output until mid-2016, nearly a decade later. This recent growth has been driven in large part by smaller, unspecialized clusters like Upstream Chemicals,³⁵ Computer Technology, and Automotive, in which the region has no apparent competitive advantage over peer regions. In other words, national trends rather than regional competitiveness likely drove much of this expanded output.³⁶ Ten other goods-producing clusters – including historical strengths in metals and machinery manufacturing – produced less in 2017 than they did a decade earlier.

Just two clusters – Biopharmaceuticals and Food Processing – accounted for three-quarters of the traded goods-producing sector’s growth during 2007-17.

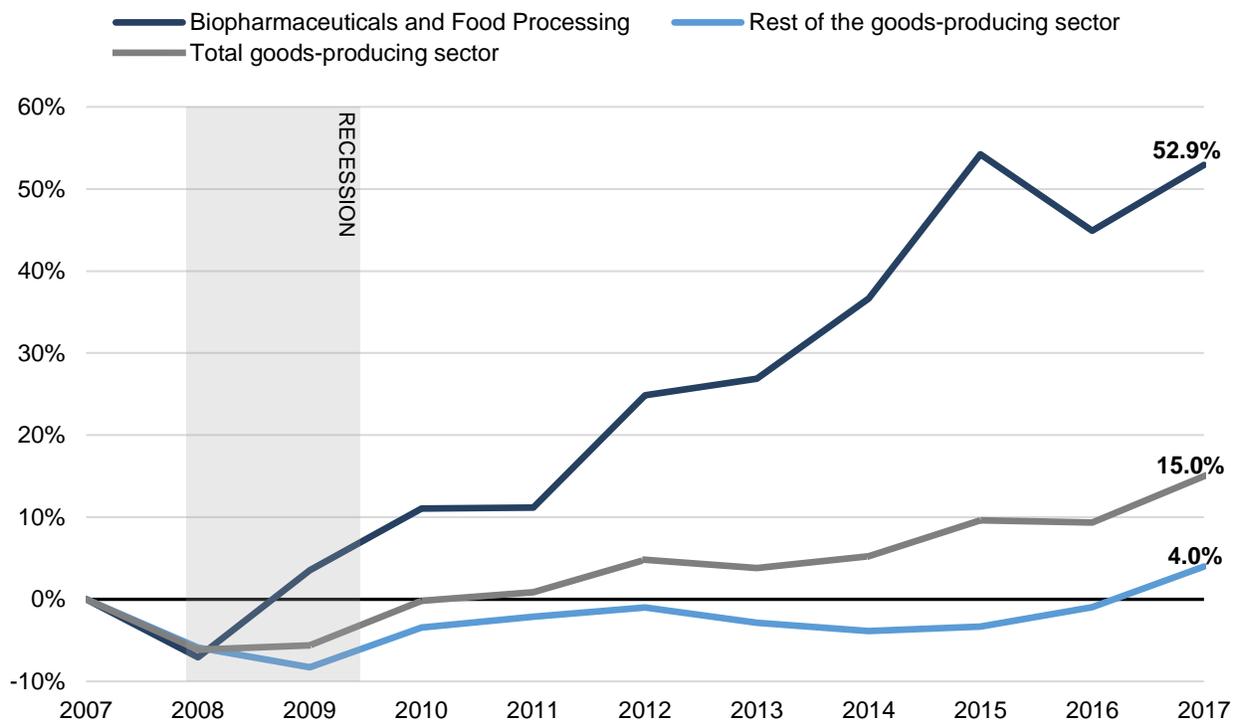


Figure 6: Cumulative change in real annual output in goods-producing clusters, 2007-17
 Note: Totals include all traded industry clusters, including those otherwise excluded from the report. Index year 2007.
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Some meta-issues help to explain these regional trends. Nationwide, manufacturers have outsourced headquarter or back-office support functions to growing professional and business services industries. As a result, part of the fall in production jobs can be attributed to the shifts of certain roles (for example, accounting jobs or building security) from one business to another and therefore from one classification to another in federal data sources.³⁷ Trade policies have also enabled some manufacturers to off-shore certain activities – especially lower-value production dependent on unskilled labor – to areas with lower labor costs like Southeast Asia and Latin America.³⁸ Finally, by temporarily slowing industry demand, the 2007-09 recession allowed many manufacturing businesses to further restructure their production models through cost-saving technologies, modern logistics services, and new business practices.³⁹ However, even after taking national deindustrialization into account, current data suggest that the competitive edge of some Chicago regional clusters is eroding relative to peer regions.

Clusters in which the Chicago region has no apparent competitive advantage expanded output due to national trends, while some historic strengths shrank.

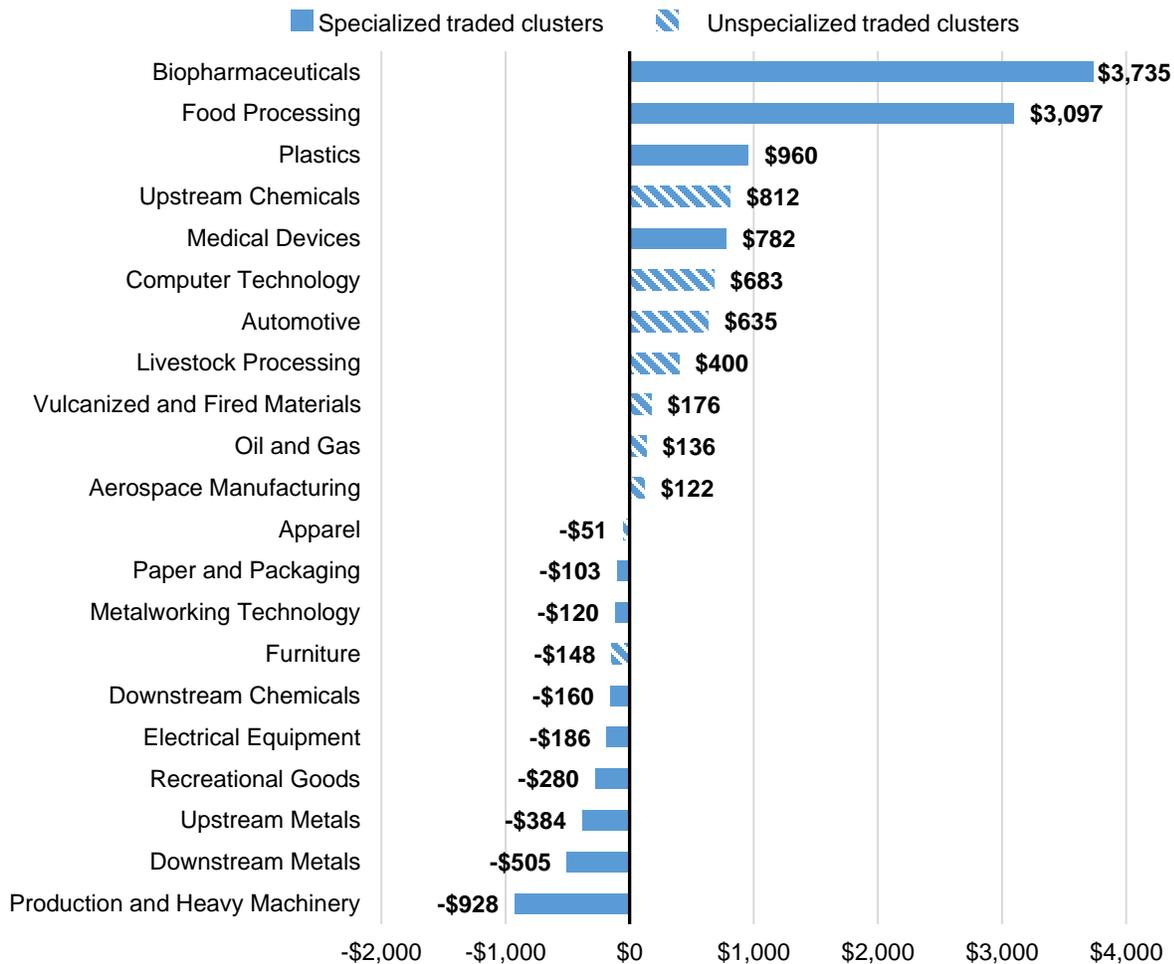


Figure 7: Change in real annual output in goods-producing clusters, 2007-17, in millions of 2012 dollars
 Note: Specialization refers to employment concentration relative to the national average.
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).



Employment change

Declining specializations and nearly flat production levels indicate that key Chicago regional clusters are out of line with national growth trends and have likely faced specific challenges. The makeup of the region's economy now more closely reflects both peer regions and national averages – creating a potential challenge for future growth. Differences between industry trends here and elsewhere in the U.S. help to illustrate our region's relative competitiveness in confronting these pressures. Persistent declines among metropolitan Chicago's specialized traded clusters signal that the region is losing ground as growth occurs in other parts of the U.S. like Dallas, Houston, Atlanta, and other, smaller regions.⁴⁰

Many factors, such as changes in trade and business practices, production technologies, staffing patterns, and industry demand, contribute to industry trends both nationally and regionally. Similar clusters in separate metropolitan economies may adjust to these pressures differently, and small and medium-sized businesses in particular may need technical assistance to deal with these changes. However, over time, most businesses will adopt and adapt national best practices that enhance their market position. Cluster analysis therefore looks at how well the Chicago region competes in aggregate, rather than tracing the story of any single business or industry. The following chart provides a snapshot of these changes by combining three metrics:

- **Location quotient** (along the vertical axis) signifies how specialized a cluster is within the region. Clusters above the horizontal axis have higher employment concentrations in the region than the national average and are considered economic strengths.
- **Employment change** (along the horizontal axis) captures the extent to which each cluster expanded or contracted total jobs between 2001-17. Clusters to the right of the vertical axis grew jobs.
- **Total jobs** (size of bubble) reveals the relative number of people employed in each cluster as of 2017.

Together with other indicators, this figure provides initial, high-level insights on how these industries have performed in light of recent trends. Some clusters – primarily large service clusters – have expanded employment in recent years by drawing on the region's position as the preeminent North American freight hub and as a major center for high-skill, high-wage professionals. However, long-term pressures have driven steep job declines in many others, including nearly all goods-producing clusters.⁴¹



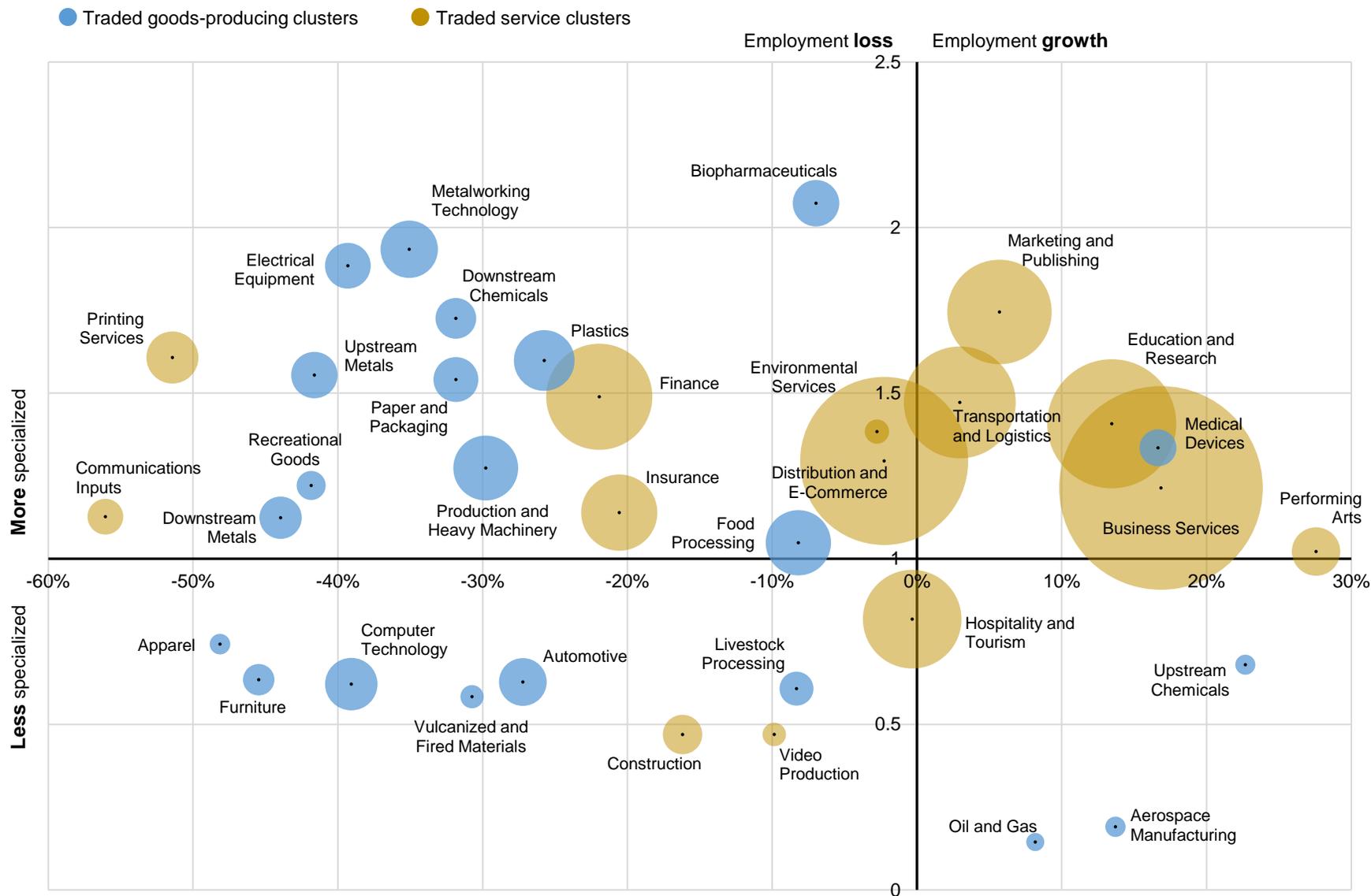


Figure 8: Regional employment change and location quotient in traded clusters, 2001-17

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Note: Size signifies the relative number of people employed as of 2017. A location quotient is the ratio of a cluster's regional employment concentration relative to the national average.

The specific forces driving trends in different clusters vary widely based on their unique operating conditions. They reflect the cumulative impacts of cyclical, structural, and policy-related factors, as well as how market forces effect different industries across different regions. However, recurring patterns – even those in line with national trends – show that the Chicago region’s economic base is narrowing, with serious implications for opportunity, infrastructure and land use planning, and other public concerns. The chart below presents one cross-section of the data on employment change. Sixteen specialized traded clusters dropped a total of 170,000 jobs during 2001-17, while five gained a combined 71,000 jobs. Only Medical Devices grew employment among goods-producing clusters, and these gains accounted for only 1,500 new jobs (2 percent). Taken together, the Chicago region’s nationally and globally competitive industries employ fewer workers than they once did.

Most specialized traded clusters – including all but one specialized goods-producing cluster – shed employment between 2001-17.

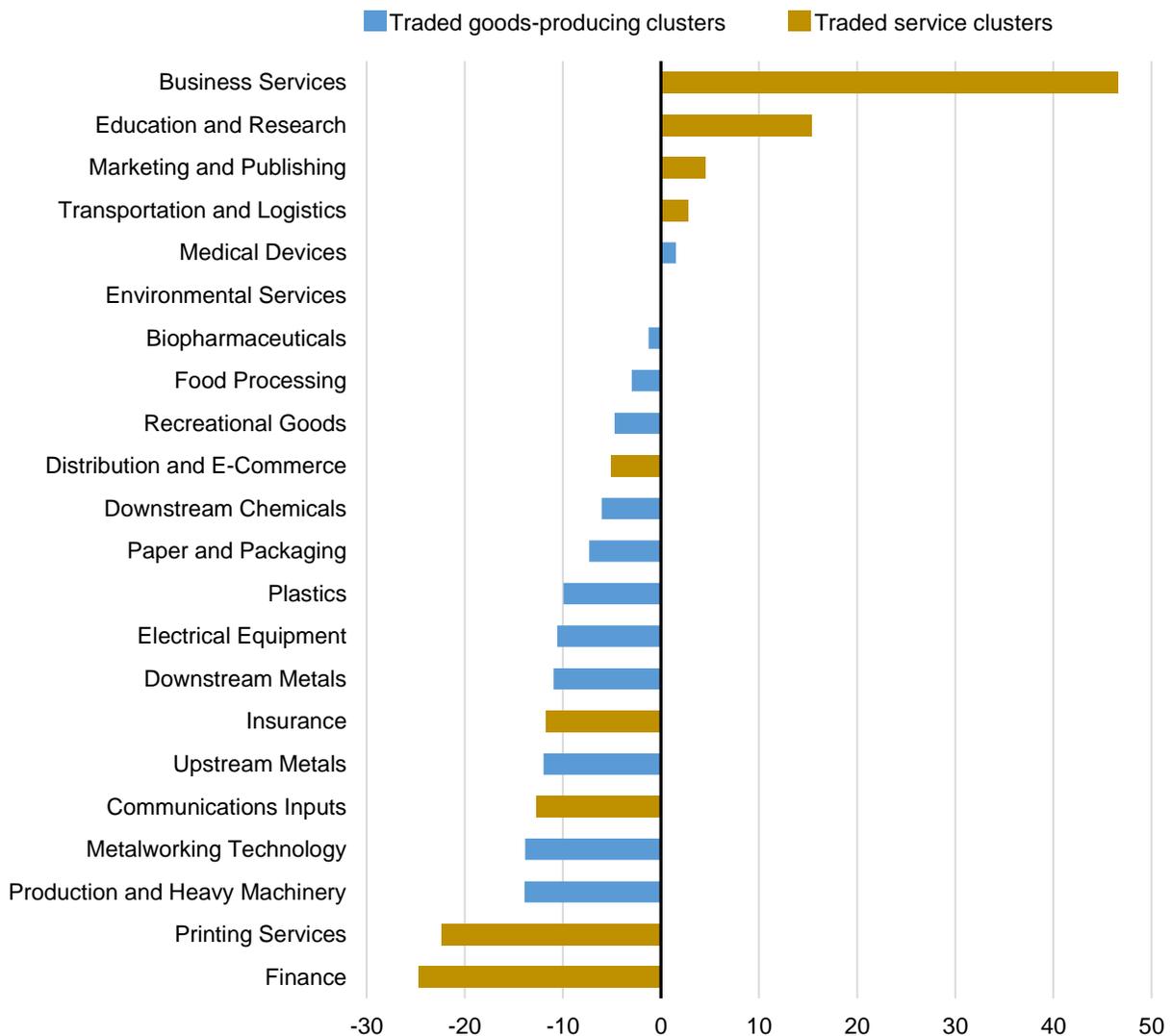


Figure 9: Total Chicago regional jobs change, 2001-17, in thousands
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Leading, mixed, and trailing clusters

A cluster’s location quotient changes depending on how its employment grows or declines over time relative to the U.S. economy overall. The table below and the following chart provide another way to visualize each cluster’s recent performance, by comparing its location quotient in 2001 and 2017. In the chart, clusters plotted above the diagonal, dotted line have grown faster – or shrank slower – in metropolitan Chicago than elsewhere in the nation. As a result, their location quotient has increased. In contrast, clusters below the line have not kept pace with national trends, and their location quotients have declined. The extent of these shifts is reflected in how closely clusters follow the diagonal, dotted line. The table below summarizes these results and assesses clusters’ performances since 2001 as *leading*, *mixed*, or *trailing*. Broadly, among specialized clusters, those that follow national trends – for example, by successfully adapting to new production techniques or slowed aggregate demand – are less concerning than those that demonstrate eroding competitiveness.

Only three leading clusters grew regional employment ahead of the national average during 2001-17, so that their location quotients increased: Medical Devices, Paper and Packaging, and Transportation and Logistics. Several mixed clusters have held location quotient declines to between 0 and -10 percent, including the region’s largest (Business Services) and most specialized (Biopharmaceuticals) traded clusters. Although some mixed clusters have added jobs year over year, none have quite kept pace with national trends. Like nearly all industries, leading and mixed clusters have faced substantial market shifts over the past two decades, and their continued specialization indicates a steady or even strengthening competitive advantage.

Leading	Mixed	Trailing	Unspecialized
Job changes exceed the U.S. average, increases in location quotient of 10 percent or more	Job changes similar to U.S. trends, location quotient changes between -10 and +10 percent	Job changes lag behind the U.S. average, declines in location quotient of 10 percent or more	Location quotient below 1.05 in 2017, regional employment is at or below the national average
Medical Devices Paper and Packaging Transportation and Logistics	Biopharmaceuticals Business Services Communications Inputs Environmental Services Marketing and Publishing Plastics Production and Heavy Machinery Recreational Goods	Distribution and E-Commerce Downstream Chemicals Downstream Metals Education and Research Finance Food Processing Insurance Electrical Equipment Metalworking Technology Printing Services Upstream Metals	Aerospace Manufacturing Apparel Automotive Construction Furniture Hospitality and Tourism Computer Technology Livestock Processing Oil and Gas Performing Arts Upstream Chemicals Video Production Vulcanized and Fired Materials

Figure 10: Relative performance of metropolitan Chicago’s traded industry clusters since 2001

Note: Thresholds reflect that on average, Chicago regional traded clusters’ location quotients can change ± 6 percent annually.
Source: Chicago Metropolitan Agency for Planning Analysis of Economic Modeling Specialist International data (Emsi 2018.4).



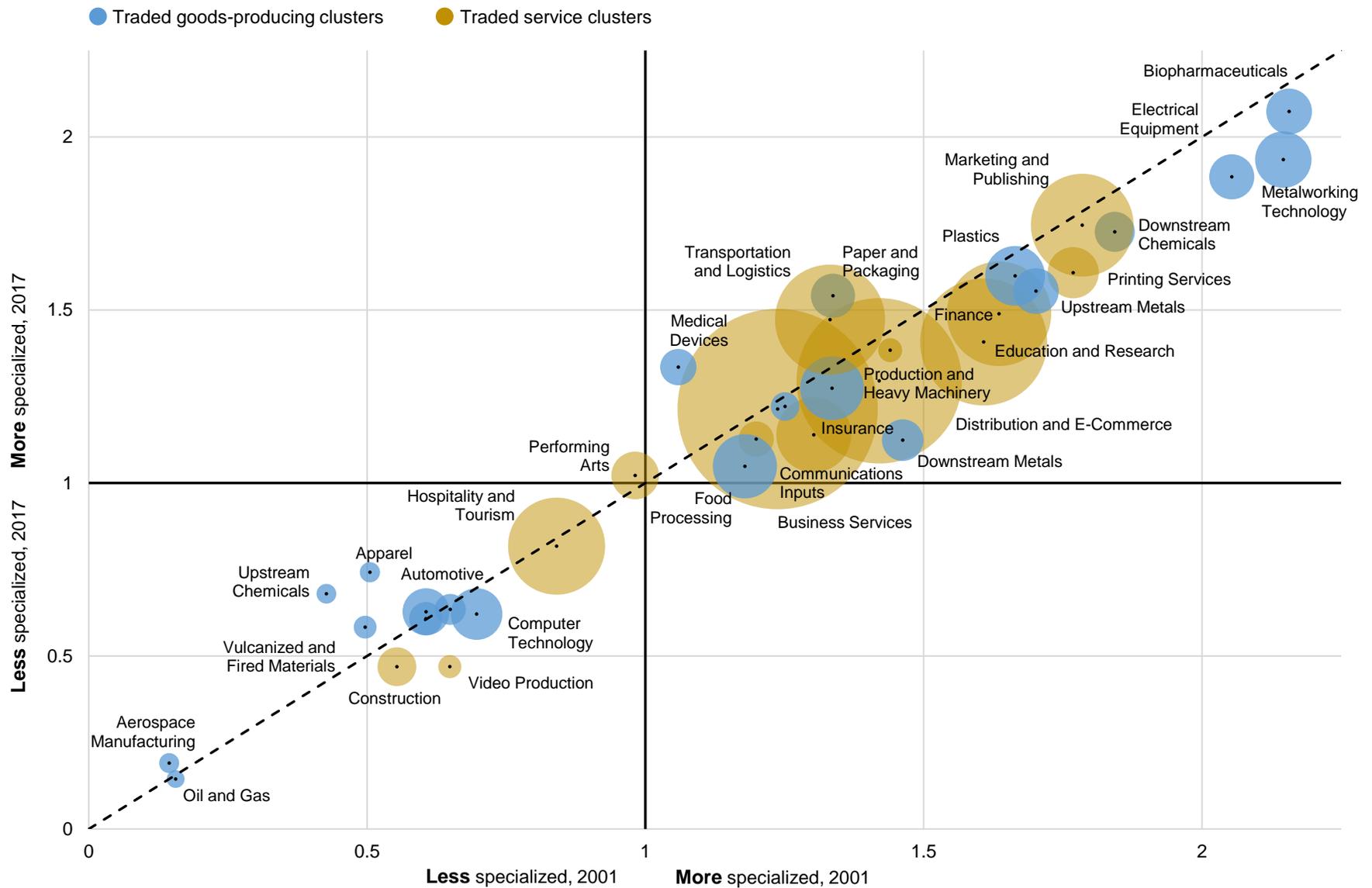


Figure 11: Location quotient change in Chicago regional traded clusters, 2001-17

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Note: Size signifies the relative number of people employed as of 2017. A location quotient is the ratio of a cluster's regional employment concentration relative to the national average.

In contrast, the Chicago region's trailing clusters include many historical industrial assets and sources of employment for middle-skill workers seeking upward economic mobility. Taken together, they shed more than 104,000 jobs (14.4 percent) during 2001-17 in fields as diverse as heavy and advanced manufacturing, Finance, and Insurance.⁴² The remaining 623,000 jobs in trailing clusters make up 13.9 percent of regional employment and include many of the jobs most supportive and accessible to workers without a bachelor's degree. Continued erosion in these clusters will therefore undermine future regional prosperity. However, despite these setbacks, trailing clusters can support renewed growth. For instance, while Metalworking Technology dropped more than a third of its jobs between 2001-17, the cluster still has nearly twice as many workers as the U.S. average – suggesting that the region maintains deep assets and expertise.⁴³

Comparing these trends to peer regions demonstrates both common and unique issues in developing smart economic and industrial policy. The following charts provide the same assessment of traded clusters in the New York, Los Angeles, and Houston metropolitan areas during 2001-17. Each region is more heavily reliant than metropolitan Chicago on specific clusters to power its economy: Finance as well as Marketing and Publishing in New York; Performing Arts and Aerospace Manufacturing in Los Angeles; Oil and Gas in Houston.

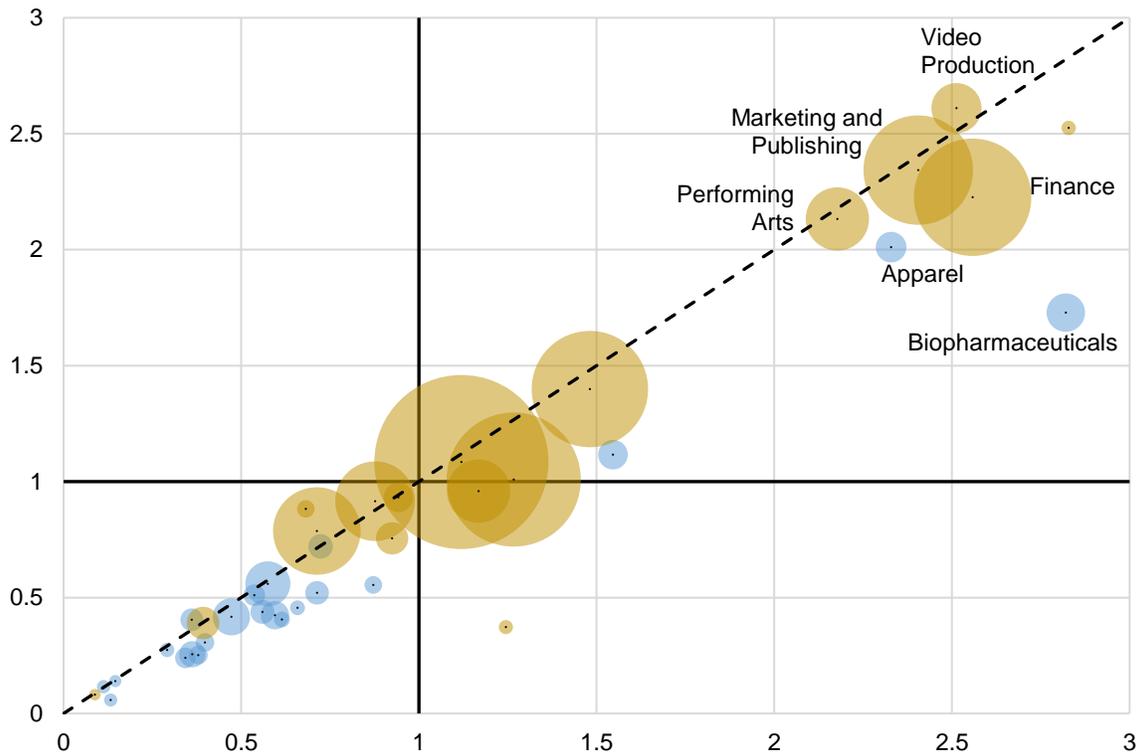
The strength of peer regions' dominant clusters is undeniable; landmarks like Wall Street and Hollywood have become synonymous with these industries internationally. The continued success of these select clusters can buoy regions' economic growth and buffer them from certain macro-issues in the U.S. economy. However, dependence on a narrowing industrial base can also expose regions to particular market volatilities or the cascading impacts of decisions made by just a few firms. For example, Los Angeles' Aerospace Manufacturing cluster – a field notorious for sudden downturns and feast-or-famine contracts – shed one-third of its jobs during 2001-17, amid slowdowns in federal government contracts.⁴⁴

Moreover, widespread declines in location quotients across all three peer regions indicate that the largest U.S. metropolitan economies are experiencing employment shifts at rates faster than the nation overall. Public officials and industry leaders nationwide need to remake economic development to sustain broad prosperity and growth.⁴⁵ Doing so means supporting specialized traded clusters to compete in light of future challenges like a potential high-tariff environment or continued trends in technological change, outsourcing, and off-shoring.

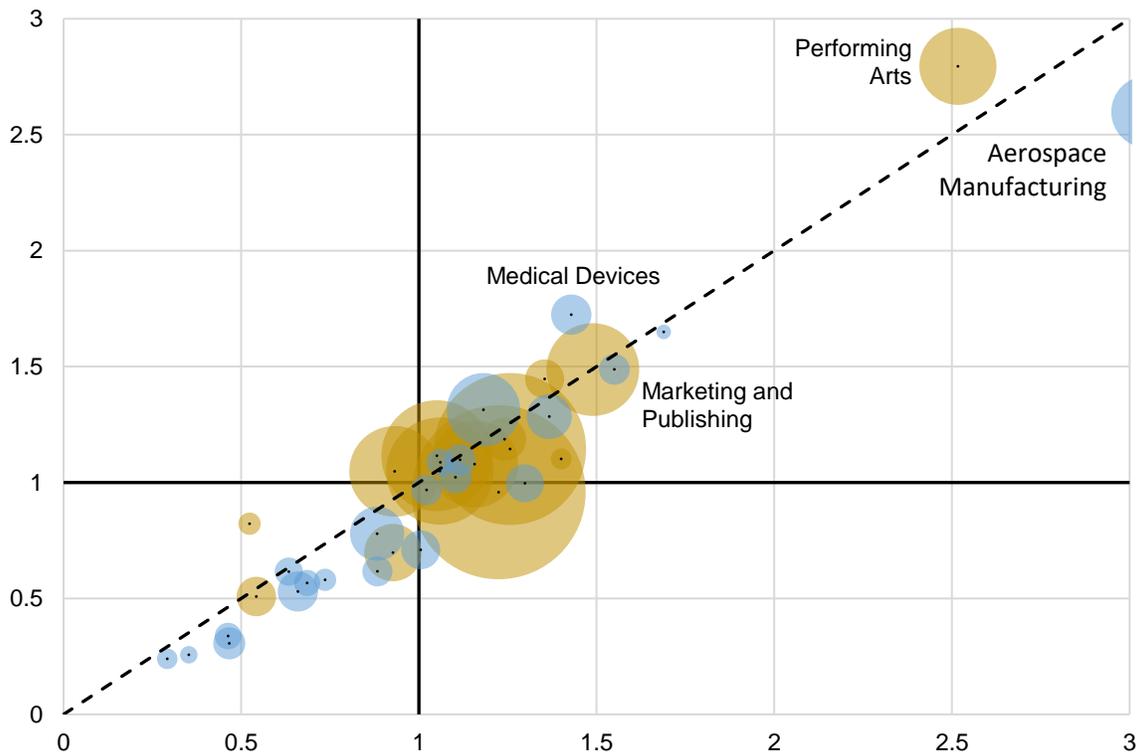
These patterns underscore why metropolitan Chicago should develop regional economic and industrial policy that addresses and strengthens the full breadth of its traded clusters. By all accounts, metropolitan Chicago has many opportunities to re-specialize industrially – by leveraging recent innovations in data science and the Internet of Things⁴⁶ or emerging energy storage, biomedical, and transportation technologies. Each depends on preserving our existing assets and advantages.



New York's narrowing economic base relies heavily on key service clusters, as only one specialized cluster has outperformed the national average since 2001.



Los Angeles more closely resembles the Chicago region's diverse industry mix and has encountered similar competitive setbacks in the national context.



Although Houston has fewer specialized clusters, it remains the hub of Oil and Gas activity in the U.S. and has seen important gains in other clusters.

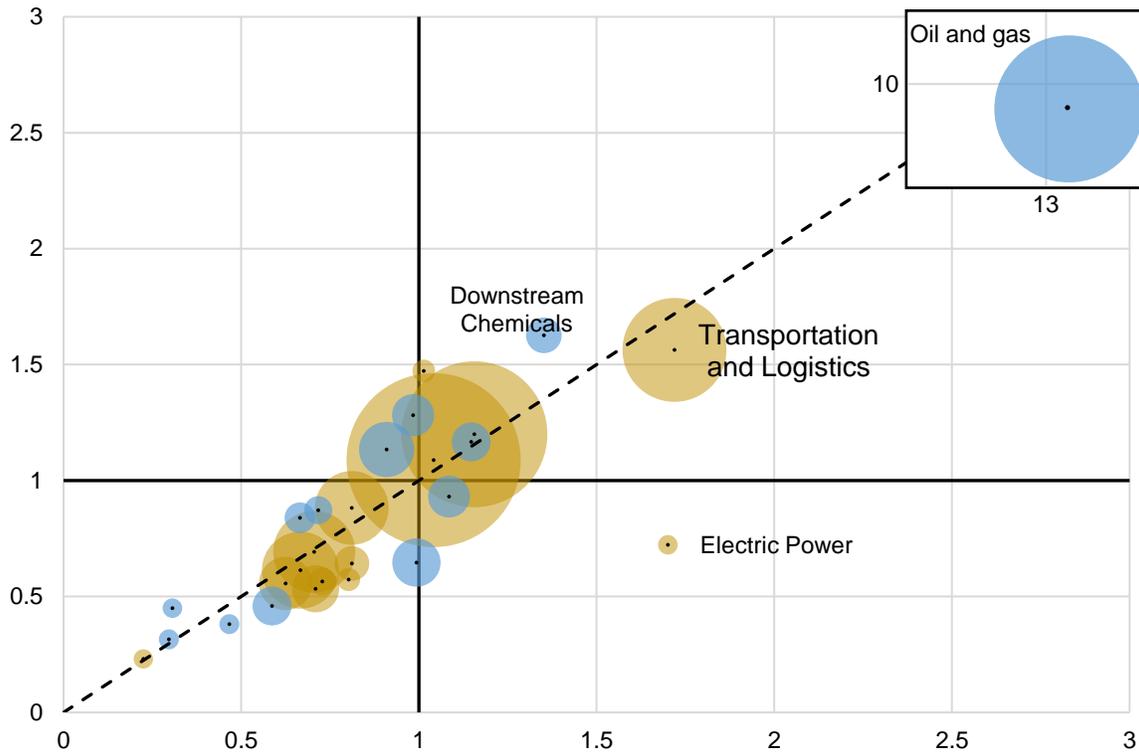
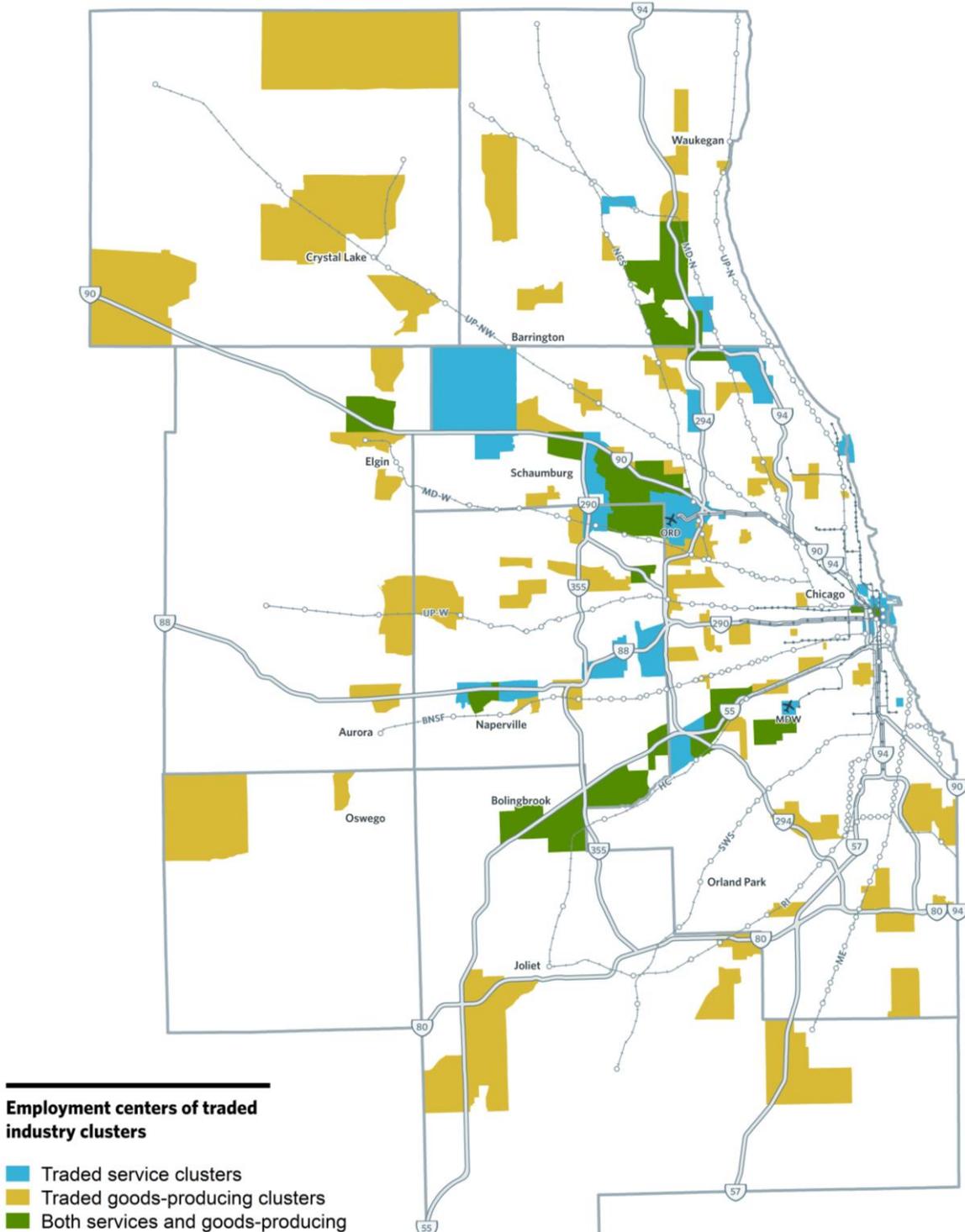


Figure 12: Location quotient change in New York, Los Angeles, and Houston metropolitan area traded clusters, 2001-17
 Note: Size signifies the cluster's relative employment in 2017. A location quotient is the ratio of a cluster's regional employment concentration relative to the national average.
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Traded clusters are inherently regional, appearing in communities across the Chicago region and drawing on assets that span jurisdictional boundaries.



Note: Concentrations are census tracts with cluster employment at least one standard deviation above the regional average.
 Source: Chicago Metropolitan Agency for Planning analysis of Illinois Department of Employment Security data, 2017.



People and skills build robust clusters

Industries choose to invest and operate in metropolitan Chicago in part to access the skills and ingenuity of the region's workers. Yet, accelerating shifts in technology, industry demand, and global trade are changing how individuals and businesses relate to each other in the labor market. Enhancing this relationship – between workers seeking to build a career and employers looking to build their workforce – is crucial to sustaining the region's competitiveness. This section looks at who works in specialized traded clusters, as well as recurring patterns in their skills, wages, and economic mobility.

A mounting body of research now shows that two essential economic goals – expanding opportunity and improving growth – are inextricably linked.⁴⁷ In metropolitan Chicago, only one in five Hispanic adults has achieved an associate's degree or higher, and a black household typically earns just \$47.28 for every \$100 in income that a white household earns.⁴⁸ To restart robust growth, the region needs to both meet industries' evolving skills demand and provide pathways for all residents to participate in building strong regional industries. Doing so will mean changing old practices. Business development leaders have long recognized the role of skills and workforce issues in regional growth, while historically keeping concerns of racial and economic inequality at arm's length. Given recent trends, regional leaders are increasingly developing strategies to ensure every resident can contribute to and benefit from the economy.⁴⁹

The forces driving inequality are complex, but many stem from differences in the opportunities workers can access in the regional labor market. Specialized traded clusters support greater labor productivity, wages, benefits, and career advancement than local industries for workers with all levels of education and training.⁵⁰ Yet, metropolitan Chicago's economic strengths are interlaced with a history of discrimination and disinvestment that underpin broader inequities among workers, businesses, and communities.

People of color, women, and workers without a bachelor's degree face higher barriers to obtaining jobs that support economic mobility. The figure below shows that over half of the region's white workers (53.1 percent) are employed in traded clusters, compared with just 39.4 percent of black workers. Hispanic workers fare somewhat better (48.9 percent), but a substantial share (16 percent) work in unspecialized clusters that do not make up the region's core strengths. Previous research has also shown that white residents have a disproportionate hold on regional firm management and ownership, particularly in manufacturing industries.⁵¹ These trends reflect the combined effects of industry-specific factors and broader racial inequities, such as longer commutes,⁵² lower educational attainment rates,⁵³ separate business networks,⁵⁴ and gaps in perceptions of manufacturing careers.⁵⁵



Metropolitan Chicago’s core industries – those in specialized traded clusters – employ a smaller share of the region’s black and Hispanic workers.

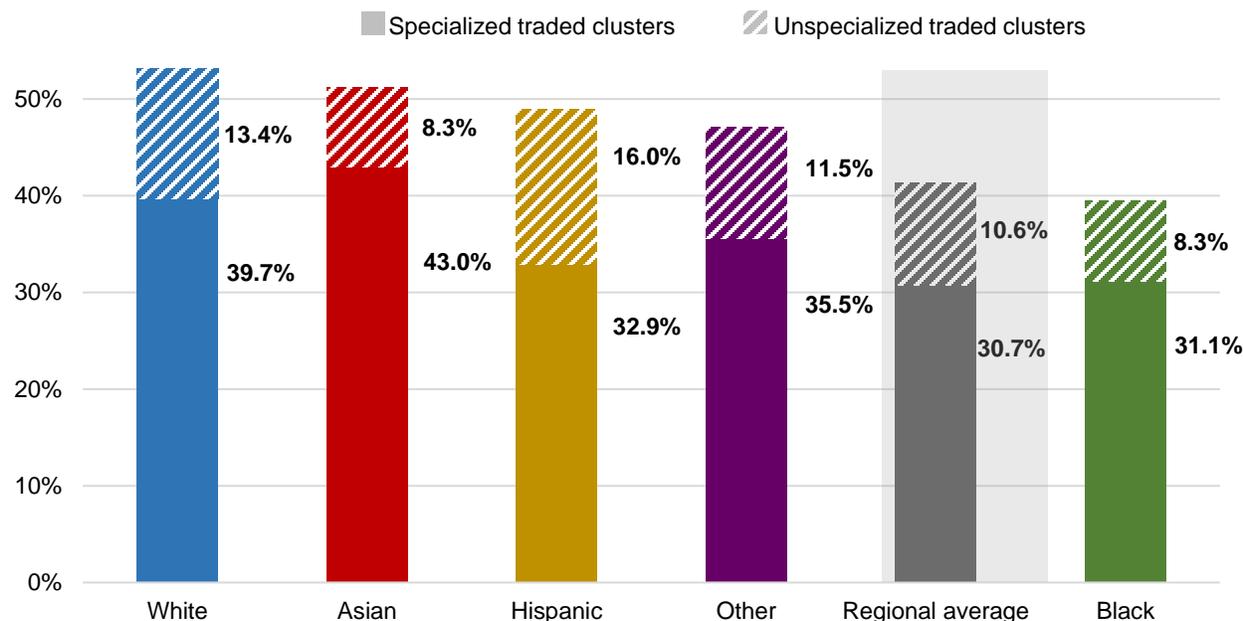


Figure 14: Share of regional workforce employed in traded clusters by race and ethnicity, 2017

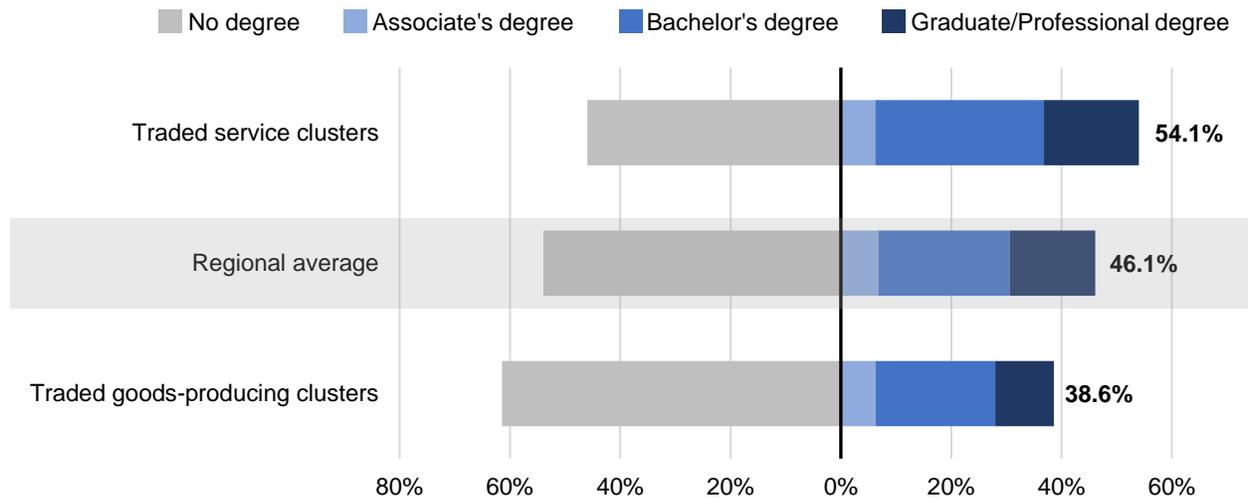
Notes: Specialization refers to employment concentration relative to the national average. Estimates include only employees working 20 hours per week or more.

Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Finding work in metropolitan Chicago has also been getting more difficult for middle-skill workers and those without a college degree. Prior analysis shows that regional job gains since 1980 have concentrated in lower-skill (e.g., personal services or food preparation) or higher-skill occupations (management and professional roles).⁵⁶ As a result, the share of workers employed in middle-skill, middle-wage work has fallen both regionally and nationally. While not unique, these patterns are starker in the Chicago region because of its historical industrial mix and persistent declines in production jobs.⁵⁷ Traded goods-producing clusters are less reliant on workers with at least an associate degree (38.6 percent) than traded service clusters (54.1 percent), but manufacturers shed 29.2 percent of jobs during 2001-17 – compared with 1.3 percent job declines in the service sector.⁵⁸

Recent industry shifts are interacting with existing socioeconomic disparities to further restrict access to high-quality employment, undermining efforts to achieve more inclusive growth. In an era of global commerce, fewer residents are employed in nationally and globally competitive industries, which can offer workers better opportunities. Other segments of the economy can also provide pathways for upward economic mobility, such as local business ownership or a career in healthcare. Yet, to increase all workers’ access to good jobs, the region needs to change our economic trajectory and sustain traded clusters’ growth and specialization. Decoding the barriers to pursuing these careers depends on first identifying who currently fills them.

Recent industry shifts continue to provide new opportunities for workers with a bachelor's degree, while labor demand for those without a degree is shrinking.



Employment trends among traded clusters reflect the existing disparities in who can access and afford higher education, particularly for people of color.

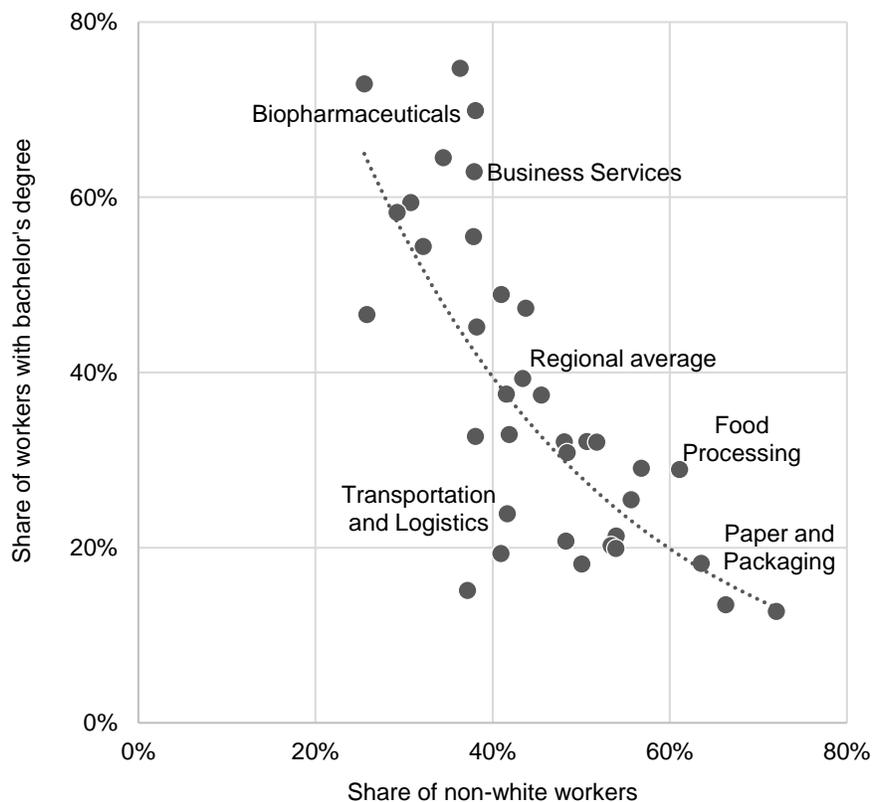


Figure 15: Educational attainment by sector and compared to non-white workers, 2017

Note: Sector totals include all traded industry clusters, including those otherwise excluded from the report. Estimates include only employees working 20 hours per week or more.
 Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Race and ethnicity

Another cross-section of this data shows the diversity of workers within each cluster. Taken together, metropolitan Chicago's traded clusters tend to employ higher rates of whites than the region's economy as a whole. In 2017 black workers made up 16.5 percent of the regional population and 15 percent of the workforce, but they filled only 10.9 percent of jobs in traded clusters.⁵⁹ These patterns show how the structure of the region's economy – the mix and performance of industries here – affect outcomes for different workers and communities. For instance, Asian workers are four times more likely than black workers to be employed in Biopharmaceuticals – one of the region's most specialized and highest paying clusters.⁶⁰

Levels of racial and ethnic diversity vary widely among traded clusters. As shown in the figure below, non-white workers represent 63.6 percent of the Paper and Packaging workforce, compared with just 25.5 percent of Marketing and Publishing. In total, seven clusters – a mix of commodities and advanced manufacturers – employ a majority people of color. Eleven clusters employ a greater share of non-white workers than the regional workforce overall (43.3 percent).

As a result, the performance of specific clusters can have disproportionate effects on different communities. Every traded cluster that employs a higher share of minority workers than the region overall lost jobs during 2001-17. Moreover, nearly one-third of all regional Hispanic workers (32.0 percent) are employed in a traded cluster with declining job counts, in part because they are twice as likely to work in a goods-producing or unspecialized cluster.

To remain competitive, regional leaders need to address the twin forces of rising racial diversity and the persistent exclusion of non-whites from a skilled workforce. Metropolitan Chicago limits its own economic growth when it fails to mobilize the full human capital of its residents. Talent pools that reflect the region's diversity spur growth both by developing more innovative ideas and by implementing those ideas more readily.⁶¹ Yet, research shows that even high-aptitude students from lower income and diverse backgrounds struggle to participate in innovation and invention.⁶² The Federal Reserve Bank of Cleveland has also found that minority-owned businesses receive fewer, smaller, and more expensive loans than other businesses,⁶³ even though higher levels of minority entrepreneurship, racial inclusion, and income equality drive regional productivity.⁶⁴ In positioning clusters to succeed, business leaders increasingly see racial equity as a source of competitive advantage as well as social and economic progress.⁶⁵



Racial and ethnic diversity varies widely among traded clusters, so key industry trends can contribute to racial disparities in employment outcomes.

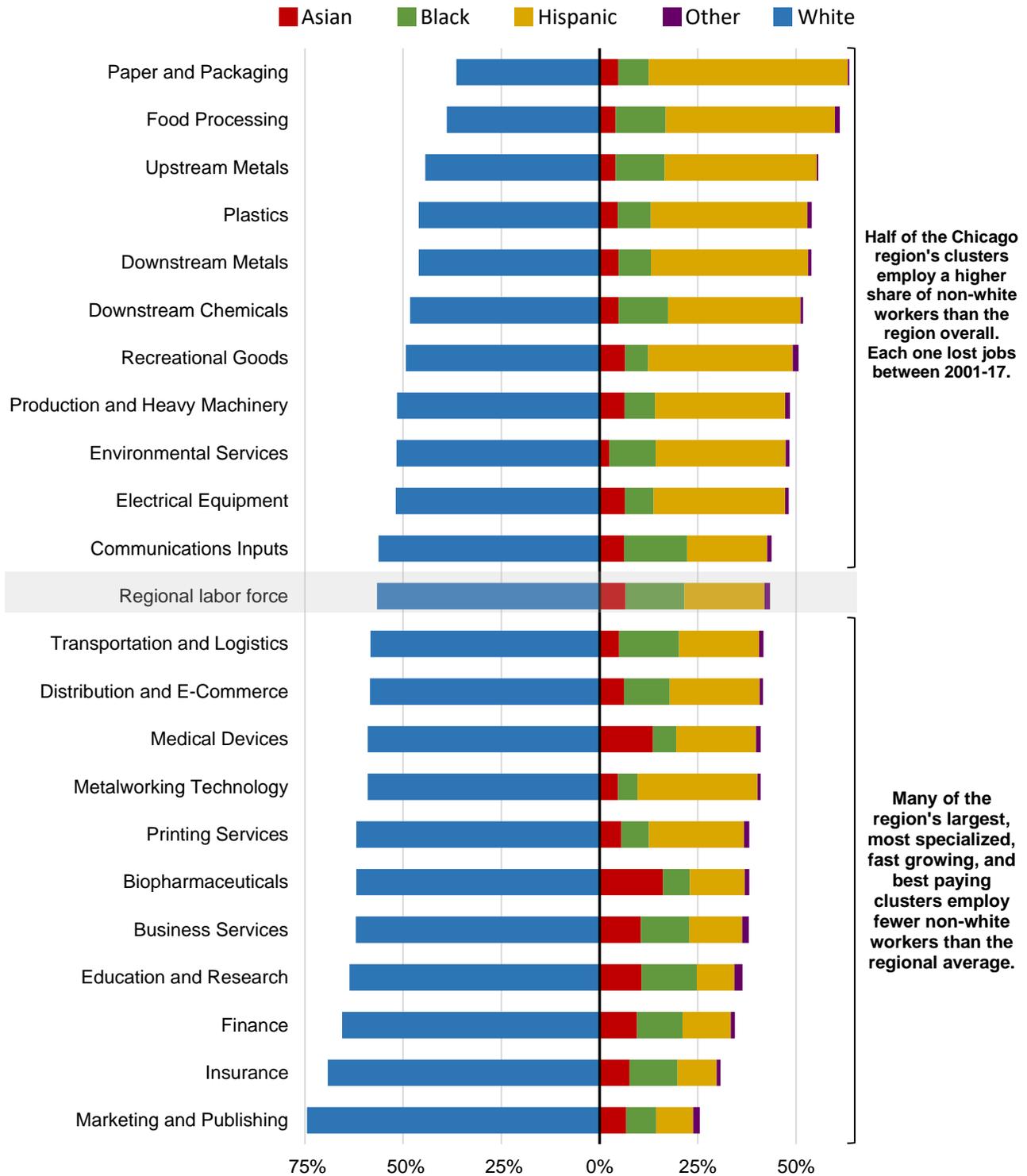


Figure 16: Share of regional employment by race and ethnicity, 2017

Note: Estimates include only employees working 20 hours per week or more.

Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.



Gender and age

Cluster analysis reveals other important differences in the types of jobs and opportunity available to individuals in the labor market. Taken together, traded clusters remain heavily male-dominated, and women – particularly those without a bachelor's degree – may see fewer pathways to enter and progress through these industries. Women make up 52.6 percent of the regional workforce but only 37.0 percent of workers in traded clusters. Just three clusters employ majority female workers, including Insurance, Education and Research, and Marketing and Publishing. Higher levels of female employment in high-skill, high-wage industries reflect national trends as women obtain post-secondary degrees at increasingly higher rates than men. According to the National Center for Education Statistics, women accounted for more than 56 percent of U.S. undergraduate students in 2017.⁶⁶

However, deep gender differences persist across other industries, particularly those that tend not to require a bachelor's degree. For example, women account for just one in five metals manufacturing workers, when these industries offer more career opportunities for workers without a bachelor's degree.⁶⁷ These and other traded clusters would offer women better pathways to upward economic mobility than the region's economy overall. Instead, women are more likely to work in government and industries geared toward meeting local demand for retail, healthcare and personal services, and leisure.⁶⁸

Barriers that prevent women from accessing better jobs also have disproportionate effects in perpetuating inequality and undermining policies to alleviate poverty. In 2017, 22.7 percent of U.S. children lived in households led by a single mother, and improving career opportunities and supports for women generally remains a top priority among social programs.⁶⁹ At the same time, these data do not show gender pay gaps within industries or further disparities in the workplace due to occupation concentrations, job satisfaction, or other measures of job quality.⁷⁰ In addressing industry-specific workforce issues, employers need to build equitable workplaces and improve women's access to career information, training, and job opportunities.



Women – particularly those without a bachelor's degree – may see fewer career pathways in traded clusters that employ a predominantly male workforce.

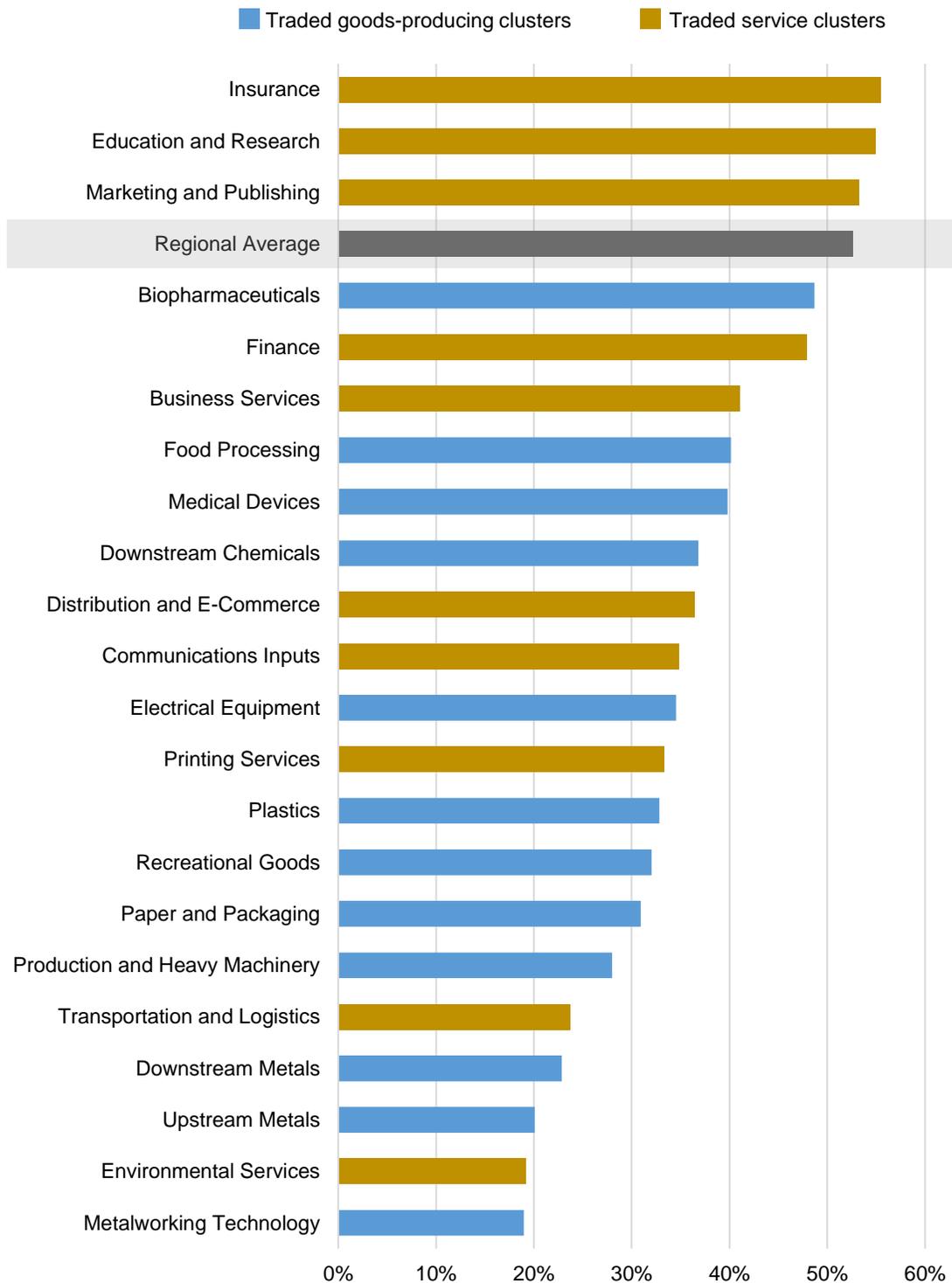


Figure 17: Female workers as a share of regional employment, 2017

Note: Estimates include only employees working 20 hours per week or more.

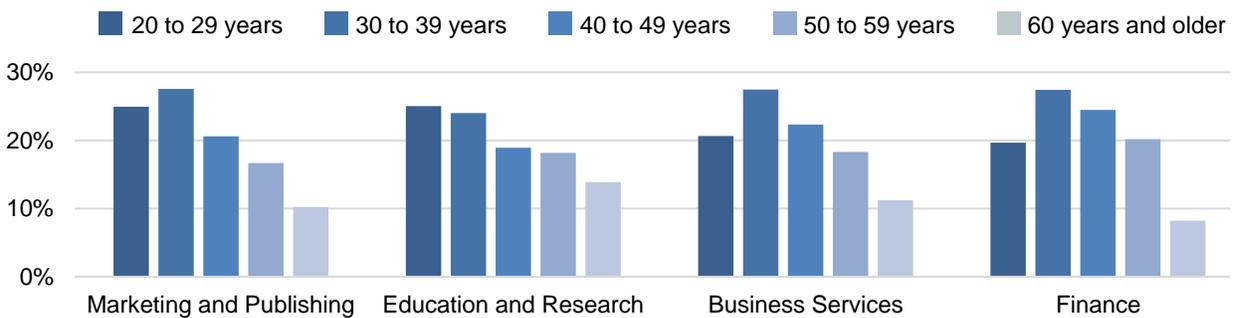
Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.



Metropolitan Chicago’s labor force is also aging as the population changes and people work later in life due to lifestyle choices, socioeconomic factors, and financial needs.⁷¹ Perceptions of the job quality and opportunities in different industries have also reshaped which career paths younger workers are pursuing.⁷² The implications for workforce planning vary by cluster. For instance, older workers are often highly trained and expensive to replace, but employers may need to adapt work arrangements or occupational health and safety to better accommodate them.⁷³ Delayed retirements can also slow career prospects for younger workers and require employers to reconsider how they train, compensate, and mentor the next generation.

Population growth is both a condition and a consequence of better economic opportunity.⁷⁴ One common concern is the potential for labor shortages in specific clusters if employers simply lack enough qualified replacements for aging workers. Manufacturing and freight firms in particular rely on older workers to meet operating demands.⁷⁵ Historically, these clusters also anchored middle-skill, middle-wage communities on Chicago’s South and West Sides and in nearby suburbs.⁷⁶ Recent trends deepen concerns that shrinking, aging workforces in goods-producing clusters could worsen existing population loss and disinvestment in some local communities.⁷⁷ Instead, clusters may need to pursue joint, employer-driven solutions to retain and retrain older workers while finding alternative ways to recruit and retain a skilled labor pool regionally.

Taken together, nearly half (47.1 percent) of workers in traded service clusters are ages 20-39 years...



While goods-producing clusters employ more workers over age 50 than under age 40 – including some with as many workers in their 60s as those in their 20s.

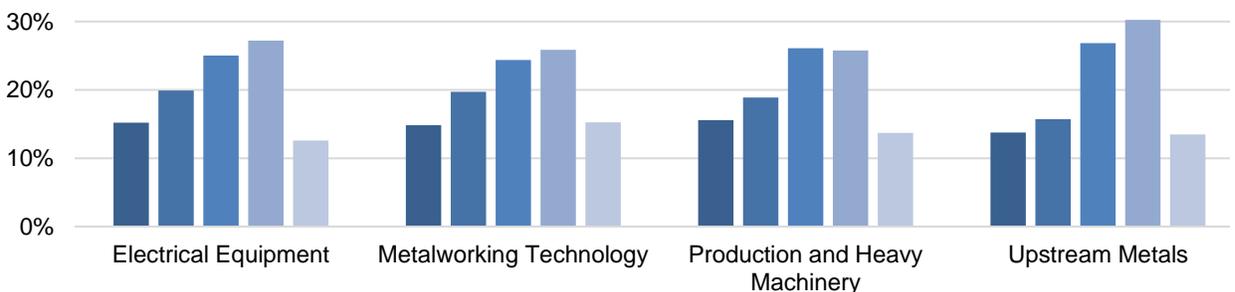


Figure 18: Share of regional employment in select traded clusters by age, 2017

Note: Estimates include only employees working 20 hours per week or more.

Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.



While the traded goods-producing and service sectors each have demographic patterns, age structures within them vary substantially among clusters.

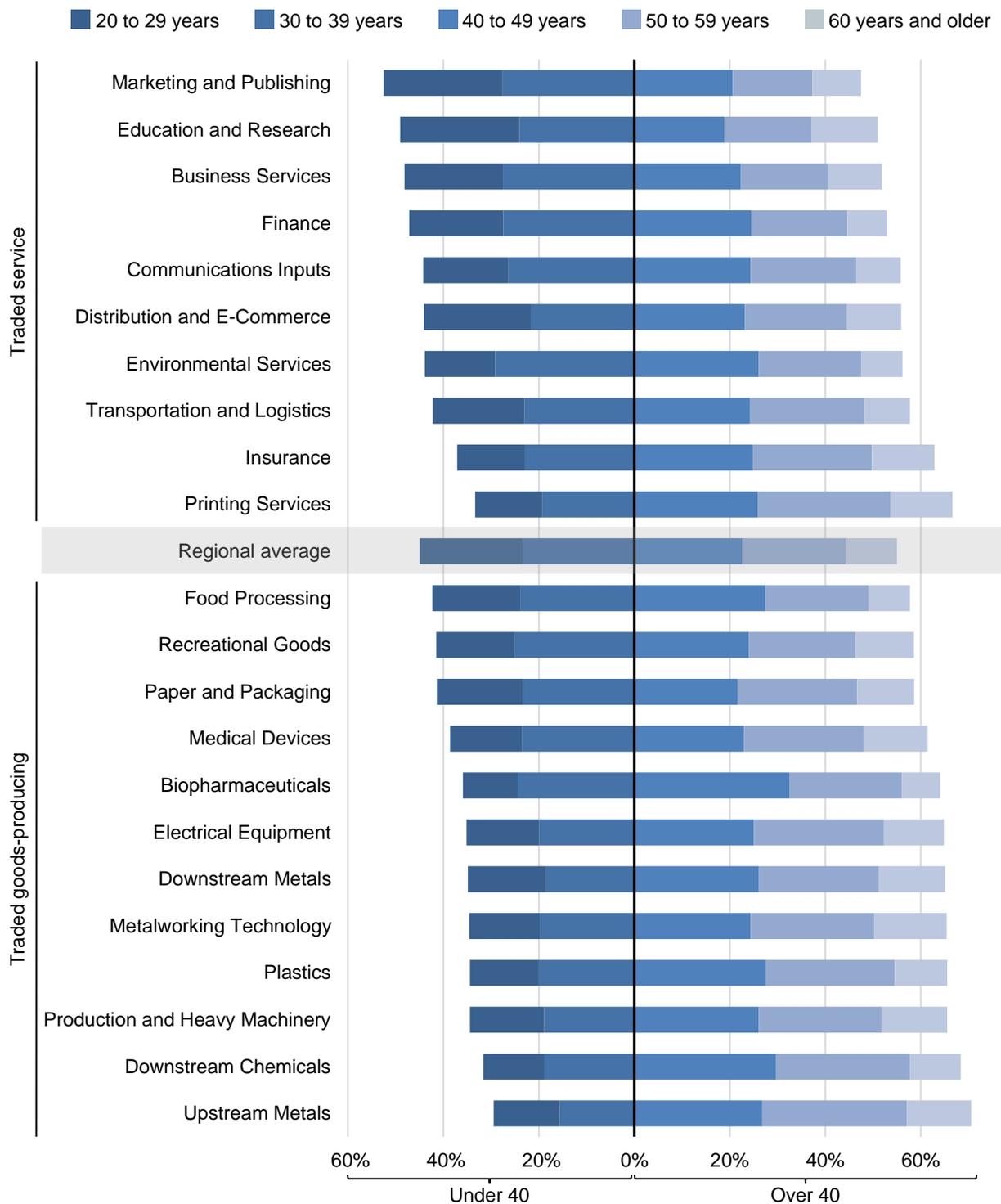


Figure 19: Share of regional employment under and over 40 years old, 2017

Note: Estimates include only employees working 20 hours per week or more.

Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.



Skills demand

The requirements to enter and remain in the workforce are changing, particularly in economic segments that have seen significant job declines. Today's export-oriented firms are increasingly looking for improved problem solving, literacy, numeracy, technological, and professional skills.⁷⁸ Many workers need additional post-secondary training and must continuously enhance their skills over time to be competitive in the job market.⁷⁹ However, traded clusters vary in the skills and work experiences they expect, as well as where workers can obtain them. Although frequently discussed, simple measures of joblessness and job openings in the Chicago region understate how industry-specific workforce issues amplify existing racial and economic inequality. Differences in training and education requirements interact closely with disparities in workforce demographics and economic mobility discussed in other sections.

While specific education and training qualifications vary, nearly all traded clusters require a highly skilled workforce. More than half of the Chicago region's Plastics workers (52 percent) require moderate-term on-the-job training (up to 12 months), while 73 percent of Marketing and Publishing workers have a bachelor's degree or higher.⁸⁰ Broadly, this pattern holds across other traded clusters: With some exceptions, service clusters tend to have educational attainment rates near or above the regional average, while goods-producing clusters require higher levels of on-the-job training. Workforce issues also vary by cluster. Each industry relies on a unique mix of occupations, and those jobs draw on a unique mix of skills and training. For clusters without a robust talent pipeline, barriers to attaining vocational training and direct entry-level experience can create as many workforce issues as those to attaining a college degree.

While manufacturers tend to employ fewer college graduates, potential applicants often face steep entry-level job requirements for on-the-job training and work experience. These industries contend with complex compliance regulations for quality control and safety, and production managers increasingly seek workers with advanced technical skills to operate sophisticated machinery, robotics, and process-controlled software.⁸¹ Manufacturers – as well as some service clusters like Transportation and Logistics – support a substantial but declining share of the region's middle-skill, middle-wage jobs.⁸² Sustaining these opportunities depends on spurring a virtuous cycle between fostering a skilled workforce for the 21st century and growing the industries that employ them.

Challenges have emerged on both sides of this matching process. On the labor supply side, the U.S. has provided inconsistent support for vocational training and has been slow to implement a system of apprenticeship programs on a national scale.⁸³ Since 2001, federal funding for workforce training such as Workforce Innovation and Opportunity Act (WIOA) formula grants, Career and Technical Education programs, and adult basic education has also fallen by more than a third.⁸⁴ Employers in some key industries report increased difficulty finding enough qualified workers, as well as challenges in navigating the complex public workforce system.⁸⁵ Metropolitan Chicago has a well-educated, diverse workforce, and its public workforce and education systems have been national leaders in implementing WIOA reforms. Yet, existing disparities still prevent many black and Hispanic residents from attaining competitive skills and work experience.



On the labor demand side, common hiring and training practices can contribute to gaps between employers' expectations and available workers. For instance, inflated job requirements like preference for specific shop floor experience can lead to large pools of overlooked talent.⁸⁶ Alternatively, job applications can undercut candidates' cross-sector skills if they require unnecessary digital literacy or fail to consider relevant experience in the U.S. Armed Forces. Some employers also use rolling job postings to fill positions with temporary or contract workers without investing in further training. As a result, job placement programs struggle to identify full-time, entry-level positions with clear career pathways to upward mobility. Because conditions vary from one industry to another, training providers also have difficulty aggregating, streamlining, and communicating what skills employers actually need.

At the center, individuals and households are making decisions about how to invest in their careers – complex decisions that can have lifelong consequences. People of color, those with disabilities, and other marginalized workers must also contend with persistent inequities. Even for workers in high-growth fields with industry-recognized credentials, some jobs provide better opportunities for career advancement and wage growth than others.



While specific education and training qualifications vary, nearly all traded clusters require a diverse and highly skilled workforce.

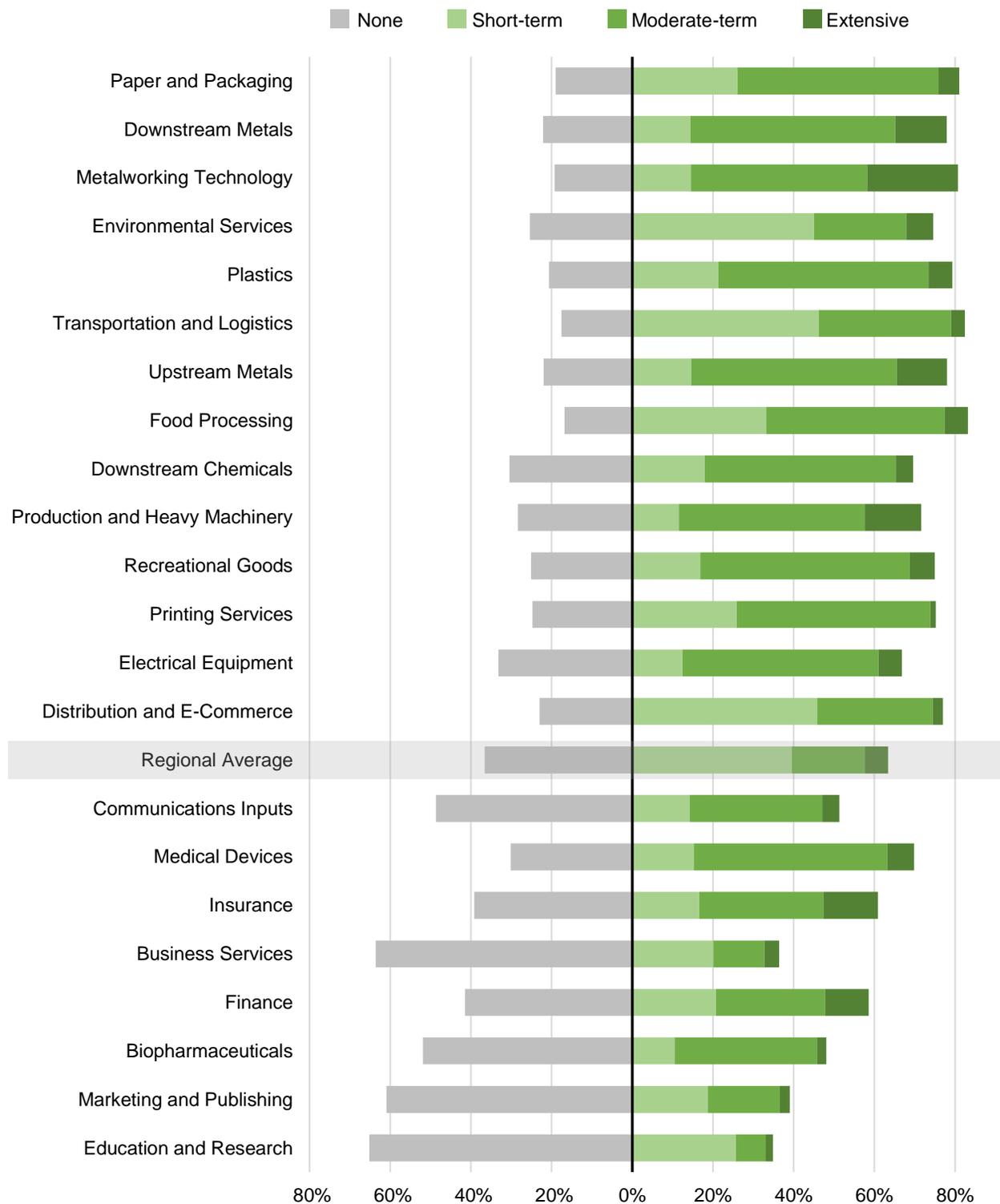


Figure 20: Share of regional employment by typical on-the-job training requirements, 2017
 Note: On-the-job training estimates based on staffing patterns and U.S. Bureau of Labor Statistics' classifications for occupations that require up to 1 month (short-term), up to 12 months (moderate), or greater (extensive) training to attain necessary skills.

Both classroom and work-based learning models are important in meeting clusters' unique skills demand and enabling upward economic mobility.

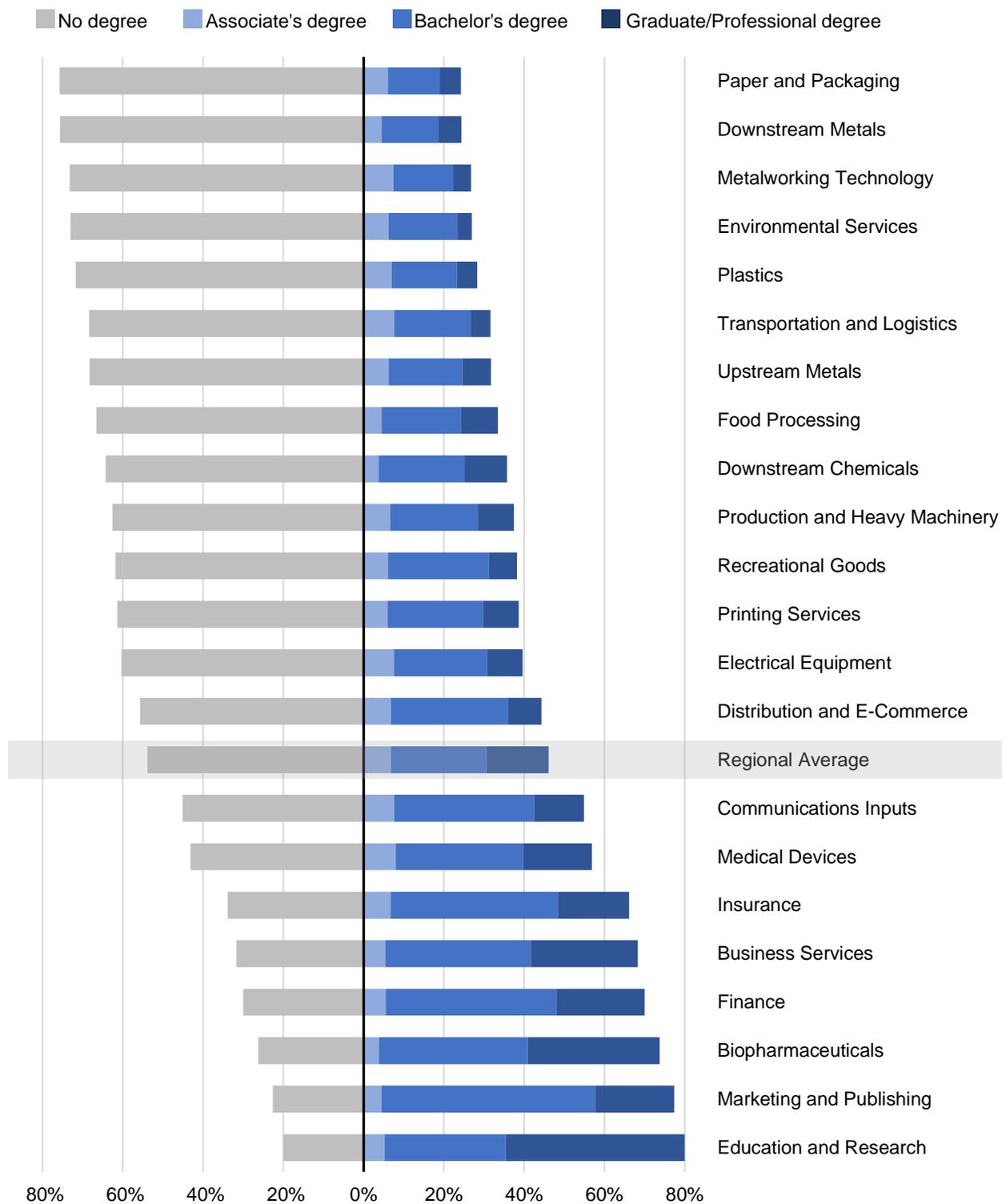


Figure 21: Share of regional employment by highest degree held, 2017
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialist International (Emsi 2018.4), U.S. Bureau of Labor Statistics, and Integrated Public Use Microdata Series, 2017 American Community Survey data.

Careers in specialized goods-producing clusters often require workers to blend on-the-job training, undergraduate education, and work experience over time.

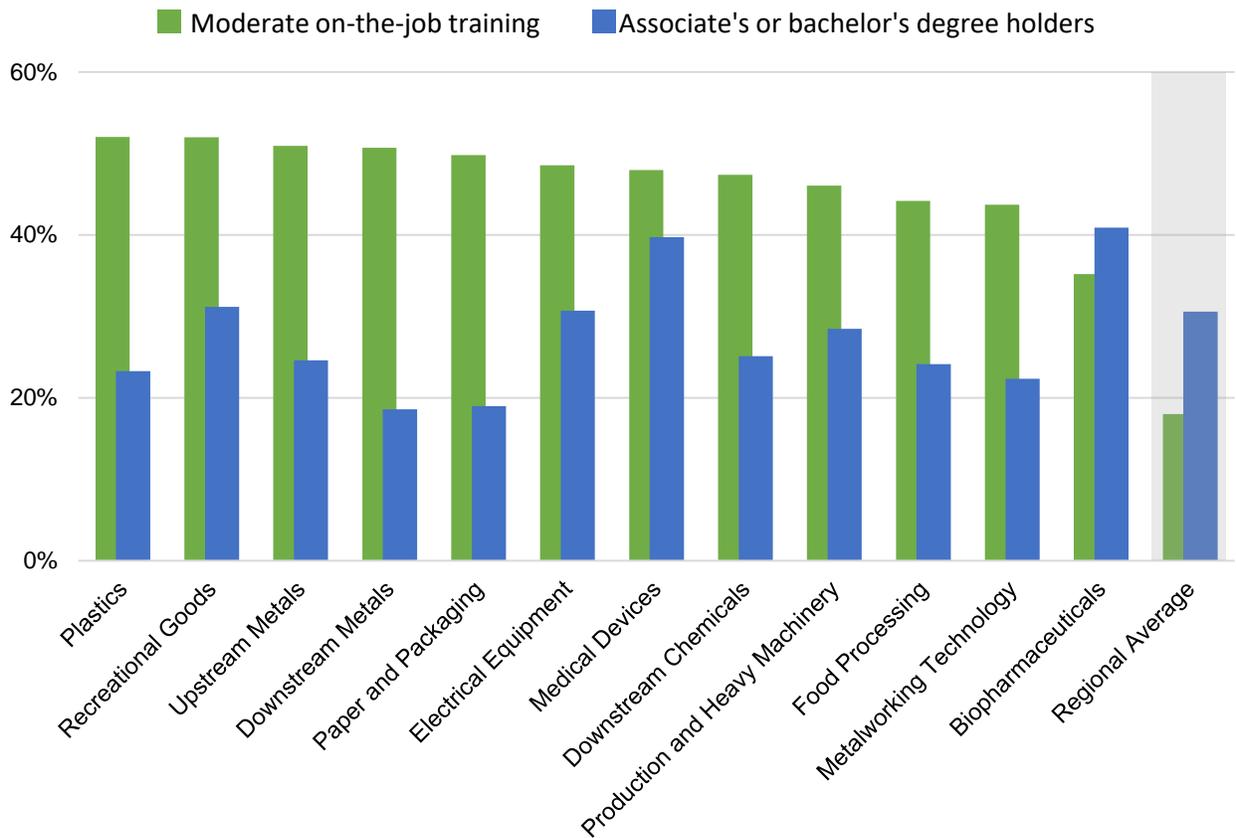


Figure 22: Share of regional workers with an associate's or bachelor's degree as highest degree held, and share of regional jobs typically requiring moderate on-the-job training, 2017

Note: On-the-job training estimates are based on industry staffing patterns and the U.S. Bureau of Labor Statistics' classifications for occupations that require moderate on-the-job training (up to 12 months) to attain necessary skills.

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialist International (Emsi 2018.4), U.S. Bureau of Labor Statistics, and Integrated Public Use Microdata Series, 2017 American Community Survey data.



Economic mobility

Economic mobility has become a prominent public issue in recent years. A growing body of research reveals the barriers that many Americans – particularly people of color – encounter in achieving and maintaining the promises of the middle class.⁸⁷ While many factors contribute to these trends, public debates generally focus on how children in poorer neighborhoods grow up and enter the workforce.⁸⁸ Researchers and public officials also look at how socioeconomic conditions interact with the shifting mix of industries and occupations that residents can access in their local labor market.⁸⁹ For most workers, doing better means career advancement that better matches their experience to skills demand and wages. Indicators of cluster job growth and demographics therefore need to be compared with those of job quality and opportunities for advancement. Efforts to both reinforce the region’s competitiveness and expand opportunity depend on determining how skills and economic mobility interact within clusters.

Traded cluster	Median hourly wages	Median annual wages*	Share of workers with employer-sponsored insurance
Business Services	\$32.73	\$68,080	72%
Finance	\$32.58	\$67,773	87%
Insurance	\$30.67	\$63,801	86%
Communications Inputs	\$29.50	\$61,367	83%
Biopharmaceuticals	\$28.51	\$59,297	90%
Education and Research	\$27.31	\$56,795	82%
Marketing and Publishing	\$25.20	\$52,425	78%
Environmental Services	\$24.68	\$51,343	77%
All traded clusters	\$23.99	\$49,902	74%
Hourly wage required to afford a two bedroom rental home*	\$22.69	\$47,195	--
Transportation and Logistics	\$22.48	\$46,752	68%
All Chicago metropolitan area jobs	\$19.23	\$39,998	71%
Distribution and E-Commerce	\$18.96	\$39,429	73%
Printing Services	\$18.96	\$39,429	78%
Downstream Chemicals	\$18.44	\$38,349	76%
Medical Devices	\$18.44	\$38,349	81%
Downstream Metals	\$17.58	\$36,568	74%
Production and Heavy Machinery	\$17.58	\$36,568	79%
Electrical Equipment	\$17.53	\$36,458	81%
Metalworking Technology	\$17.53	\$36,458	76%
Upstream Metals	\$17.53	\$36,458	82%
Paper and Packaging	\$17.35	\$36,096	71%
Recreational Goods	\$16.66	\$34,654	73%
All local clusters	\$16.66	\$34,654	67%
Plastics	\$16.38	\$34,072	74%
Food Processing	\$15.13	\$31,461	70%

Figure 23: Median wages and employer-sponsored insurance coverage, 2017

Note: Annual estimates assume full-time employment for 2,080 hours per year. Housing wage reflects fair market rents as determined by U.S. HUD and considers spending more than 30 percent of income on housing as unaffordable.

Source: Chicago Metropolitan Agency for Planning analysis of U.S. Census Bureau, U.S. Bureau of Labor Statistics, National Low Income Housing Coalition, and Economic Modeling Specialists International data (Emsi 2018.4).



Altogether, metropolitan Chicago's traded clusters typically pay \$7.33 more per hour than the region's local clusters, or an additional \$15,200 each year for full-time workers. Nearly three-quarters also receive employer-sponsored health insurance – a common proxy for overall job quality – compared with 67 percent of those working in local clusters. High-skill, high-wage occupations across industries buoy these estimates. These include jobs in service industries like Business Services (\$32.73 per hour) and Insurance (\$30.67) as well as advanced manufacturers in Communications Inputs (\$29.50) and Biopharmaceuticals (\$28.51). Hourly wages reflect just the base pay that typical workers see in their paychecks and do not include other job perks like bonuses, benefits, stock options, or performance pay. Such add-ons can widen the differences in workers' total compensation, particularly for those in higher-wage industries and occupations.

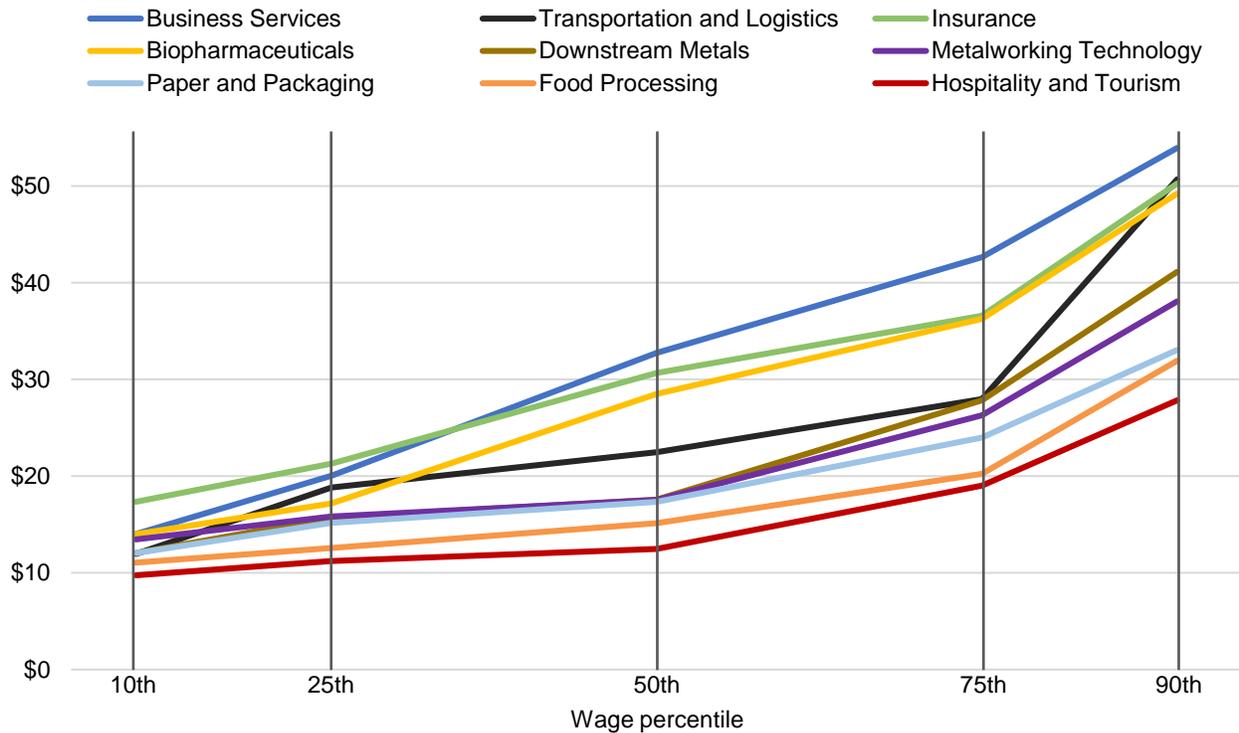
Median wages are only one indicator of how well clusters support economic mobility and are best viewed together with the report's other findings. For example, median wages alone do not show the variation *within* clusters in how much different workers earn and what opportunities they have. Persistent wage gaps are a primary driver of racial and economic inequality in the U.S., accounting for three-fourths of the wealth gap between black and white Americans.⁹⁰ This report does not include information on race and gender pay gaps due to data limits. However, the distribution of wages within each cluster – together with information on its staffing pattern, demographics, and job quality – helps to compare the extent to which most workers can move up and earn more.

Upward economic mobility usually looks like a series of career steps – perhaps retraining, earning a raise, attaining a degree, switching companies, or stepping into a managerial role. Over time, career advancement enables households to make other quality of life choices like moving to another neighborhood or saving for their children's education. Although employees may work for multiple industries over the course of a career, many of these career steps occur within rather than across clusters. These decisions depend on the potential value workers see in taking a risk to go back to school, change jobs, or start a new business. However, career pathways – and the signals they pass along to workers – vary widely from cluster to another.

An analysis of wages within key clusters reveals, for example, that workers who can get a foothold in Business Services and move from its 25th wage percentile up to the cluster median can expect to earn 63 percent more. By comparison, a worker in Hospitality and Tourism would earn just 11 percent more by moving between that cluster's 25th to 50th wage percentiles.⁹¹ Many factors contribute to the conditions and career options that workers encounter in the labor market. These might include existing inequities, industry trends, staffing patterns, commutes, skills demand, job quality and requirements, or wage structures. The challenge for public officials and economic developers lies in understanding how these factors interact. Pursuing inclusive growth and meeting evolving skills demand requires additional, fine-grained analysis on how workers enter and progress through specialized traded clusters. Race and ethnicity predict these differences: clusters with a higher share of employees of color have less opportunity for in-cluster economic advancement than whiter clusters.



The wage gains that workers can expect for incremental career advancement vary widely among traded clusters, with top earners often seeing the greatest gains.



But, traded clusters that employ higher shares of non-white workers tend to offer their typical employees less wage growth for taking similar career steps.

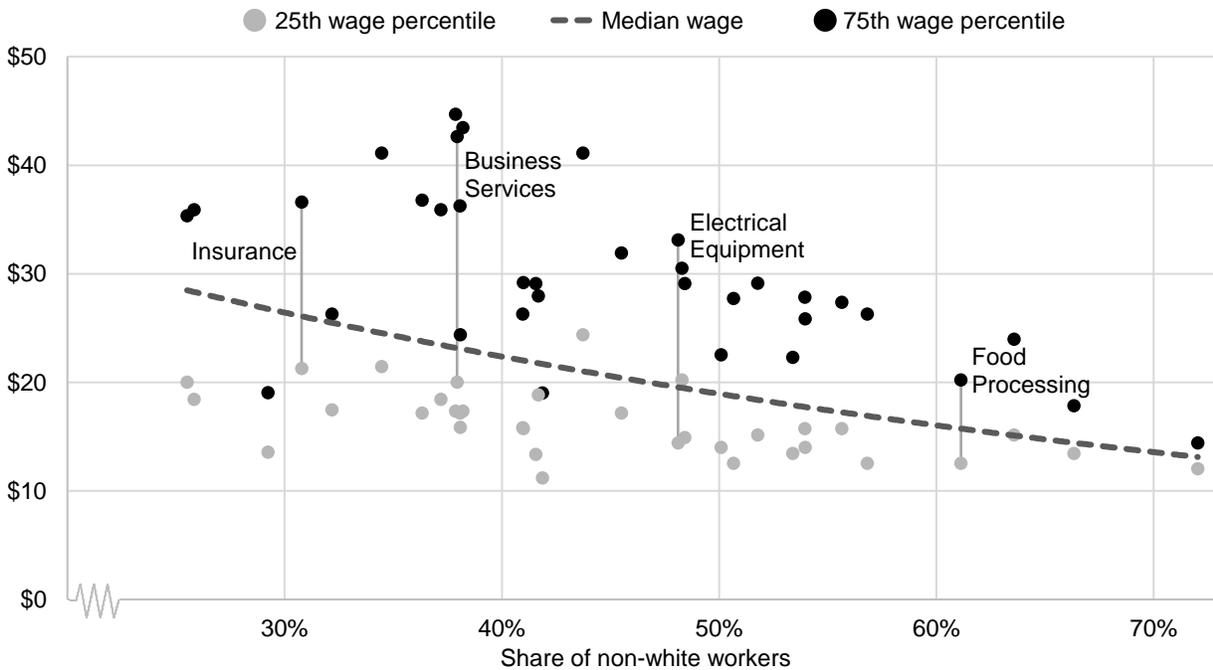


Figure 24: Hourly wages by percentile and compared to share of non-white workers, 2017

Note: Hourly wages include only base pay and exclude other forms of compensation.

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialist International (Emsi 2018.4) and Integrated Public Use Microdata Series, 2017 American Community Survey data.

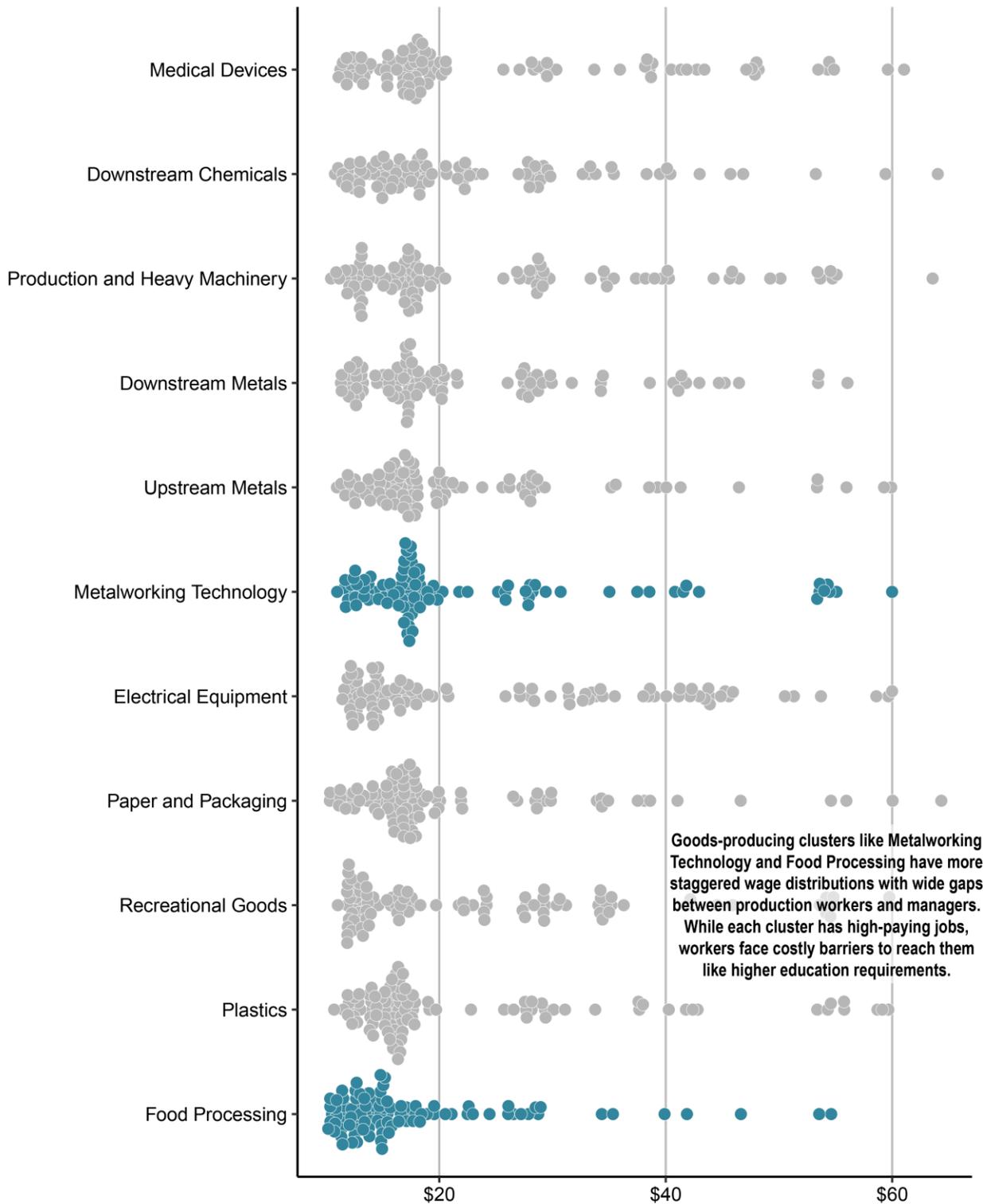


Imagine randomly selecting 100 workers in each of metropolitan Chicago's specialized clusters and comparing their hourly wages.



Figure 25: Hourly wage distribution in metropolitan Chicago's specialized traded clusters, 2017
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

The resulting wage distributions reveal how each workforce is structured, as well as the varying opportunities for lower- and middle-skill workers to progress.



Note: Distributions are a probability sample of 100 workers in each cluster. Hourly wages include only base pay and exclude benefits, bonuses, stock options, or other forms of compensation.

These insights speak to an old problem for the industrial Midwest, where declines in economic mobility have accompanied long-term job declines in manufacturing, changing skills demand, and shifts in labor relations.⁹² Recent research from the Brookings Institution uses 25 years of job-switching data to get at the extent to which industries support upward economic mobility for workers without a bachelor's degree.⁹³ Brookings' analysis uses annual earnings and employer-sponsored health insurance as proxies for job quality in identifying *good jobs* and the *promising jobs* that serve as stepping-stones to reaching a good job within 10 years. Traded clusters have a disproportionate effect on upward mobility in metropolitan Chicago, providing 36.9 percent of all jobs in the region but 53.1 percent of these good and promising jobs. However, most traded clusters have also seen long-term declines in employment, in particular manufacturing jobs for workers without a bachelor's degree.

The resulting patterns contribute to other macroeconomic trends. Since 1980, relative demand for labor has been concentrated in either low-skilled (e.g., personal services or food preparation) or high-skilled jobs (management and professional occupations), while those in the middle have eroded.⁹⁴ In other words, the profile of a middle-wage job has shifted toward occupations that require more training than in the past. While these relationships are difficult to outline clearly, Brookings' estimates on good and promising jobs reflect a best attempt yet to map who benefits most when different industries grow and evolve.

Clusters that offer better career pathways for middle-skill workers also tend to be less accessible by public transit and employ fewer women.

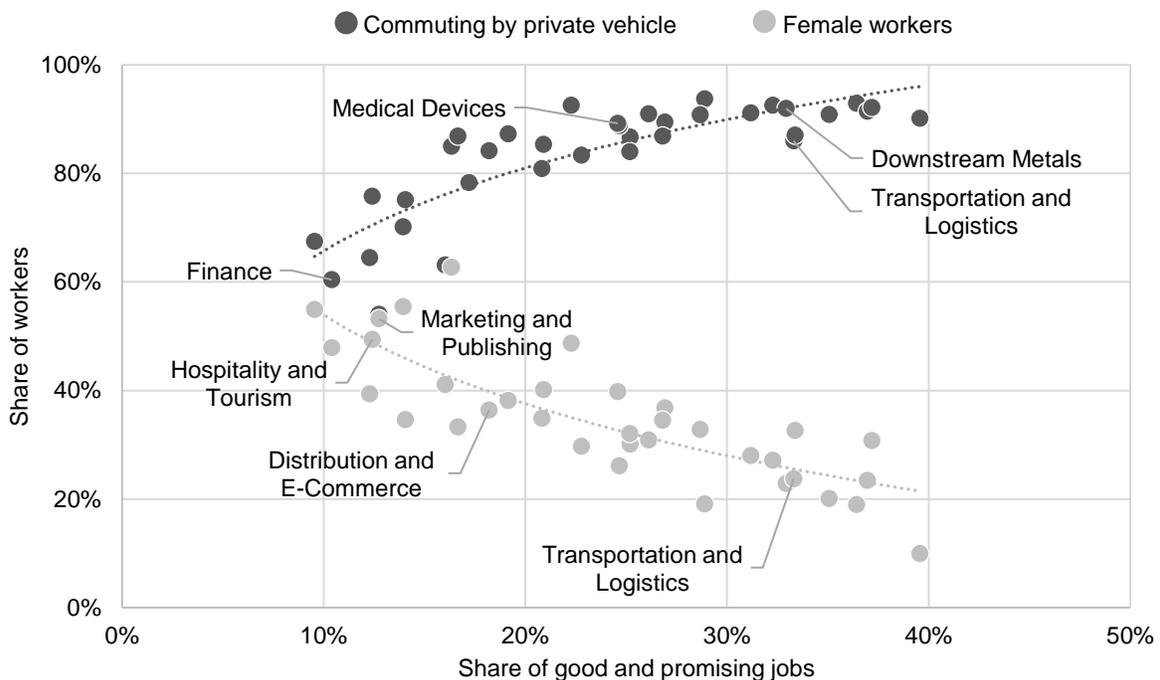
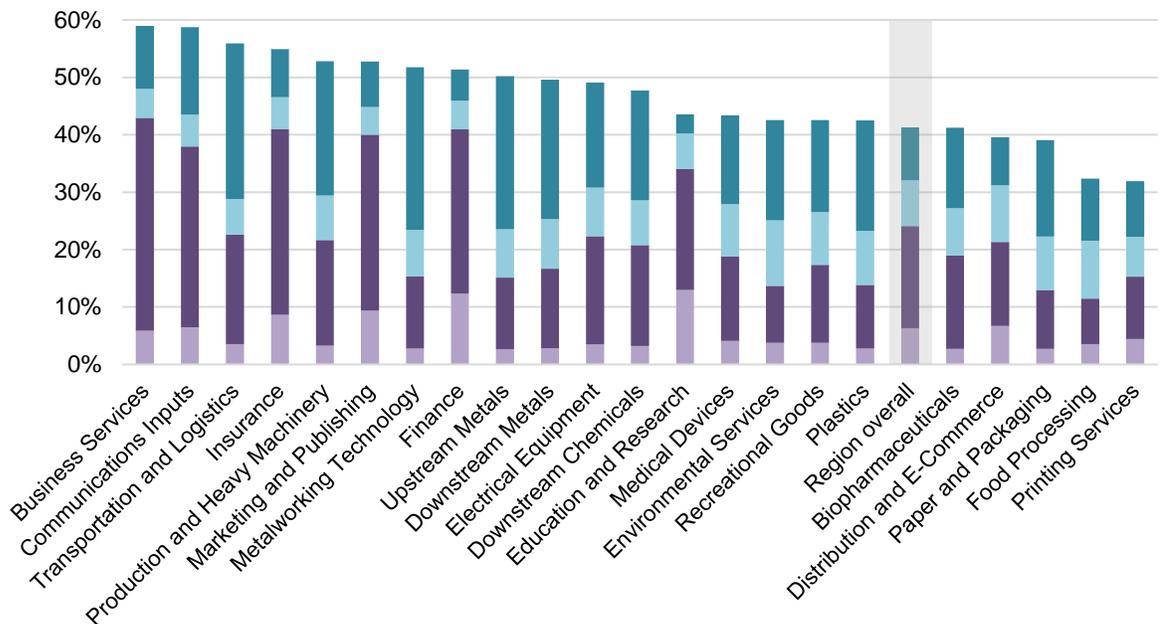


Figure 26: Share of jobs that do not require a bachelor's degree considered good or promising, compared with private vehicle commuters and women as a share of regional employment
 Note A "good job" pays at least the region's median annual earnings for full-time, year-round workers and provides employer-sponsored health insurance. A "promising job" enables an incumbent worker to reach a good job within 10 years.
 Source: Chicago Metropolitan Agency for Planning analysis of Brookings Institution data.



Most traded clusters offer more good and promising jobs than the regional economy overall...

■ Good jobs that require a bachelor's degree ■ Promising jobs that require a bachelor's degree
■ Good jobs that do not require a bachelor's degree ■ Promising jobs that do not require a bachelor's degree



But the labor market for workers without a bachelor's degree is shrinking.

■ Good jobs that do not require a bachelor's degree ■ Promising jobs that do not require a bachelor's degree

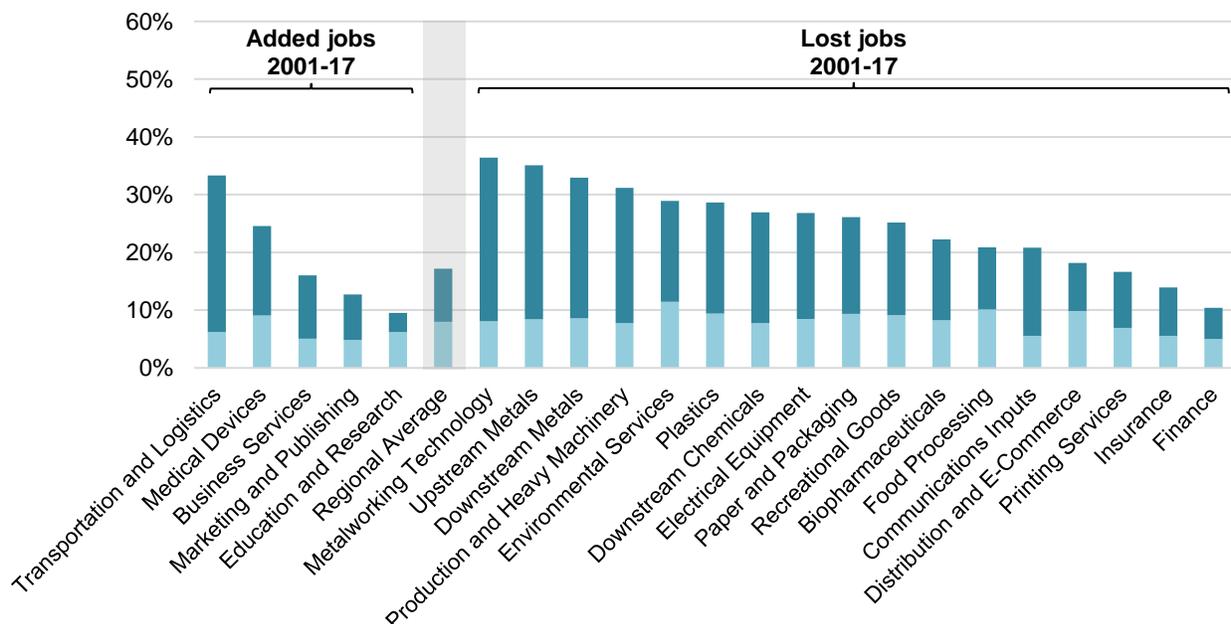


Figure 27: Share of jobs considered good or promising by educational level

Note: A “good job” pays at least the region’s median annual earnings for full-time, year-round workers and provides employer-sponsored health insurance. A “promising job” enables an incumbent worker to reach a good job within 10 years.

Source: Chicago Metropolitan Agency for Planning analysis of Brookings Institution data.

Commute modes

Access to qualified labor is one of the foremost issues guiding businesses' investment decisions. For many workplaces, such access requires convenient, 30-minute, one-way commutes to and from communities with a high quality of life.⁹⁵ Workers consider commute choices based on interrelated factors like where they work, whether they own a car, how much they earn, and the value they put on time, costs, and comfort. Employers must then balance these expectations with other factors like market access, supply networks, utilities, land use restrictions, and their related costs. Commute mode trends therefore help to reveal the landscape of work and opportunity in metropolitan Chicago.

High-skill, high-wage service clusters are heavily concentrated in the Chicago Loop, including 30-45 percent of jobs in Marketing and Publishing, Finance, Business Services, and Insurance.⁹⁶ They also have a much higher share of workers opting for public transit, active modes like walking and bicycling, or working at home. By comparison, goods-producing clusters are more evenly dispersed across the region – often in areas with less flexibility for commuters. Transit ridership broadly depends on the speed, reliability, and frequency of service on a well-networked system.⁹⁷ Key industrial centers – like those in the south and west suburbs of Cook County and near major freight facilities – may have available transit services but still lack high-quality connections to communities where workers can and want to live.

Traded clusters with higher shares of Hispanic employment tend to have fewer high-quality transit connections to the communities where their workers live.

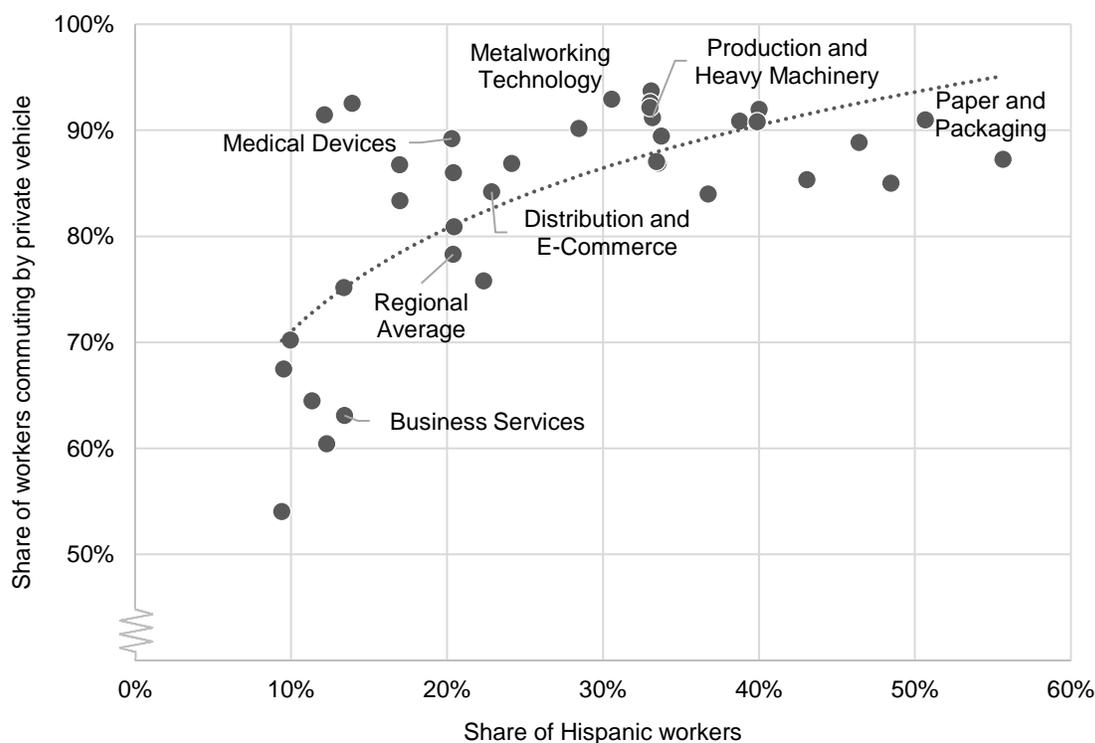


Figure 28: Share of workers commuting by private vehicle and share of Hispanic workers, 2017

Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.



Traded clusters' commute modes – including reliance on private vehicles – reveal how workers access different regional employment centers.

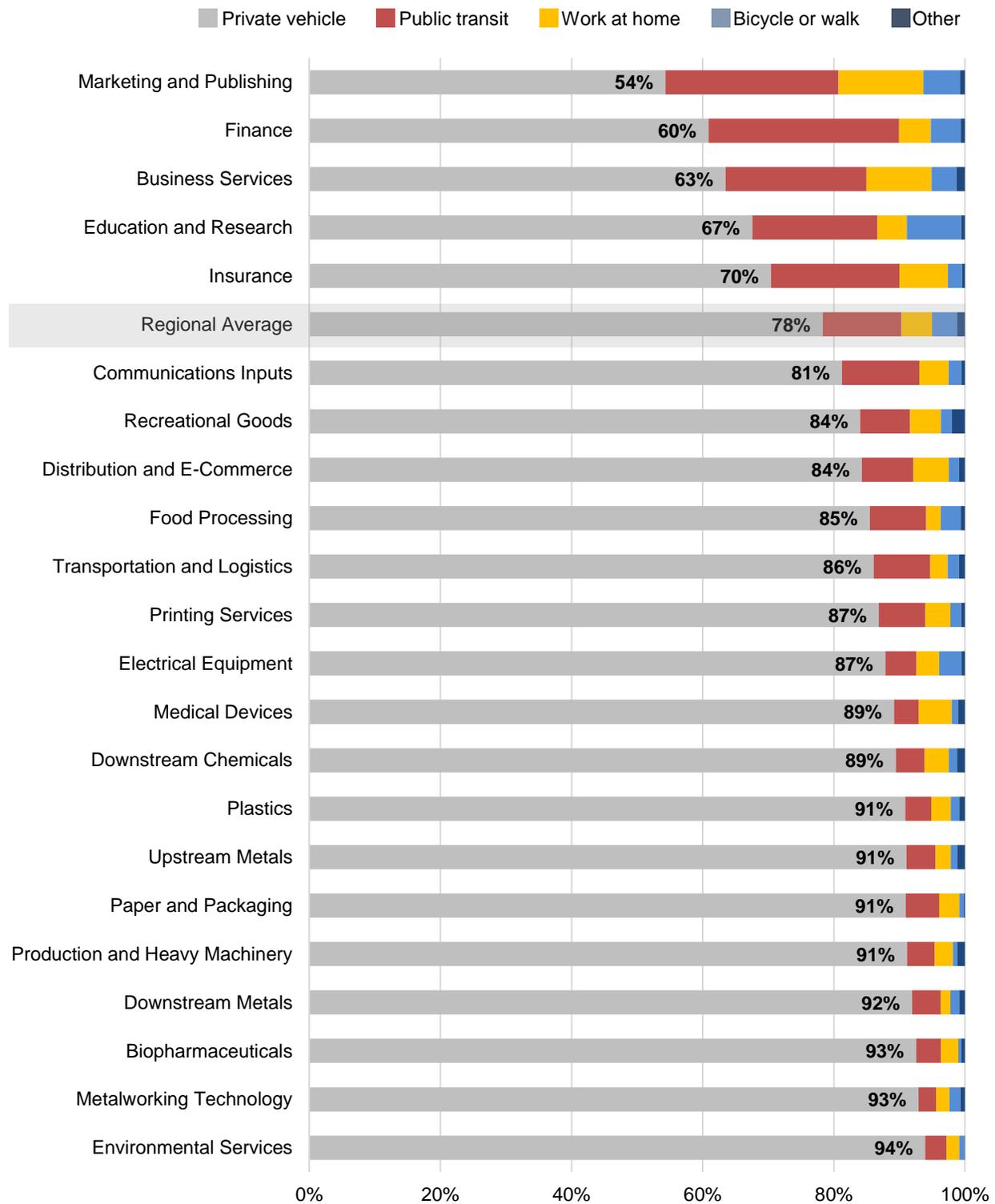


Figure 29: Share of workers by commute mode in Chicago regional traded industry clusters, 2017
 Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Business trends reveal shifting conditions

The primary objective of economic development is to spur broad growth by supporting the competitiveness of the region's businesses and workers. Data on regional cluster production therefore help to form a more complete picture about the economic forces affecting clusters and their employees. During 2001-17, metropolitan Chicago grew total output by just 0.9 percent annually (half the national average) and employment by just 0.2 percent annually (one-third the national average).⁹⁸ The evidence in this report suggests our slow growth reflects an evolving economic base that has encountered recent challenges with significant regional implications. For example, data show declines in total business income for the region's metals, machinery, and equipment manufacturers, as well as job declines in Finance, Insurance, and Distribution and E-Commerce that outpace the U.S. overall.⁹⁹

This section takes a deeper look at select business dynamics of the region's specialized traded clusters since the 2007-09 recession, including gross value added, exports, and establishment trends, drawing lessons for regional economic and industrial policy.¹⁰⁰ Regional leaders need to consider whether our core clusters are prepared to weather future economic cycles and compete in increasingly global markets. In the decade after the 2007-09 recession, the U.S. economy experienced one of its longest and slowest expansions in history, leading some to speculate whether lower potential growth is a new normal.¹⁰¹ At the same time, the Chicago region officially recovered its 2007 pre-recession peak nearly four years after the nation overall.¹⁰² Researchers have attributed this slowed growth nationally to various issues, including lower aggregate demand, greater import competition, deferred maintenance on infrastructure and public education, new trade tensions, and slowed growth in the U.S. labor force.¹⁰³ Recent analysis also shows a sustained slowdown in U.S. economic dynamism – understood as business investment, job mobility, innovation, and new firm creation.¹⁰⁴ Together, these forces have raised concerns of another potential economic downturn.

National headwinds – even if overestimated – provide a backdrop for the various opportunities and challenges ahead for metropolitan Chicago's traded clusters. While slowing down overall, new firm creation in the U.S. is also increasingly concentrated in large places with existing footholds in advanced industries.¹⁰⁵ As the global economy evolves, many businesses operate in a particular region because they can draw on the productive advantages and network effects of clusters. As these benefits spur greater business activity, they allow some metropolitan regions to more easily grow their economies and achieve broad prosperity, even in uncertain economic conditions. Achieving the Chicago region's economic goals will require a clear understanding of these dynamics and continuous improvements in our global, competitive position.



Growth and resilience

The 2007-09 recession took a heavy toll across the U.S. economy – including northeastern Illinois – and had far-reaching effects for households, businesses, and communities. Altogether, the region’s economy – measured by real gross regional product (GRP) – shrank 4.8 percent over two years, wiping out nearly \$28 billion in annual output.¹⁰⁶ As the economy recovered, renewed growth eventually helped the region surpass its 2007 pre-recession peak in mid-2014 and end 2017 up 8.9 percent from the start of the recession a decade earlier. While significant, this recovery has lagged behind peer regions and the national average. During 2007-17, metropolitan Los Angeles grew annual output more than twice as fast (18.7 percent), while the New York and Houston areas grew by 15.8 percent and 10.4 percent respectively.¹⁰⁷

Half of metropolitan Chicago’s traded clusters grew annual output – measured by GRP-by-industry, also known as gross value added (GVA) – faster than the regional average. These clusters include many of the region’s largest and most concentrated clusters by employment, such as Biopharmaceuticals, Transportation and Logistics, Medical Devices, and Business Services. Taken together, the growth of higher-performing clusters made outsized contributions to the region’s recovery, employing 25.5 percent of workers and generating nearly 31 percent of overall GRP. Their growth over the past decade extends a longstanding shift in the region’s economic base toward the service sector and select advanced manufacturing industries.

Several other clusters experienced negative growth during 2007-17 – that is, their total economic production declined. In total, these clusters contributed \$12 billion less to overall real GRP than they did a decade earlier.¹⁰⁸ In many cases, the 2007-09 recession accompanied or accelerated longer-term, industry-specific pressures. As in other parts of this report, developing a single, consistent explanation for why particular clusters grow or decline is challenging. Broadly, those that lost ground tended to experience deeper declines during the recession and shallower or nonexistent recoveries in later years. They also tend to be smaller, goods-producing clusters with less than \$5 billion in total annual output. One notable exception is Finance – a \$26 billion cluster with nearly 88,000 employees in 2017 – which experienced a 12.9 percent decline in real annual output during 2007-17.

Understanding real gross regional product and real gross value added

Economists can get a high-level snapshot of economic cycles and conditions by tracking metropolitan Chicago’s real gross regional product (GRP), or the total value of all goods and services produced here. In turn, GRP-by-industry – also called gross value added (GVA) or annual output – is the total production of a particular industry or cluster and represents its contribution to overall GRP. Adding GVA across all industries in northeastern Illinois is equal to GRP for the region’s full economy. “Real” indicates that the data were adjusted for inflation – in this case, to 2012 dollars. While the terminology and calculations can be difficult, these aggregate measures allow researchers to study year-over-year growth in different parts of the economy on a comparable scale. Particularly during severe economic cycles, they provide an indicator of the health and resilience of different industries – in terms of both final sales and the cost of their inputs. One way to understand real GVA is as a measure of the total income of all businesses in an industry after they have paid their suppliers. In other words, it reflects the remaining income that businesses have to pay their employees, pay taxes, and earn a profit.



Traded clusters saw various changes in production during 2007-17. Smaller goods-producing clusters experienced both output and job declines.

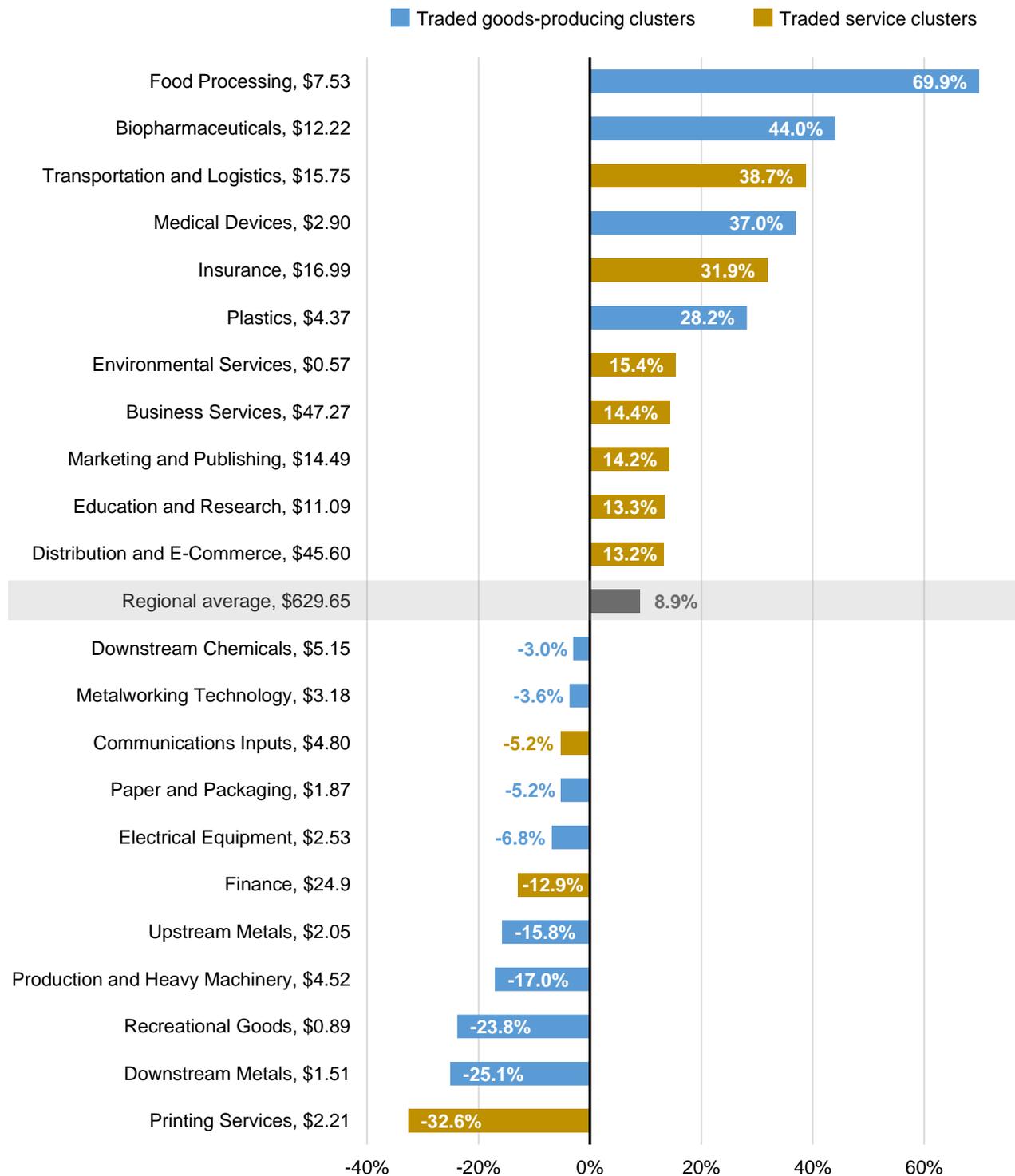


Figure 30: Real annual output, 2017 and change in real annual output, 2007-17, in billions of 2012 dollars

Note: Cluster data include only the seven counties of northeastern Illinois; regional data reflects the U.S. Census Bureau metropolitan statistical area.

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialist International data (Emsi 2018.4).



How clusters responded to the 2007-09 recession also helps to demonstrate broader patterns. Economists expect most firms to scale back operations and hiring during a recession before rebounding as demand returns. When aggregated, the behavior of individual businesses in terms of total production and jobs give an indication of traded clusters' potential resilience during future economic downturns. Most of the Chicago region's major clusters followed this trajectory between 2007-17, although not all at the same pace. Some clusters grew steadily, while others have yet to recover. Recurring patterns over the past decade reveal how regional economic and industrial policy may need to adapt to changing economic conditions.

Three clusters – Medical Devices, Education and Research, and Environmental Services – managed to grow both output and employment consistently during the 2007-09 recession and subsequent economic expansion. These growing clusters all tend to receive higher levels of public spending on healthcare, scientific research, defense, and infrastructure. In addition to the region's existing strengths, federal efforts to spur the economy and expand medical coverage may have helped to shelter them from some recessionary pressures.¹⁰⁹ They also tend to have relatively less direct competition from foreign imports due to strict quality control and safety regulations that require a highly skilled, domestic workforce.¹¹⁰

Most traded clusters reduced annual output during the 2007-09 recession before slowly expanding again, but only some have regained their pre-recession levels.

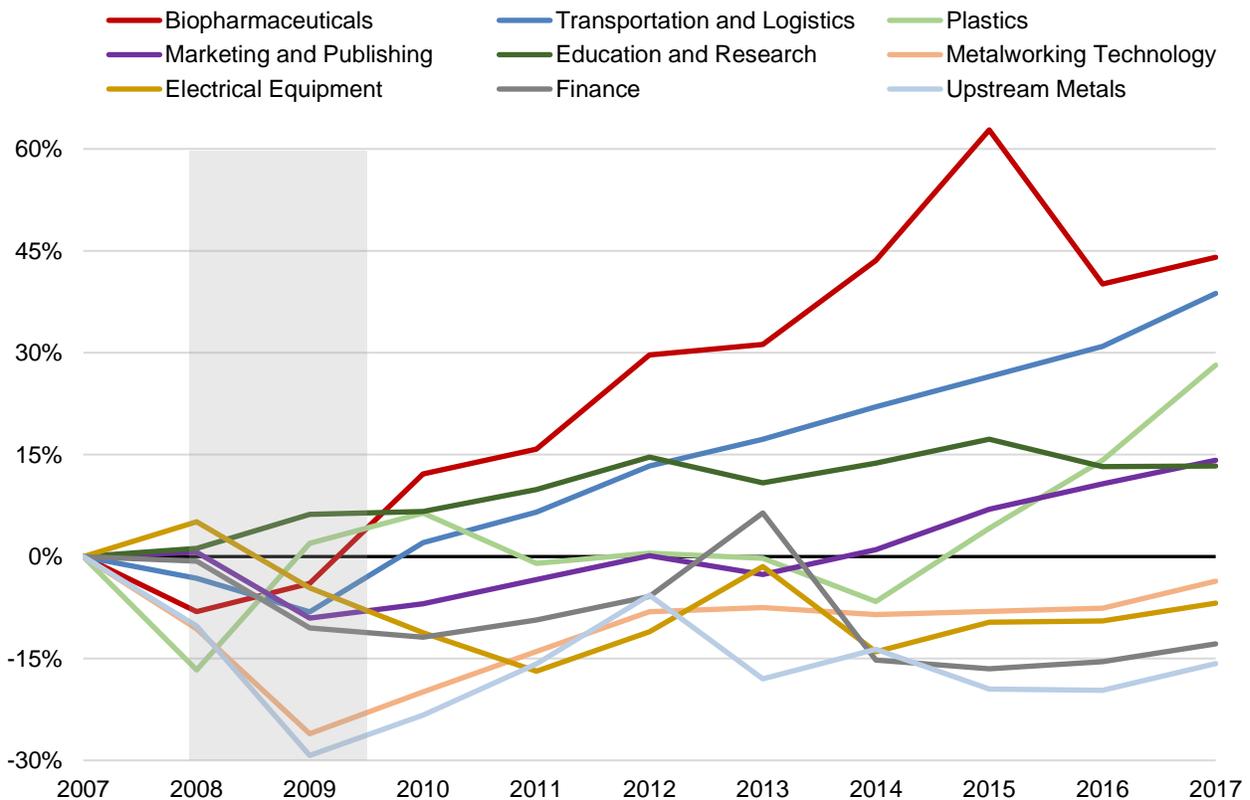


Figure 31: Cumulative change in real annual output, 2007-17
 Note: Data are indexed to 2007 levels to show year-over-year growth on a comparable scale.
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialist International data (Emsi 2018.4).

Following the economy's path as a whole, a larger number of traded clusters experienced initial declines in both production and jobs before regaining some or all of these losses. However, the recovery has looked quite different among these rebounding clusters. Several such clusters have fully regained their 2007 pre-recession levels of output and employment, including Distribution and E-Commerce, Marketing and Publishing, Food Processing, Transportation and Logistics, and Upstream Chemicals.¹¹¹ This group also include industries that tend to be more responsive to economic conditions than other segments, such as Construction, Hospitality and Tourism, and some goods-producing clusters.

Many traded service clusters have higher output and employment levels in 2017 than they did a decade earlier, while several goods-producing clusters produce less and employ fewer workers.

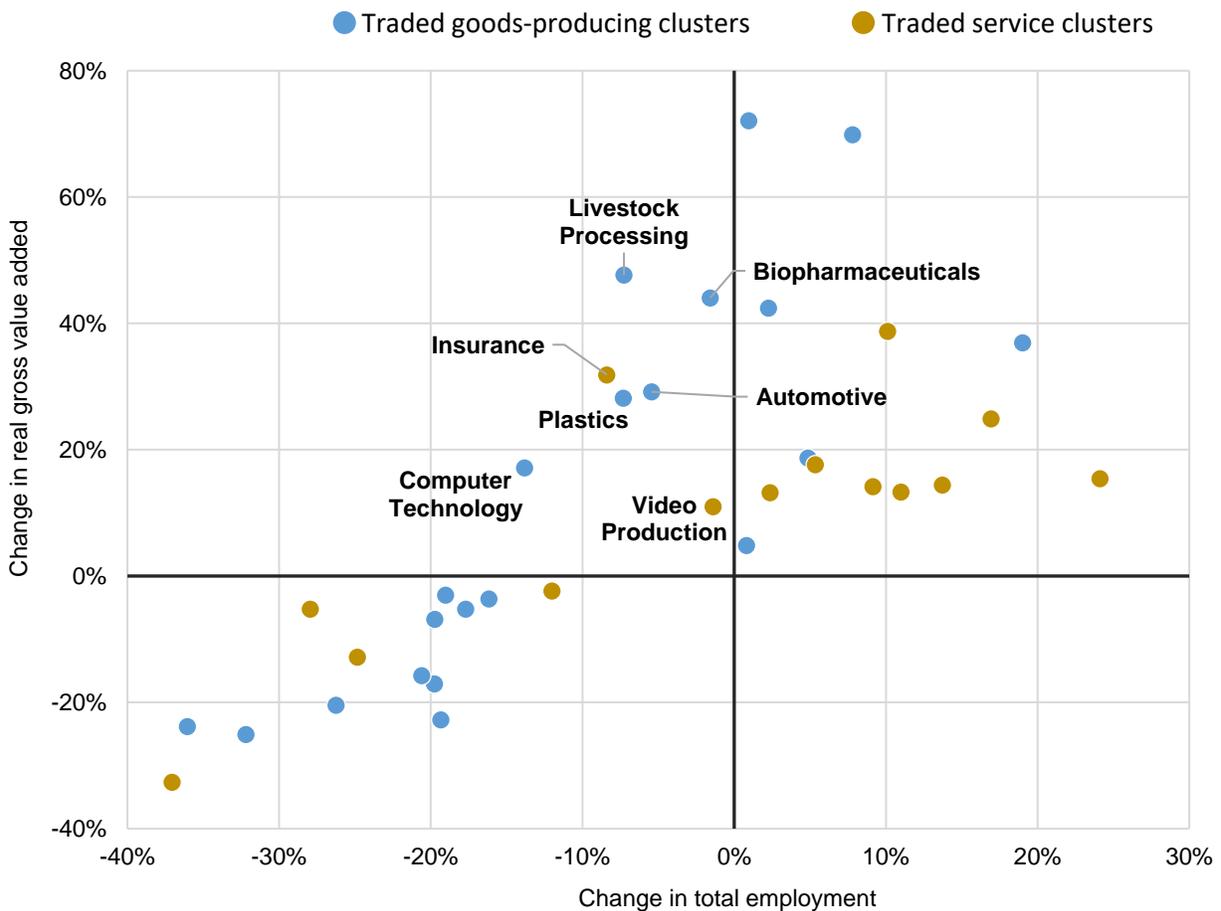


Figure 32: Change in real gross value added and total employment, 2007-17
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialist International data (Emsi 2018.4).

Trends in total production and jobs do not necessarily mirror each other, and differences can provide top-line indicators of business restructuring and productivity shifts. Most rebounding clusters – in particular, Biopharmaceuticals, Plastics, and Insurance – have grown output far ahead of employment in recent years.¹¹² Research shows that economic downturns lower the opportunity cost for some businesses and industries to restructure their business models and improve productivity.¹¹³ For example, businesses may invest in new technologies that replace or augment human tasks, offshore lower value activities overseas, or outsource certain back-office and support functions.¹¹⁴ Healthier businesses may also have used the recession as an opportunity to invest in cheap capital and equipment made available from failing businesses.

While researchers debate the relative impact of these forces, a common concern is their long-term effect on middle-skill, middle-wage jobs if future economic cycles lead to similarly jobless recoveries in key economic segments. Future economic cycles may accelerate the region's trends toward job polarization, in which relative labor demand is concentrated in high- and low-skill occupations.¹¹⁵ Prior CMAP analysis shows that manufacturing output and jobs are particularly sensitive to the state of the overall economy.¹¹⁶ For instance, slower long-term growth can reduce demand for durable and capital goods like machinery and equipment, while unstable incomes can reduce demand for many consumer products. These new findings suggest that even firms in rebounding clusters may hire at a slower pace in the future if they have restructured and streamlined production.

Finally, current trends suggest that many manufacturing industries still have room to recover from the 2007-09 recession and that recent output growth has not yet reversed longer-term declines.¹¹⁷ Amid a plodding U.S. recovery, several goods-producing clusters – as well as the Finance cluster – are showing early signs that businesses are once again expanding production. Some may regain their 2007 pre-recession levels as more recent data become available. But, it remains unclear if these clusters – which include Upstream and Downstream Metals, Metalworking Technology, Downstream Chemicals, and Electrical Equipment – will continue to expand production or how many new workers they will hire. Nonetheless, the manufacturing sector remains a core driver of the Midwest's economy, contributing more to recent growth than consumer spending or the services and construction sectors.¹¹⁸ While manufacturers nationwide employ fewer people than in past decades, these industries still provide many opportunities for workers seeking good jobs.



Export activity

With slowed aggregate demand in the U.S. and Europe, future cluster expansion increasingly depends on trade with emerging foreign markets in Brazil, India, China, Mexico, and South Africa. Most economic growth is occurring abroad, as free trade practices and the rise of the global middle class open new market opportunities for specialized products and services. As in peer regions, metropolitan Chicago has relied on exports and foreign direct investment to drive its economic competitiveness over the past decade.¹¹⁹ The figure below shows the clusters with the highest levels of export activity and reflects the rise of global services.

Despite the growing importance of international markets, many small- and medium-sized businesses here still do not pursue potential trade opportunities – a critical issue in increasing northeastern Illinois’ potential growth. Regional coordination on foreign trade has already helped to improve access to capital, export assistance, and global markets.¹²⁰ Boosting traded clusters’ total output will depend on further enhancing the region’s foreign trade position and its prominence as a center for international business development.

Professional services – as well as goods movement and logistics services – make up a large share of the Chicago region’s exports activity.

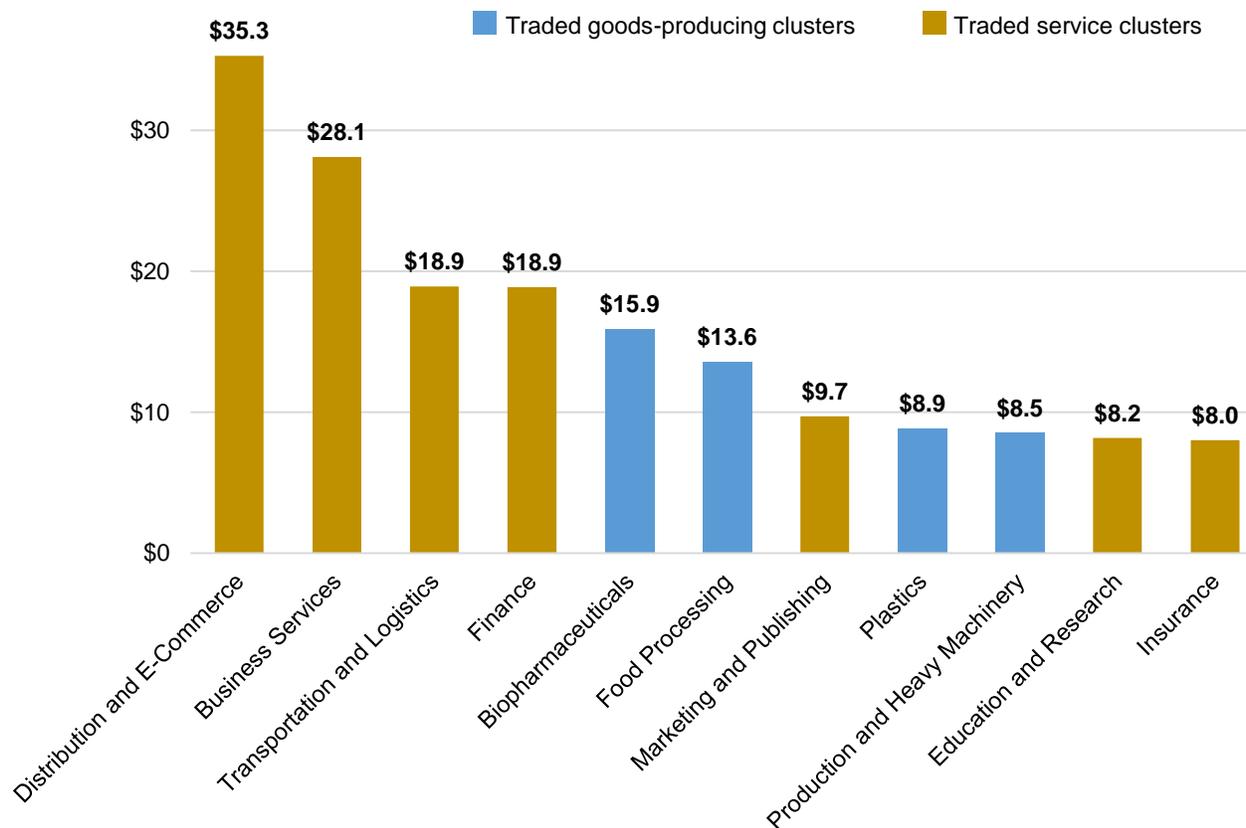


Figure 33: Estimated nominal foreign exports, 2017, in billions

Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialist International data (Emsi 2018.4).



Expanding access to jobs that support upward economic mobility depends on nurturing incumbent businesses in part by expanding their foreign trade activities. Yet, international tensions have added to global trade volatility as well as uncertainty for goods-producing clusters.¹²¹ The prospect of a high-tariff environment has dampened expectations that U.S. businesses can expand exports long-term while raising recurrent hopes that some might choose to *reshore* – or bring operations back to the U.S. However, little reshoring has actually materialized over the past decade. Growth in U.S. imports from low-cost countries regularly outstrips increases in goods producers’ total output.¹²² The decision to reshore would require many businesses to abandon large foreign investments prematurely, make new capital investments here (including in new technologies to keep employee costs low), and redevelop a generation of skilled production workers.¹²³ In response to trade tensions, businesses with offshored activities are more likely to relocate jobs across low-cost countries – for example, from China to Vietnam or from Asia to Latin America – than exchange them for new domestic jobs.



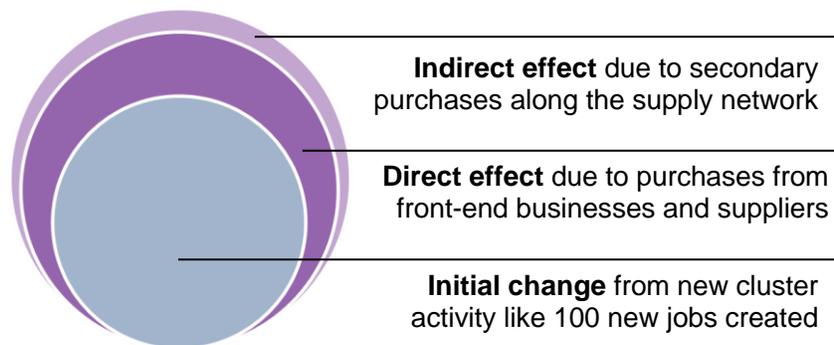
Multiplier effects

Successful cluster strategies help to focus resources and efforts on the businesses that have deep productive advantages in the Chicago region and whose growth would have outsized impacts on the economy as a whole. Researchers, public officials, and economic developers often consider a cluster's estimated *multiplier effect* – that is, the additional economic activity created elsewhere in the regional economy when one cluster expands. Put simply, some segments have a greater ripple effect than others based on how different assets and industries knit together.

The figure below demonstrates the wide divergence in *direct* and *indirect effects* that result from an initial change in select regional clusters. Direct effects occur in front-end businesses or immediate suppliers that would enable expanding the cluster's operations or activities, while indirect effects occur among the suppliers of those suppliers, as incremental spending ripples out. Although not shown in the figure, cluster expansion also leads to an uptick in consumption of other goods and services produced by local clusters like food and entertainment as new workers become consumers in the regional economy. This additional local spending is called an *induced effect*.

Broadly, clusters with stronger regional supply networks tend to have larger multipliers because their success also raises the demand for other intermediate products, support services, and labor available within metropolitan Chicago. For example, each new job created in Food Processing or Upstream Metals creates a second additional job among their direct and indirect suppliers, while Hospitality and Tourism would need to add three new jobs to have the same impact.¹²⁴ Multiplier analysis – like any economic forecasting – is an inexact science that uses assumptions about inter-industry trade patterns, the region's industry mix, and the flow of money into and out of the area.¹²⁵ However, multipliers remain useful tools for comparing regional industries. Moreover, multiplier effects are not static over time. They vary based on clusters' operating conditions and their tendency to buy intermediate goods and services nearby. So, developing regional supply networks or bolstering underperforming or underrepresented industries can help to improve particular multiplier effects.

Multiplier analysis helps to demonstrate the additional economic activity that can radiate out to the rest of the economy when one cluster expands.



Specialized traded clusters with extensive regional supply networks have a greater ripple effect in the regional economy than others.

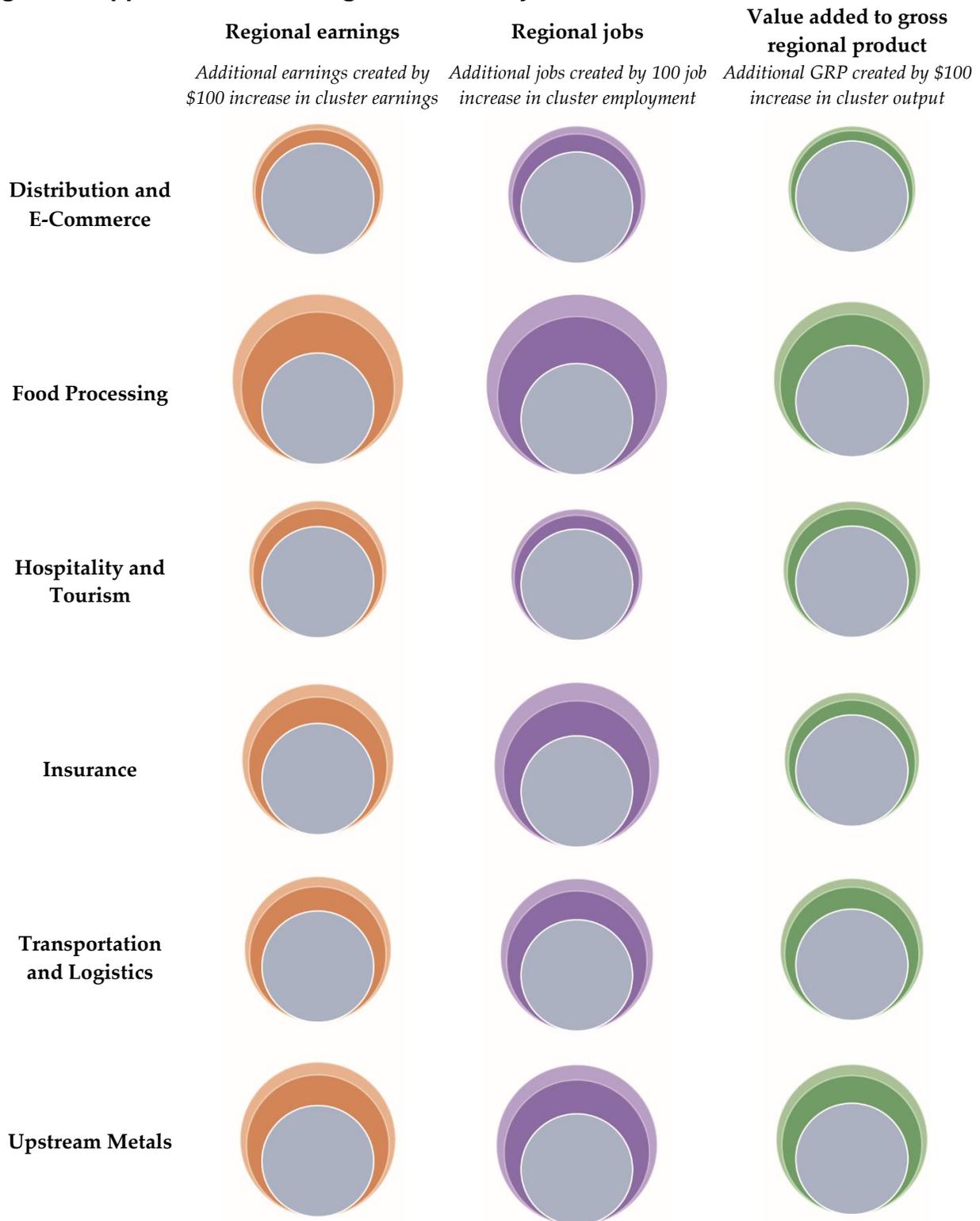


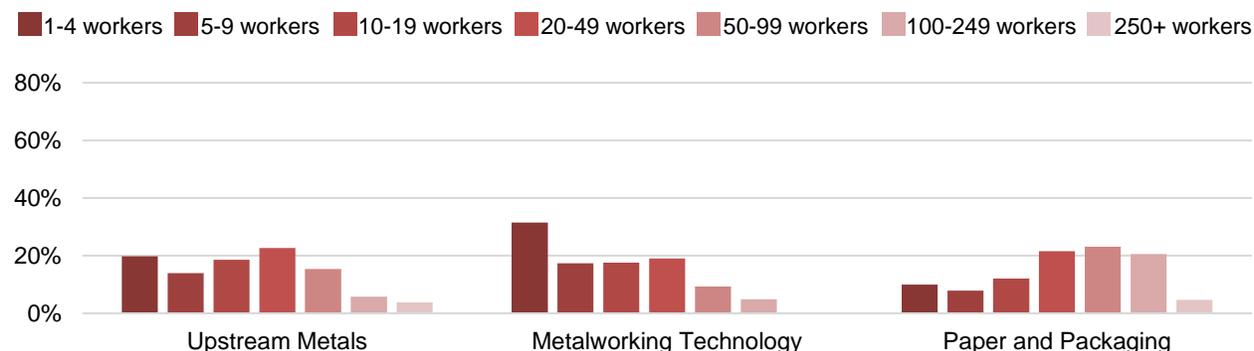
Figure 34: Direct and indirect multiplier effects of growth in select Chicago regional industry clusters
 Note: Size signifies the relative direct and indirect effects in metropolitan Chicago of new cluster growth.
 Source: Chicago Metropolitan Agency for Planning analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Establishment trends

The benefits of industry clusters stem from an environment of balanced competition and collaboration. A robust cluster ecosystem encourages businesses to innovate, keep prices low, pay higher wages, and develop new relationships with customers, suppliers, and competitors – or risk being replaced. Over time, clusters also increase the region’s potential growth by cultivating shared economic assets and new efficiencies. These dynamics are intertwined with patterns of entrepreneurship and business expansion. Data on the age and size of establishments – that is, individual business units at a single location – help to indicate the structure and health of traded clusters, as well as the economy more broadly.

Establishment trends in metropolitan Chicago generally align with academic research on age and size distributions. Available data show that traded clusters tend to concentrate into fewer, larger incumbent businesses as they become more specialized in the national context. In other words, as a cluster matures, successful businesses gain access to the resources needed to expand employment, and the average age and size of establishments rises. These relationships are complex and contested. Establishment age and size can serve as proxies for other parameters, and have been associated in academic research with performance,¹²⁶ efficiency,¹²⁷ survival,¹²⁸ wages,¹²⁹ urban growth,¹³⁰ and other factors. Healthy growth therefore takes different shapes in different clusters based on their unique dynamics.

Goods-producing clusters have higher fixed startup costs that can create barriers to entry and benefit the growth of incumbent businesses...



While service clusters exhibit a trade-off between higher startup rates and lower rates of business survival and expansion.

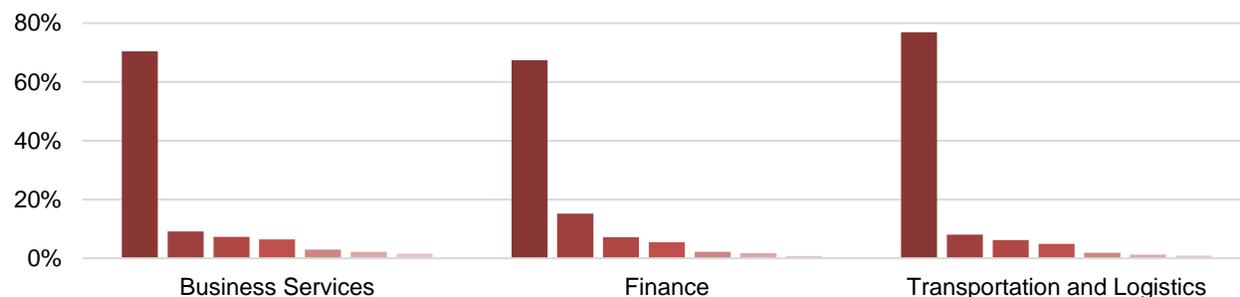


Figure 35: Share of regional establishments in select traded clusters by number of workers, 2016

Note: Establishments refer to individual business units at a single location.

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



To explore these trends, it is helpful to contrast the two overarching sectors used throughout this report – clusters that produce goods and those that sell services. Traded goods-producing clusters have much larger, older establishments. Taken together, these business units have an average of 60 employees and 21 years of experience, compared with 23 employees and 12 years in traded service clusters.¹³¹ The figure above shows the size distributions for the three oldest (top panel) and three youngest clusters (bottom panel) by average establishment age. This comparison shows a larger pattern in the types of establishments that tend to dominate each sector: larger, older manufacturers and smaller, younger service providers.

Goods-producing businesses rely more heavily on large export markets and physical capital like machinery, freight equipment, or industrial space to grow – resources that create higher fixed costs and greater barriers to entry. As successful businesses mature, economic theory suggests that they benefit from greater economies of scale and reduced competition from new entrants.¹³² This process results in more symmetric size distributions and less variation in size, as job growth occurs primarily through business expansion rather than business startups. National research shows that the manufacturing sector has a long history of high market concentration – that is, fewer, larger incumbents hold the bulk of market share.¹³³

Traded cluster	Average establishment	Share of establishments by employment		
	age in years	1-19	20-249	250+
Upstream Metals	32	52%	44%	4%
Metalworking Technology	31	67%	33%	0%
Paper and Packaging	26	30%	65%	5%
Production and Heavy Machinery	24	57%	40%	5%
Downstream Metals	24	68%	30%	2%
Printing Services	24	78%	21%	1%
Plastics	23	41%	56%	3%
Downstream Chemicals	23	55%	42%	3%
Electrical Equipment	21	61%	35%	4%
Medical Devices	21	65%	32%	3%
Food Processing	18	64%	29%	7%
Insurance	16	76%	21%	3%
Education and Research	16	78%	17%	5%
Marketing and Publishing	16	90%	9%	1%
Biopharmaceuticals	15	46%	37%	17%
Distribution and E-Commerce	15	83%	16%	1%
Recreational Goods	14	80%	19%	1%
Environmental Services	13	77%	22%	1%
Business Services	11	87%	11%	2%
Finance	10	90%	9%	1%
Transportation and Logistics	8	91%	8%	1%
Communications Inputs	7	88%	11%	1%

Figure 36: Average establishment age in years and share of establishment by employment size, 2016

Note: Establishments refer to individual business units at a single location.

Source: Chicago Metropolitan Agency for Planning analysis of Dun & Bradstreet and U.S. Census Bureau County Business Patterns data.



Entrenched advantages for incumbents in goods-producing clusters can weaken competition. However, large firms can also serve as centers of gravity around which talent, capital, startups, and knowledge circulate.¹³⁴ Some evidence shows that small businesses are more likely to grow by locating near a few larger firms rather than by many smaller firms.¹³⁵ Other barriers to entry may also contribute to these broad trends, including policies like subsidies to existing businesses, license requirements, local land use restrictions, and high effective tax rates on industrial properties.

By comparison, the Chicago region's traded service sector has a higher share of young, small establishments that rely more on human capital than physical capital. With lower fixed costs, these clusters have higher rates of new businesses entering and exiting the market, which results in more skewed size distributions.¹³⁶ The prospect that a business will shutter is typically greater below 5 years of age, and only a small share of service establishments go on to expand in size. In some cases, this churn of new businesses opening and closing may indicate clusters more experimentation and entrepreneurship, which proponents say increases potential growth on a regional scale.¹³⁷ This idea leads many public officials and economic developers to focus resources on supporting young, start-up businesses. However, empirical studies disagree on whether start-ups actually have an edge in driving overall regional innovation.¹³⁸ Either way, prior cluster research indicates that high-growth businesses tend to emerge from existing regional strengths, suggesting that regional leaders need to balance support for both start-ups and incumbent firms.¹³⁹

Cluster strategies depend on in-depth analysis because the behavior of high-priority clusters can contradict broad patterns and common assumptions. For example, in 2001, the region's Biopharmaceuticals cluster looked more like a service cluster than other goods producers, with a large share of smaller, younger establishments. Scientific and commercial breakthroughs in the 1990s opened new investment opportunities, until shifts in the economics of developing and marketing drugs led biomedical industries to restructure.¹⁴⁰ By 2016, the cluster more closely resembled other goods-producing clusters, with a higher market concentration among large incumbent firms.¹⁴¹ Together, Biopharmaceutical firms have more than twice as many employees in the Chicago region than the national average – more than 86 percent of whom work in Lake County.¹⁴² While the cluster has broadly consolidated, young startups have significant market opportunities. Related cluster strategies may need to assess the pipeline and ecosystem helping competitive startups enter the market.

Establishment trends have important implications for how regional leaders tailor public policies and programs to address barriers to growth. Census data show that business creations and closures – rather than business moves – make up the vast majority of the region's new economic activity.¹⁴³ Significant resources are committed to backing young startups through incubators, accelerators, and incentives, particularly but not exclusively in service clusters.¹⁴⁴ In contrast, efforts to support incumbent firms traditionally focus on incentives for large employers and some technical assistance for manufacturers.



The Chicago region’s Biopharmaceuticals cluster became more concentrated among larger firms during 2001-16, as startup firms matured and consolidated.

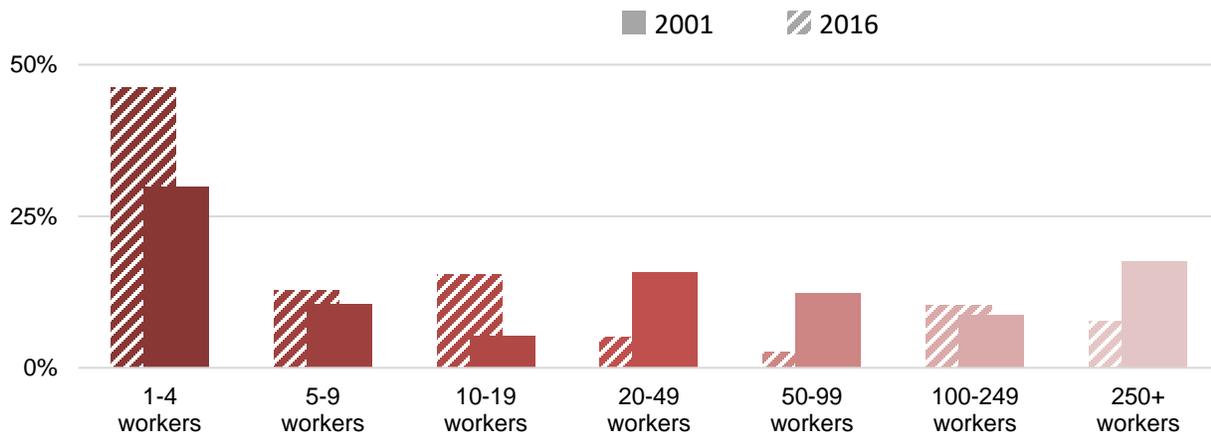


Figure 37: Share of regional Biopharmaceuticals establishments by number of workers, 2001 and 2016

Note: Establishments refer to individual business units at a single location.

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

However, a better understanding of the dynamics within high-priority cluster can adapt existing efforts or identify new approaches to supporting export-oriented businesses. For example, research highlights the region’s need to boost succession planning and develop a pipeline of viable purchasers for hard-to-replace manufacturers with retirement-age owners.¹⁴⁵ In addition, minority-owned businesses receive fewer, smaller, and more expensive loan and equity investments – compounding barriers in service clusters with both low minority representation and smaller establishments.¹⁴⁶ Public and private partners will need to adapt to different operating conditions to successfully improve the competitiveness and potential growth of high-priority clusters.



Freight infrastructure sustains our clusters

Metropolitan Chicago is the preeminent freight hub of North America. Even in an era of global commerce, its economy is defined in part by its geographic location and physical connectivity. Historically, the region served as the primary conduit by which raw materials flowed from an expanding nation to industrializing centers on the East Coast and for manufactured goods to return to frontier markets. Today, the region continues to build on this legacy as a global center for both goods production and movement, handling \$3 trillion of transported goods each year and exporting over \$46 billion of goods in 2017.¹⁴⁷ Manufacturing processes have been remade in recent decades by accelerating shifts in technology, outsourcing and off-shoring, and global trade practices. Yet, the region's highest employment concentrations – common indicators of competitive, specialized industries – are still in goods-producing clusters that move tens of billions of dollars in freight annually.¹⁴⁸ Strategies to foster competitive clusters will also mean implementing efforts to modernize freight infrastructure and operations.

Prior CMAP analysis shows the significant value that the region's unparalleled access to freight infrastructure, workforce, and logistics services adds to goods production here.¹⁴⁹ Historical transportation investments have created rooted economic benefits that help explain why many diverse businesses choose to operate in northeastern Illinois. These assets provide manufacturers more choice in transportation mode, more connections, better travel times, enhanced market access, and lower shipping costs. Yet, recurring challenges like congestion and unresolved conflicts between railroads and highways can undermine these advantages. When the region's freight system works effectively, it supports local and national economic growth by connecting traded clusters here to new markets. When the system performs poorly, however, economic effects are felt both locally and nationwide. Infrastructural and operational improvements to the freight system can reduce traded clusters' overall shipping costs, while addressing local concerns over congestion, safety, and quality of life.

Freight Analysis Framework data

The Federal Highway Administration's Freight Analysis Framework data (FAF) estimate the movement of 43 different commodities defined by the Standard Classification of Transported Goods. The FAF is the most comprehensive regional freight data available, but it has some limitations. The commodity classifications do not align directly to existing industry and cluster definitions, making it more difficult to draw concrete conclusions. The FAF also struggles to capture multimodal freight fully and lacks the granularity to discern specific trade relationships or types of goods. Despite these limitations, FAF data is useful in developing high-level insights on the relative freight activity generated by the region's traded clusters. The following analysis includes movements of goods by truck, rail, air, water, pipeline, or a combination of these modes that either originate or terminate in northeastern Illinois. Data reflect the Illinois portion of the U.S. Census Bureau combined statistical area, including the seven-county CMAP region of Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will counties, as well as neighboring DeKalb, Grundy, and Kankakee counties.



The growth of key specialized clusters will depend in part on efforts to relieve freight congestion, improve reliability, and support intermodal connections.

	Food Processing	Medical Devices	Production and Heavy Machinery	Biopharmaceuticals	Plastics	Downstream Chemicals
Value of inbound and outbound freight, in billions	\$84.6	\$73.5	\$58.8	\$44.0	\$39.5	\$39.1
Total freight shipment weight, in kilotons	67,290	2,507	24,693	9,297	11,859	61,566

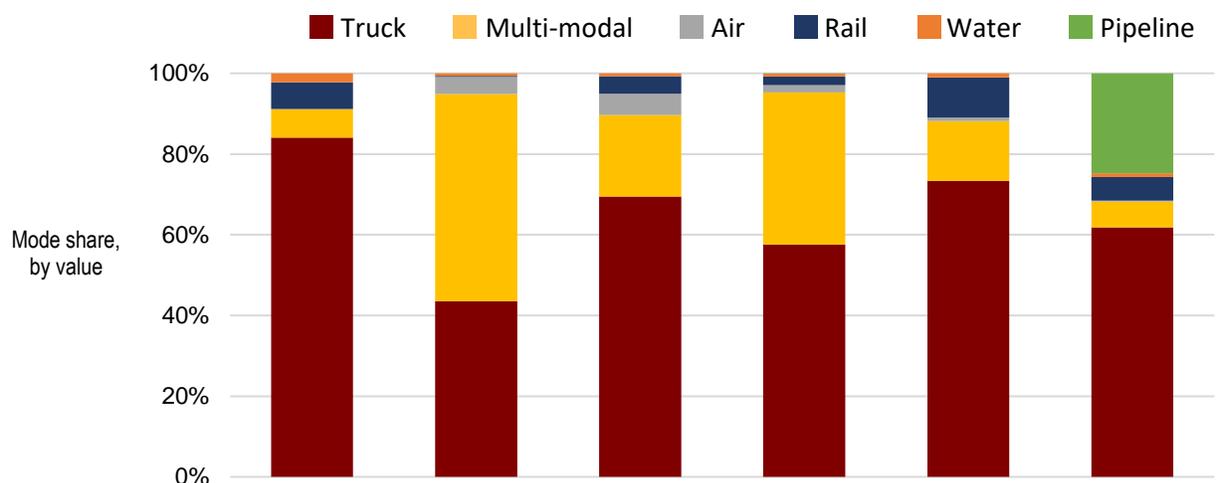
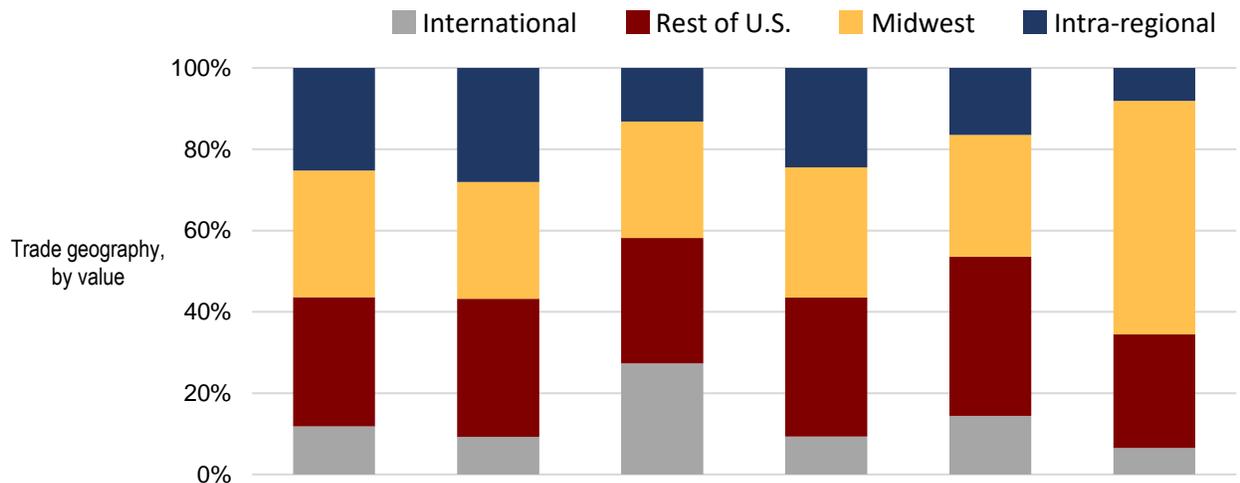


Figure 38: Shipment characteristics of major traded goods-producing clusters, 2016

Note: Data for metropolitan Chicago includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Data for the Midwest includes the rest of Illinois and all of Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin.
 Source: Chicago Metropolitan Agency for Planning analysis of Freight Analysis Framework data (FAF 4.4.1).



Supply networks

Advances in manufacturing, freight movements, and logistics are changing how goods move. In an era of global commerce, traded clusters now source inputs from around the world, exchange intermediate goods frequently, and sell final products in national and international markets. Additionally, new standards and practices like lean manufacturing – where processes are continually improved to reduce waste and improve efficiency – and changing consumer expectations for online ordering are increasing the need for rapid, reliable goods movement. As a result, the region’s transportation system needs to support increasingly complex supply networks with greater reliability. How traded clusters use the freight system – as well as their growing demand for distribution and logistics services – is a critical issue in sustaining one of the region’s greatest competitive advantages.

Broadly, most traded clusters add significant value to the goods flowing into and out of the Chicago region. In other words, many regional industries export more goods by value than the region imports. While the FAF data lacks enough detail to chart specific trade relationships, the data highlight the region’s role in key supply networks and their relative importance. Approximately a third of freight generated by Electrical Equipment (34.9 percent) and Communications Inputs (37.2 percent) is exchanged directly with international partners.¹⁵⁰ By comparison, more than half (57.5 percent) of Downstream Chemical’s freight by value originates or terminates within the Midwest.¹⁵¹

Other clusters – most notably Medical Devices, and Production and Heavy Machinery – reflect larger, national trends as some American manufacturers have moved away from vertical integration toward greater specialization.¹⁵² Rather than transforming raw materials into a final product singlehandedly, manufacturers have increasingly honed their competitiveness by focusing on core competencies and outsourcing other functions to their suppliers. As a result, original equipment manufacturers (OEMs) increasingly assemble products from intermediate parts sourced in national and global supply networks. Firms also reduce risks by implementing the latest just-in-time strategies for logistics management. These methods optimize supply costs, keep inventory levels low, and minimize the time that a good sits before reaching the customer. These trends appear strongest in advanced manufacturing industries that operate in niche markets or need to comply with tight quality control and consumer safety standards.

Two important clusters – Transportation and Logistics as well as Distribution and E-Commerce – do not appear prominently in the FAF data because they do not generate much freight activity directly. Instead, they serve as the intermediaries that enable other clusters’ supply networks. Their ongoing strength plays a crucial role in connecting northeastern Illinois to the rest of the world. For example, the region’s freight transportation arrangement industry (NAICS 488510) offers regional firms an array of modern logistics services: freight brokerage and forwarding, repackaging, demand forecasting, inventory management, distribution and warehousing, and assistance moving international shipments through customs. With 17,800 jobs – nearly 2.7 times the national average – and 40.6 percent job growth since 2001, the industry is an important pillar of the region’s traded goods-producing sector.



Metropolitan Chicago is a global center for goods production and movement with trading partners extending across the U.S. and around the world. In the process, regional firms add significant value to the diverse commodities and products flowing into and out of the region.

- Inbound Midwestern
- Inbound other U.S.
- Inbound international
- Outbound Midwestern
- Outbound other U.S.
- Outbound international

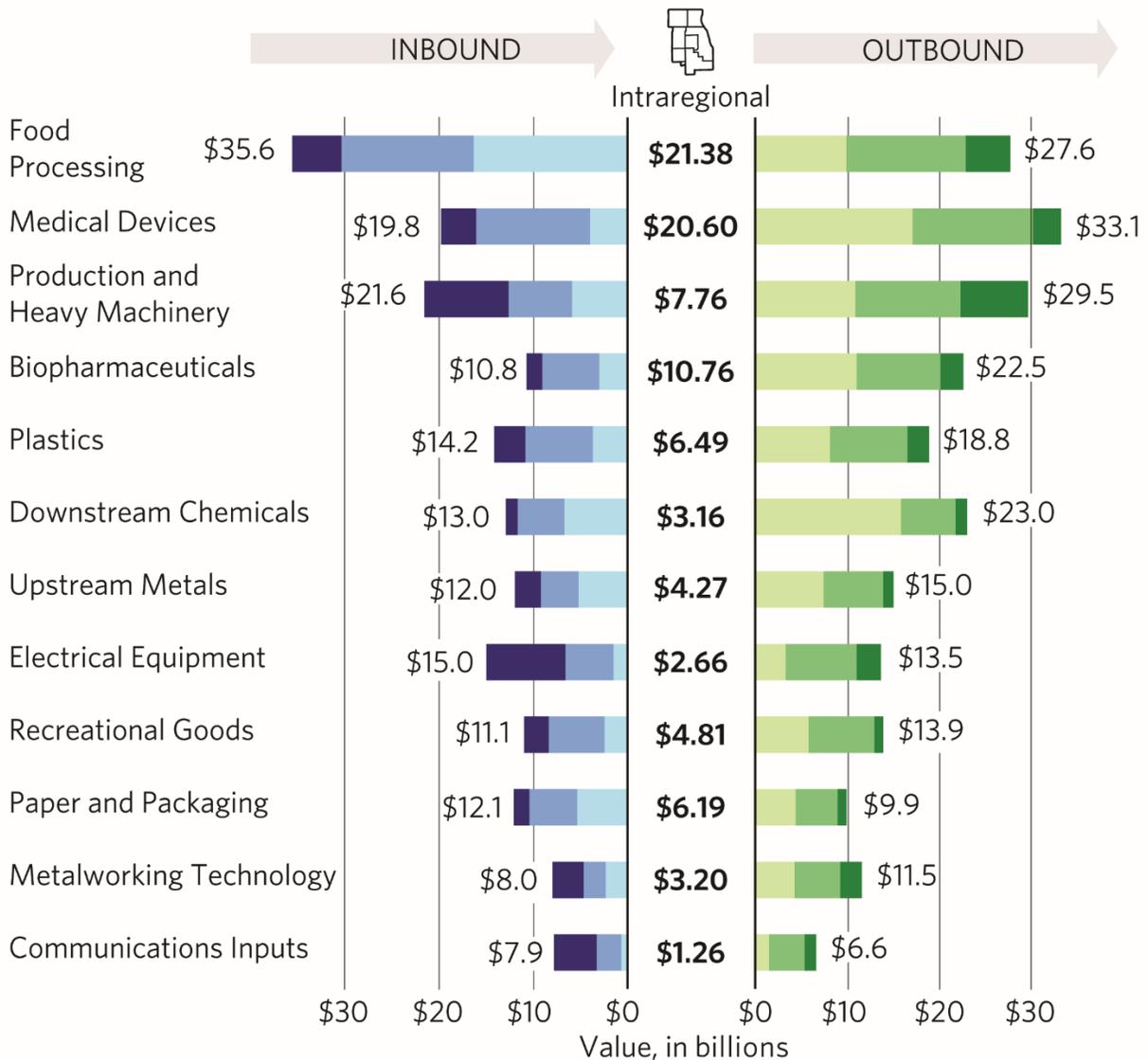


Figure 39: Top Chicago regional traded clusters for freight movements by value, 2016, in billions

Note: Data for metropolitan Chicago includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Data for the Midwest includes the rest of Illinois and all of Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin.

Source: Chicago Metropolitan Agency for Planning analysis of Freight Analysis Framework data (FAF 4.4.1).

While today’s supply networks can extend globally, they hinge on a combination of efficient, smaller moves within metropolitan Chicago. Our truck network – which makes up an estimated 84.7 percent of all traded clusters’ intraregional moves – connects firms to major freight, manufacturing, and distribution centers. Prior CMAP analysis has identified key areas where local governments can support intraregional freight by working across jurisdictions – for example, by coordinating truck routing and planned infrastructure improvements.¹⁵³

How and to what extent clusters use the regional truck system to move intermediate and finished goods depends somewhat on how they fit into different markets. The figure below shows traded clusters’ intraregional truck shipments as a proportion of their total freight moves by value and assesses the types of goods and freight activities that dominate each cluster. Not surprisingly, trucks crisscrossing the region carry a larger share of total freight (20-25 percent) in clusters that have relatively high levels of local consumption, in addition to exports like Food Processing or Printing Services.

Increasingly complex supply networks depend on our regional truck system to support traded clusters’ distinct functions in national and global markets.

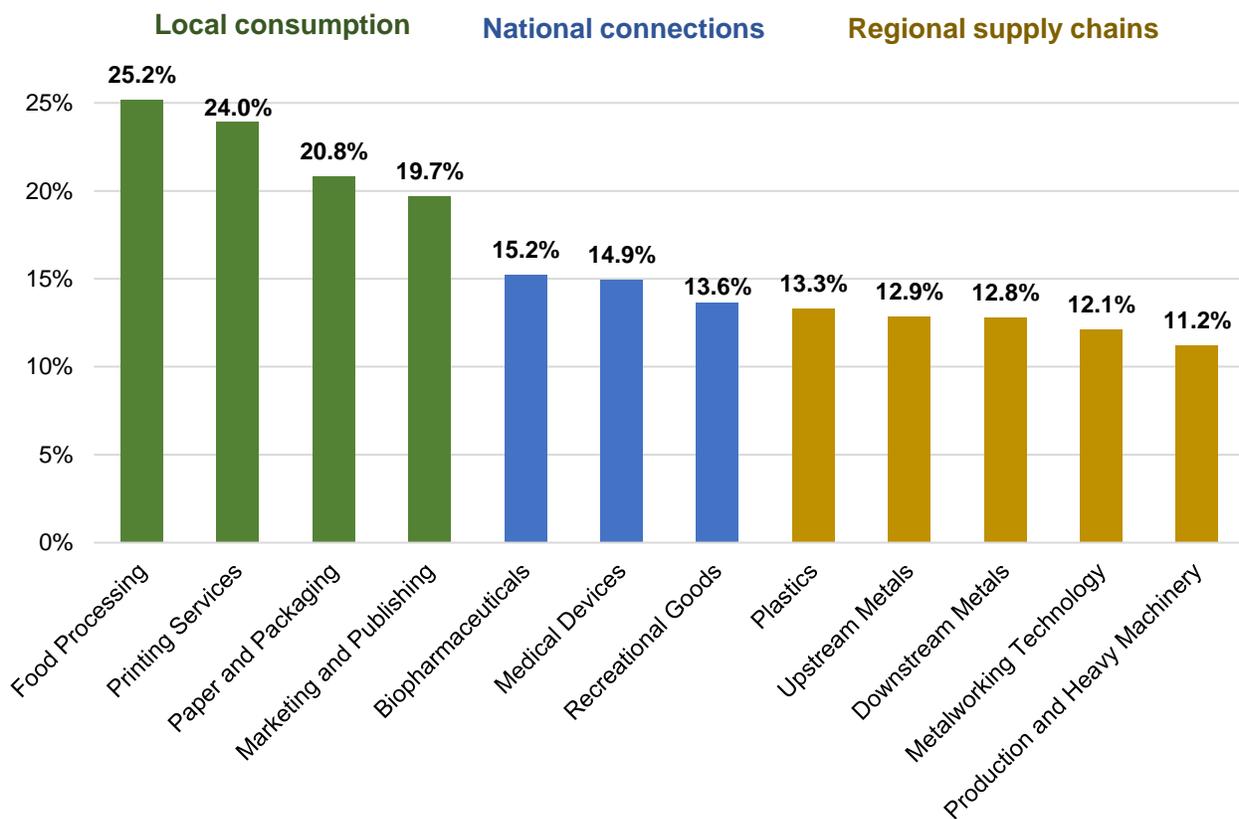


Figure 40: Intraregional truck flows as share of total freight movements by value, 2016
 Note: Data for metropolitan Chicago includes only the Illinois portion of the U.S. Census Bureau combined statistical area.
 Source: Chicago Metropolitan Agency for Planning analysis of Freight Analysis Framework data (FAF 4.4.1).



In contrast, Biopharmaceuticals, Medical Devices, and Recreational Goods tend to export final products and use trucks for first- and last-mile connections to other modes, known as drayage. For instance, multimodal flows – which include both parcel services and intermodal freight like air-truck or rail-truck moves – make up just over half (51.3 percent) of Medical Devices’ freight shipments. Drayage depends on the time and cost reliability of truck moves within the region and can cost many times more per mile than long-haul trucking. Rail-truck intermodal facilities, O’Hare Airport, and the Port of Chicago all serve as critical gateways for national and global commerce. Ensuring strong, low-cost connections with these facilities is essential to supporting clusters’ freight needs as well as the competitiveness of the region’s intermodal assets.

Finally, northeastern Illinois benefits from dense, regional supply networks that build off its recurring strengths in metals, machinery, and equipment manufacturing. For related clusters, the truck system also supports frequent moves among specialized manufacturers as they exchange sub-assemblies, components, and intermediate goods. Unlike other regions that tend to rely on longer supply chains, metropolitan Chicago’s original equipment manufacturers – which make finished products from intermediate or component parts bought from other firms – can work directly with regional suppliers to customize or improve their production inputs. Future firm-level analysis can help to identify additional opportunities to meet supply needs within the region.



Mode choice

Firms situated in metropolitan Chicago have access to ten interstate highways, six Class I railroads, one of the nation’s busiest air-cargo hubs, and the only maritime connection between the St. Lawrence Seaway and the Mississippi River system. Nearly 17.5 million twenty-foot equivalent units of freight pass through northeastern Illinois’ 20 active intermodal facilities annually,¹⁵⁴ making it the largest intermodal container handler in the Western Hemisphere. Each mode of transportation – truck, rail, air, water, pipeline, or a combination of these modes – offers a different solution to modern supply networks. The mode by which traded clusters move any particular good depends on customer needs, product value, and weight.

Trucks carry the vast majority of traded clusters’ goods into and out of the Chicago region – around 65 percent by value and 57 percent by weight. Their geographic freedom and lower costs mean that most shippers can arrange reliable, versatile, and affordable transport. The next most prominent mode depends on whether movement is measured by value or weight, as shown in the table below. Multimodal shipments – primarily rail-truck and some air-truck moves – have grown more popular as the freight system better integrates infrastructure across modes. However, FAF data do not distinguish between types of multimodal flows and so obscure the full impact of the region’s rail and airfreight systems. For instance, approximately 25 percent of all freight trains in the U.S. and 50 percent of all intermodal trains move through metropolitan Chicago. Unrivaled access to alternative transportation modes allows regional firms to make custom arrangements for different primary, intermediate, and finished products.

Mode	Value, in billions \$	Weight, in kilotons
Truck	\$545.1	320,393
Multimodal	\$160.7	23,621
Pipeline	\$61.0	143,873
Rail	\$36.5	62,247
Air	\$18.2	214
Water	\$9.6	7,780

Figure 41: Inbound, outbound, and intraregional freight movements generated by traded clusters, 2016

Note: Data for metropolitan Chicago includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Totals include all traded clusters, including those with fewer than 2,500 employees in 2017 otherwise excluded from the report.

Source: Chicago Metropolitan Agency for Planning analysis of Freight Analysis Framework data (FAF 4.4.1).



Traded clusters choose to move goods by different freight modes based on their unique conditions like customer needs, product value, and weight.

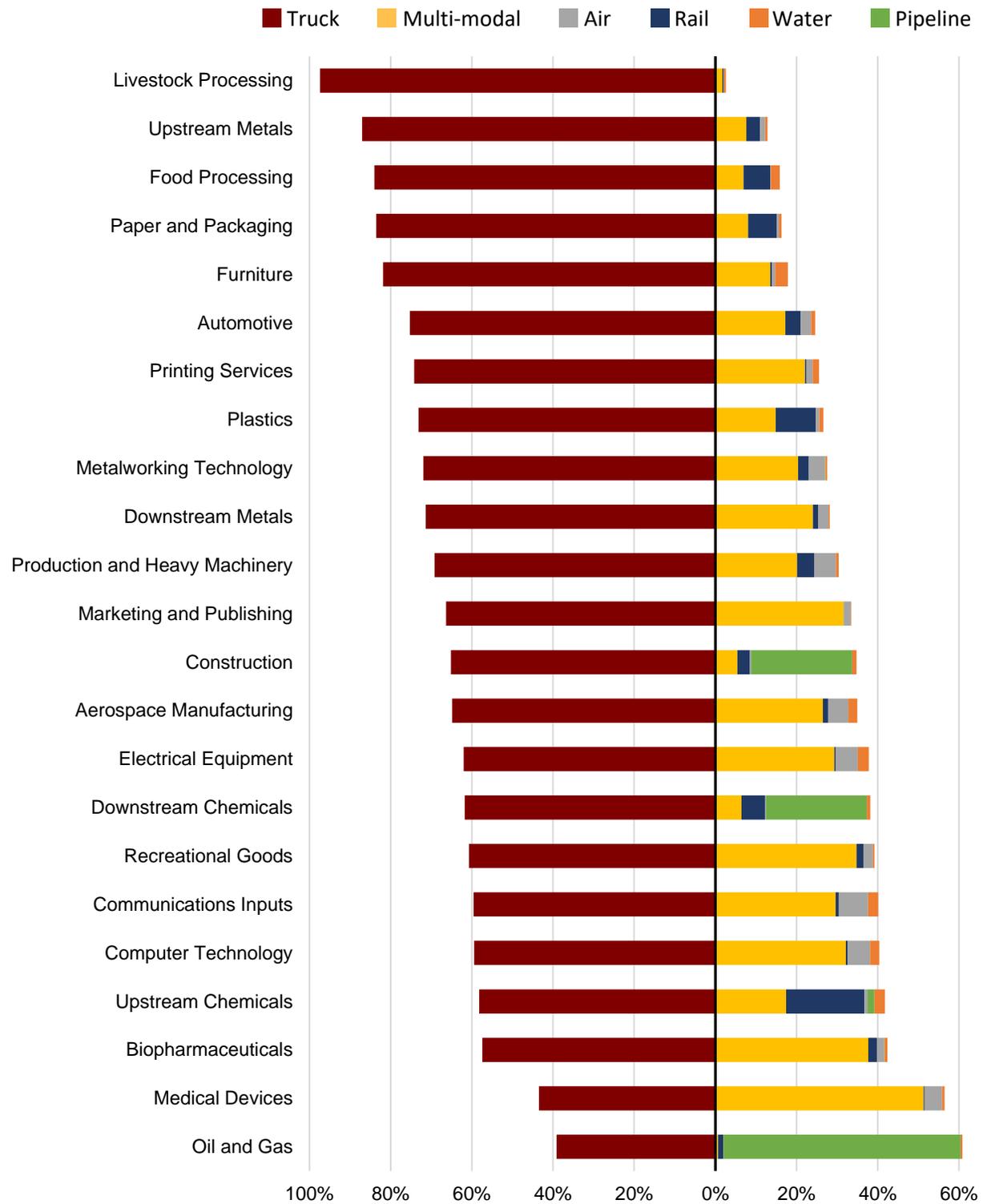


Figure 42: Mode share of total freight movements by value, 2016
 Note: Data for metropolitan Chicago includes only the Illinois portion of the U.S. Census Bureau combined statistical area.
 Source: Chicago Metropolitan Agency for Planning analysis of Freight Analysis Framework data (FAF 4.4.1).

The value density of different shipments helps to demonstrate the factors that contribute to patterns in mode share across clusters. The figure below shows the average value of freight shipments per ton across metropolitan Chicago’s specialized traded clusters, ranging between \$635 in Downstream Chemicals to \$29,318 in Medical Devices. At the low end, clusters that produce resource-intensive commodities rely on a steady flow of heavy, low value goods. These firms are more likely to compete on price alone rather than product variation and try to eke out cost advantages by pursuing affordable options with truck, rail, and water freight operators. CMAP analysis shows that manufacturers of primary metal, food and beverage, paper, and petroleum products face particularly high inbound transportation costs.¹⁵⁵ As a result, these firms are more likely to co-locate their facilities with the freight firms and infrastructure they depend on to move larger, more cost-efficient bulk shipments.¹⁵⁶

As the average value of freight shipments per ton rises, firms are more likely to take advantage of multimodal and airfreight alternatives to move goods.

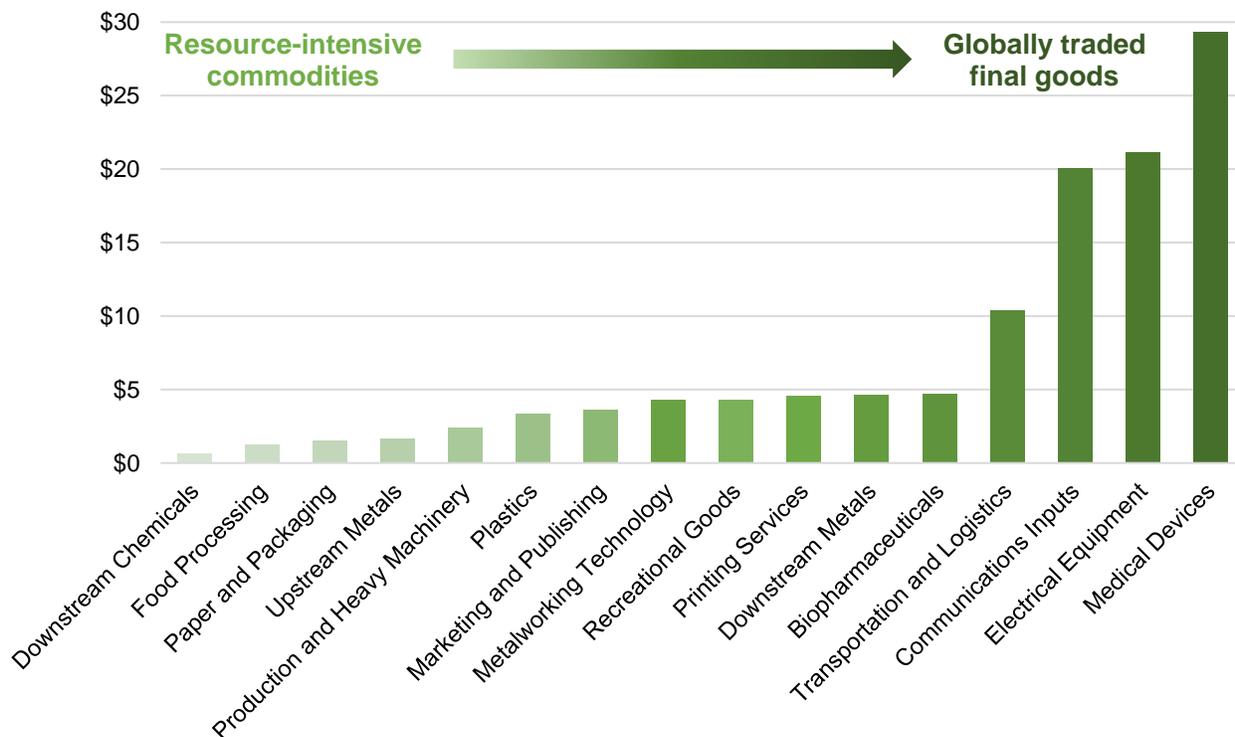


Figure 43: Value of freight shipments per ton, 2016, in thousands
 Note: Data for metropolitan Chicago includes only the Illinois portion of the U.S. Census Bureau combined statistical area.
 Source: Chicago Metropolitan Agency for Planning analysis of Freight Analysis Framework data (FAF 4.4.1).

As products become more lightweight and high value, firms tend to take greater advantage of multimodal and airfreight alternatives. These shipments include both highly customized, intermediate parts as well as final goods bound for customers across the U.S. and globe. Other factors – such as reliability, time to market, and supply network connections – therefore figure into clusters’ freight activities. For example, electronic and biomedical producers may look for transportation options that offer the speed and import-export access to respond quickly to



changing industry demand. These clusters rely heavily on truck transport to maximize supply network connections with regional rail and airfreight facilities.

Given differences in mode share, the condition of the region’s transportation infrastructure has varying impacts on the performance of traded clusters. The figure below shows key traded clusters as a share of metropolitan Chicago’s total freight movement by value. The region’s truck and rail systems have a broader array of industry users than airfreight and intermodal facilities. (By comparison, just two clusters – Oil and Gas and Downstream Chemicals – make up 92.9 percent of pipeline shipments by value.) Yet, the Chicago region is home to some of the worst freight congestion and bottlenecks in the U.S. As the North American freight hub, poor infrastructure, highway-truck conflicts, and crowded intermodal terminals can cause economic disruptions across industries both here and nationwide.

While shipments move across an integrated freight system, select traded clusters account for the majority of total goods movement by different modes.

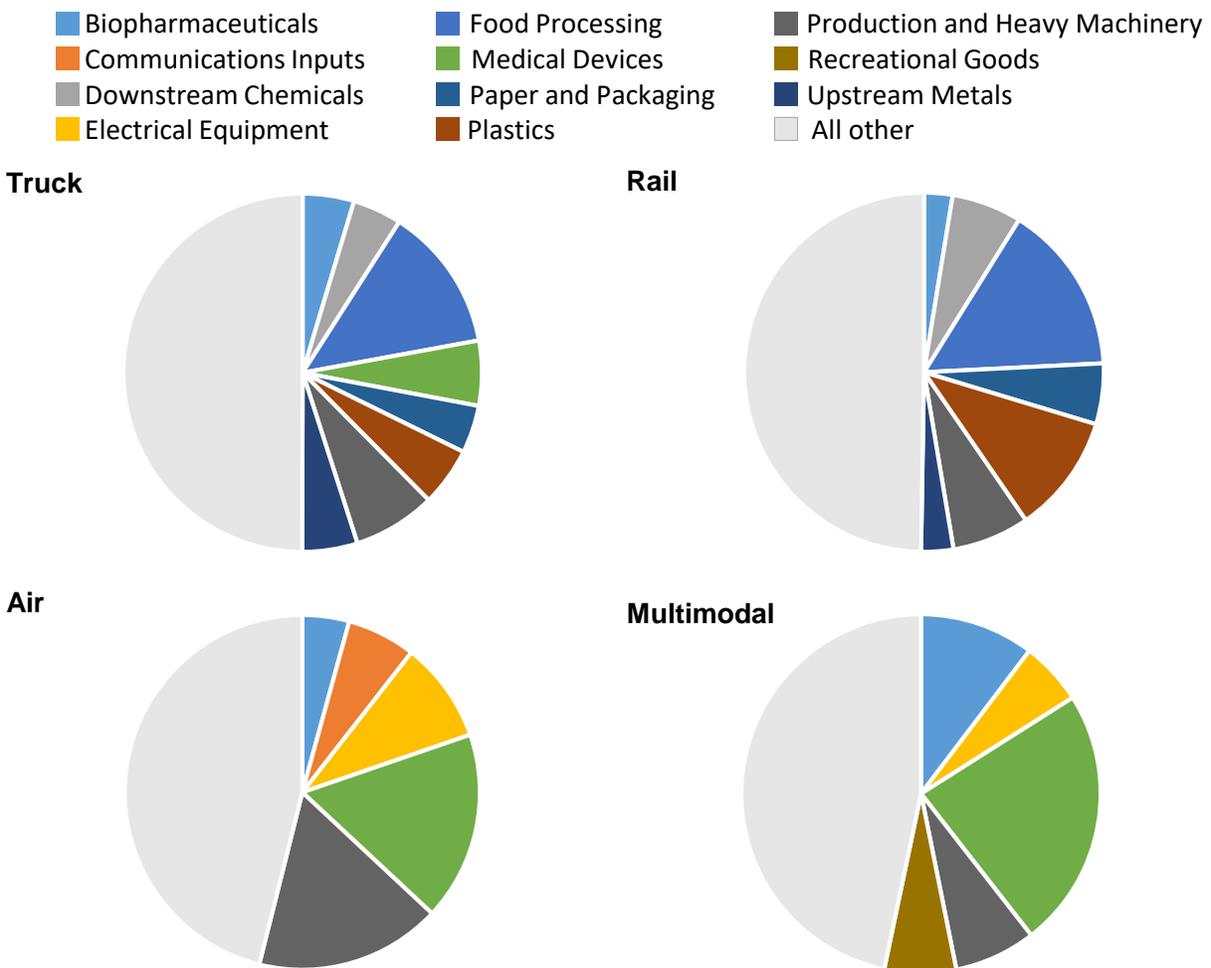


Figure 44: Traded clusters as share of total freight value by mode, 2016
 Note: Data for metropolitan Chicago includes only the Illinois portion of the U.S. Census Bureau combined statistical area.
 Source: Chicago Metropolitan Agency for Planning analysis of Freight Analysis Framework data (FAF 4.4.1).

Recommendations: Cluster strategies will reinforce regional growth

In a changing global economy, fostering stronger growth depends on improving metropolitan Chicago's competitiveness as a place to launch, operate, and expand export-oriented businesses. Doing so will mean going beyond traditional business attraction and retention. Bolstering high-priority clusters will require integrating a wider array of public policies and investments to enhance the region's underlying assets and advantages. A cluster-based approach takes existing efforts further by joining them to related decisions in infrastructure, land use, tax and fiscal policy, racial and economic equity, scientific research and development, and supports for small businesses, supply networks, and trade. In other words, it focuses and improves efforts to provide the essential components of a modern economy in light of shifts in technology, trade, and climate change.

Cluster-oriented economic development determines what is constraining the competitiveness of high-priority clusters and addresses these issues based on the capabilities and resources of regional businesses. The key is integrating direct business intelligence and a coordinated public-private response. Historically, metropolitan Chicago has favored business attraction that supports retail, large industrial, and headquarter developments with various incentives. These tactics generally do not address underlying constraints on how businesses compete in national and global markets. Instead, cluster strategies will provide stronger, more inclusive, and more sustainable growth over time. Such an approach should be grounded in an understanding of the region's specialized traded clusters, their importance to regional growth, and their potential to provide broad, inclusive economic opportunity. CMAP will continue to provide data and analysis on the region's traded clusters in order to improve the use of economic data in guiding related public investment and policy decisions.

Economic developers should take the lead in fostering co-ownership among industry leaders, developing industry expertise and credibility, and facilitating a shared vision for enhancing the region's business environment. This process should address the information gaps that clusters face internally (preventing effective collaboration) and externally (hampering public supports and promotion). Partners should learn to "speak the same language" about what matters to businesses and what cluster-specific, market-oriented interventions are needed. For instance, the steps required to strengthen firms in a dense supply network are not the same as those to strengthen firms that rely on similar skills or technologies. Reflecting metropolitan Chicago's tradition for civic partnerships, industry leaders will need to participate in implementing improved economic development strategies for them to succeed. Clusters' network and location benefits – as well as the potential for renewed cluster growth – justify private investment and an active approach to guiding related policy and planning activities.

In some cases, more concerted efforts can be gathered and organized through formal *cluster initiatives* – major programs designed to stimulate economic activity in specific traded clusters. With robust public funding and support, cluster initiatives put industry leaders directly in



charge of defining priorities and advancing cluster-specific solutions. National examples include Milwaukee's The Water Council, St. Louis' BioSTL, and North Carolina's Research Triangle Park. As worrying industrial trends have persisted, public officials and private leaders in the Chicago region have frequently discussed launching similar endeavors here. However, regional leaders should be clear-eyed about the level of financial and institutional commitment required. Rather than cure-alls, cluster initiatives are strategic bets that can accompany reliable investments in the region's core assets and efforts to address broader economic issues. They should mark the culmination of a cluster-based approach rather than its first step.

The form and function of cluster initiatives depend on the challenges and opportunities faced by the industries they support. They can be managed by public or public-private economic development organizations, independent non-profits, holding companies, university-based centers, or a coalition of lead organizations. They often develop networks for sourcing ideas, talent, supplies, customers, market opportunities, public services, financing, and other business inputs. Many initiatives draw on nearby universities and national laboratories to foster a more robust ecosystem, including the University of Wisconsin-Milwaukee and Marquette University in water technology,¹⁵⁷ Clemson University in vehicle manufacturing,¹⁵⁸ Stanford University in computer technology,¹⁵⁹ and Boston-area universities in life sciences.¹⁶⁰

Metropolitan Chicago has seen recent progress in launching facilities to stabilize and support key industries, including mHUB, the Chicago Metro Metal Consortium, and the Chicagoland Food and Beverage Network. These organizations have elevated the profile of clusters critical to the regional economy and demonstrated the potential benefit of public-private cooperation. Economic data does not yet show a substantial change in longer-term industry trends. This is likely more telling of the scale and scope of the challenge than of the organizations' work so far. Without immediate results, stakeholders convey an increasing wariness toward this type of formal, ecosystem-building approach – reflecting national debates that have reconsidered cluster initiatives as one best practice among many for regional economic development.¹⁶¹ However, if elected officials and economic developers provide the necessary support, a cluster-based approach has the potential to transform how the region restarts economic growth.

Many entities have a role to play in sustaining regional assets and economic growth. Failure to coordinate these partners can lead to unforeseen public costs and impinge on new private investment and jobs. In particular, well-planned, adequately maintained, and highly functional infrastructure can be a precondition for cluster development and growth. The diversity of the region's economy reflects the benefits of its extensive transportation and transit networks as well as multimodal connections. Nearly all traded clusters rely on infrastructure that reduces transaction costs, expands connections to workers with reliable and adequate transit service, and enables efficient trade flows. Likewise, appropriate land use planning and local development can preserve existing assets with access to transit, freight corridors, and public utilities. Regional leaders should better integrate these efforts with other place-based strategies or resources like community development block grants to meet clusters' functional needs. In many cases, policies, plans, and investments can be layered together to achieve both local and regional goals.



mHUB

Launched in 2016, mHUB strengthens the Chicago region's longstanding physical product innovation and manufacturing community.¹⁶² Drill-down analysis demonstrates that high, upfront capital costs has become a deterrent to bringing innovative products and hardware to market.¹⁶³ In response, mHUB bridges the gaps between entrepreneurs seeking to build their businesses and partners looking to invest in emerging innovations. The organization began with an advisory group of 25 small and medium-sized manufacturers convened by World Business Chicago. In its first two years, mHUB grew to more than 500 members holding 200 patents, employing 780 high-skilled workers, generating \$48.5 million in revenue, securing at least \$40 million in capital investments, and launching more than 640 products.¹⁶⁴ This early success reflects its focus on developing entrepreneurs and businesses as well as their products. mHUB's 63,000 square-foot facility contains a microfactory and 10 fabrication labs, including electronics, metals, plastic fabrication, textiles, and rapid prototyping. The space also serves as a center for accelerator programs, entrepreneurial training, mentorship, and business development, as well as partnerships with Northwestern University, Illinois Tech, the Illinois Manufacturing Excellence Center, the Technology and Manufacturing Association, and many others.

Chicago Metro Metal Consortium

The Chicago Metro Metal Consortium (CMMC) brings deliberate focus and support to the region's cluster of metal and machinery manufacturers.¹⁶⁵ Northeastern Illinois' seven counties (Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will) and the city of Chicago formed CMMC in 2014 to marshal resources around the largest such cluster in the nation, with around 90,000 workers.¹⁶⁶ Since being named one of 24 Investing in Manufacturing Communities by the U.S. Department of Commerce, its initiatives have helped to maintain the region's position as a leading hub for related businesses. In its first two years, CMMC leveraged \$46 million in public and private resources supporting metal and machinery manufacturers in Illinois. A growing regional business network connects metal suppliers with manufacturers and identifies key infrastructure improvements that would benefit the cluster.¹⁶⁷ Partnerships with education and training providers address workforce needs by promoting career pathways in manufacturing. Ongoing collaboration with Metro Chicago Exports and the German American Chamber of Commerce helps metal manufacturers reduce the cost of entry and expansion into foreign markets.¹⁶⁸ Such initiatives demonstrate the potential for businesses to work together on shared opportunities and common concerns in ways that complement their competitive interests.

Chicagoland Food & Beverage Network

The Chicagoland Food & Beverage Network (CFBN) is a private initiative to address the needs of the region's food manufacturing and packaging cluster.¹⁶⁹ Launched in 2017, CFBN offers a range of consulting, financial, innovation, workforce training, and other activities that reflect the industry cluster's rapidly changing markets. Food industries have shifted substantially in recent years amid evolving consumer tastes, technology and regulatory requirements, and skilled workforce needs.¹⁷⁰ At the same time, diverse representation and products with local roots are integral to the food cluster's business case. These industries have a high share of small and medium-sized businesses based in neighborhoods on Chicago's South and West Sides¹⁷¹ and require little more than a high school diploma for entry-level jobs with potential career pathways to well-paying, supervisory roles.¹⁷² CFBN's mission aims to align industry growth with inclusive improvements to regional employment, entrepreneurship, and neighborhood revitalization. For example, CFBN has begun building a food manufacturing training institute based on an industry-driven curriculum and partnership with regional training providers. The network also helps to connect new entrepreneurs with distribution and marketing opportunities, as well as mentorship from bigger food companies.



Considerations for new cluster strategies

Over the last 30 years, efforts to support traded clusters have taken many forms and attempted many interventions globally. Some have changed the trajectory of their regional economies, and many have failed to live up to expectations.¹⁷³ Three key considerations should guide the development of similar efforts in the Chicago region.

First, effective cluster initiatives begin with a shared vision. In lieu of robust, differentiated state or federal plans, metropolitan Chicago should take a clusters-based approach in defining a regional economic strategy. This strategy should align economic objectives and outcomes across the region's elected and appointed officials, economic and workforce developers, industry leaders, private institutions, civic partners, and others. Despite our economy's global reach and metropolitan breadth, too many approaches and tools for growth remain siloed to particular jurisdictions or types of organizations. A clusters-based approach is fundamentally multi-pronged and multi-jurisdictional. This approach will mean clearly defining the roles of high-priority clusters, their contributions to local and regional goals, and the specific market failures that warrant intervention. The process to develop a shared vision should build on existing efforts to better coordinate strategies and public services, including those led by the Chicago Regional Growth Corporation and Workforce Partners of Metropolitan Chicago. Improving how the region pursues industrial and economic development more broadly will enable it to take increasingly targeted steps to strengthen select traded clusters.

Second, well-designed, industry-led cluster initiatives can spur greater economic growth only if regional leaders truly prioritize among potential clusters.¹⁷⁴ Cluster initiatives have found success under different types of leadership, but these decisions fall to elected officials, business leaders, or civic institutions with the purview to chart a course and the ability to galvanize the appropriate resources. The Chicago region can sustain multiple priorities at once, but metropolitan economies prioritize nothing when they prioritize everything. Retooling a cluster will likely require 10-15 years of steady support, and doing so will frequently create broader co-benefits among related clusters, along regional supply networks, and across multiple communities. However, given resource constraints, ill-defined objectives can prevent public officials and economic developers from gaining deep industry expertise or providing commitments that attract meaningful investment.

Finally, the region's economic priorities ultimately depend on its economic principles and goals. Cluster strategies are just intermediate objectives in achieving larger, longer-term aims. Most notably, the region should focus public support and investments toward clusters that better support upward economic mobility and improve residents' well-being and quality of life. A cluster-based approach can further adapt existing practices to reduce inequality and drive equitable outcomes for people of color and those without a college degree. Traded clusters generate the type of economic activity that boosts productivity, wages, and living standards in disinvested or lower-income areas – primarily by spurring greater participation in a skilled workforce.¹⁷⁵ Regional leaders should take an active role in defining cluster strategies in part to ensure they promote equitable growth in different and diverse parts of the region.



Metropolitan Chicago should pursue increasingly targeted strategies that draw on a cluster-based approach and a shared vision for growing its economy.

Lead implementers	Next steps
<p>Chicago Regional Growth Corporation or similar entity, local officials, and economic development leaders</p>	<p>Develop a regional economic strategy that aligns state, regional, and local objectives with the region’s competitive strengths, especially its diverse talent pool and specialized industries.</p> <p>Advance racial and economic equity by prioritizing assistance to traded clusters that promote equitable growth in different parts of the region.</p> <p>Implement a comprehensive foreign trade and investment strategy that coordinates efforts to market the region.</p> <p>Secure robust funding for a limited number of cluster initiatives based on their regional economic importance and demonstrated potential to drive inclusive growth.</p> <p>Conduct firm-level analyses to facilitate internal cluster coordination and external marketing, promotion, and business retention efforts.</p> <p>Incorporate strategies to develop pathways to upward economic mobility for people of color, women, and workers without a bachelor’s degree. Form consortia of private companies, universities, and research institutions in pursuing competitive research awards and commercialization.</p> <p>Establish joint cluster strategies among neighboring communities – such as cluster-specific non-compete agreements or harmonizing local policies – to reduce the costs of intraregional competition.</p>
<p>Cluster organizations and other industry groups</p>	<p>Foster dense, specialized, collaborative networks for identifying customers, talent, startup and growth capital, ideas, and other business inputs.</p> <p>Build facilities with state-of-the-art equipment and broker services to act as central hubs for business assistance, entrepreneurial training, coordination, and matching.</p> <p>Provide technical and financial assistance in implementing new product and process innovations, developing market strategies, and reaching global markets.</p> <p>Sustain regional supply networks by nurturing local suppliers and attracting new investments, particularly in underperforming or underrepresented industries.</p> <p>Encourage succession planning and develop strategies for layoff aversion and business turnaround in critical industries.</p>



State of Illinois and local governments

Coordinate local zoning, development, and infrastructure investments that accommodate the functional needs of key businesses.

Identify and plan for the distinct needs of the state's regional economies, allocating resources and developing policies to reflect their specialized traded clusters.

Incorporate a cluster-based approach into strategic planning for economic development and align objectives with regional cluster benefits.

Leverage opportunities to mitigate shifts in global markets and climate change by targeting industry and infrastructure investments, and adjusting economic policies.

CMAP and partners

Conduct further drill-down analysis on the unique transportation, land use, business assistance, innovation, and human capital needs of high-priority traded clusters.

Consider economic gains and regional goals regarding inclusive growth, resilience, and traded clusters in assessing plans, policies, and programs for transportation investments.

Coordinate local governments in planning for multijurisdictional transportation investments that best support traded clusters.

Provide guidance to local partners on best practices for incentives, zoning, development, transportation investments, and other tactics to foster growth in specific clusters.

Workforce Investment Boards, education and training providers, and employers

Articulate, align programs for, and invest resources in high-quality career pathways where knowledge, skills, and work values are transferrable across multiple occupations and industries within a cluster, tailoring those resources to the needs of the diverse workforce.

Develop and deepen information networks among employers to share job postings, qualifications, and skills competencies with workforce training and assistance providers.

Align public workforce investments with broader economic goals by targeting customized worker screening, training, and recruitment services to traded clusters.





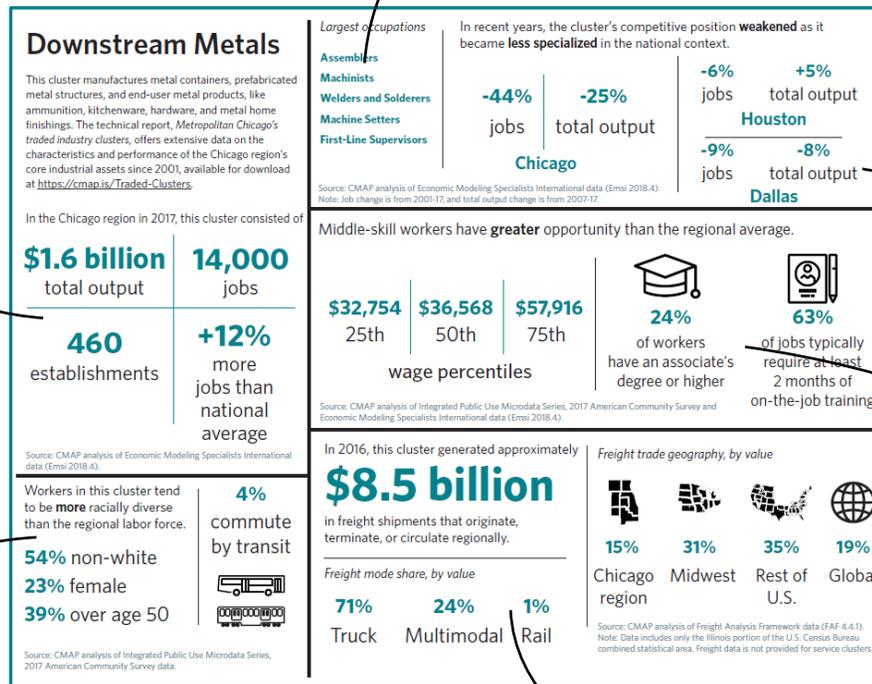
Traded cluster snapshots

Understanding metropolitan Chicago's industry clusters can improve how the region pursues economic development. ON TO 2050, the region's comprehensive plan, calls for better coordinating supports for these industrial assets. To advance this recommendation, the technical report, *Metropolitan Chicago's traded industry clusters*, provides extensive analysis on their defining characteristics and performance since 2001. The traded cluster snapshots present similar data on each of the region's 35 major traded clusters. They are available for download at <http://cmap.is/ClusterSnapshots>.

Specialized clusters – those with a competitive advantage in the region – are more likely to drive regional economic growth in the future.

Understanding clusters' staffing patterns and skills demand helps training providers to bridge the gaps between workers and employers.

Differences between trends here and leading national peers help to illustrate the region's relative competitiveness in a changing national and global economy.



As our labor force grows older and more diverse, the region needs to improve opportunities for all residents to contribute to and benefit from strong regional industries.

Determining how producers use our intermodal freight system can inform smart investments that enable greater choice, more connections, and lower costs for moving goods.

Regional leaders can improve workers' well-being and quality of life by prioritizing clusters that better support upward economic mobility.

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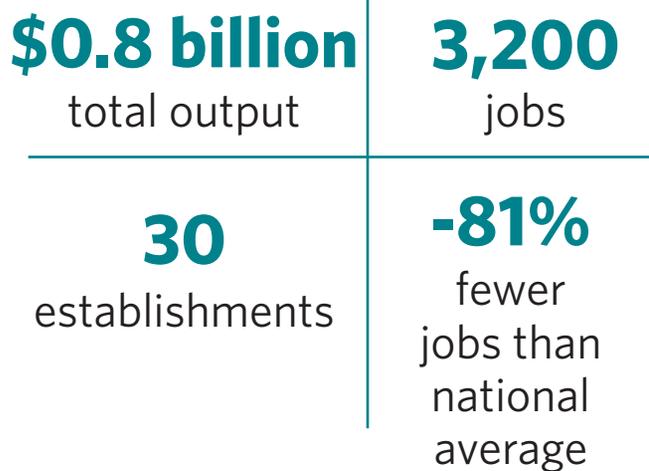
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Aerospace Manufacturing

This cluster produces aircraft, space vehicles, guided missiles, and related parts as well as the necessary search and navigation equipment used by these products. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 38%** non-white
- 30%** female
- 40%** over age 50

7% commute by transit

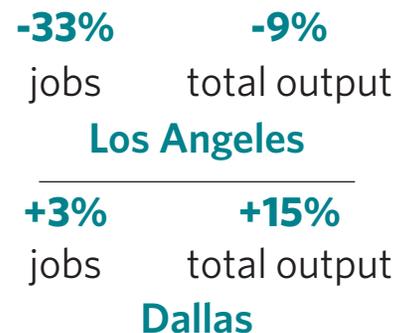


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Electrical Assemblers Fabricators**
- Software Developers**
- Industrial Engineers**
- Machinists**

In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.

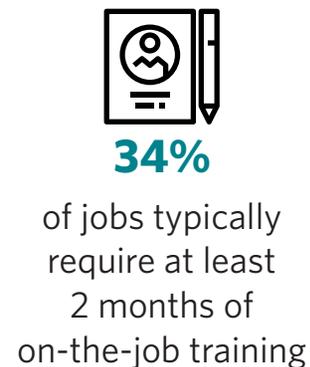
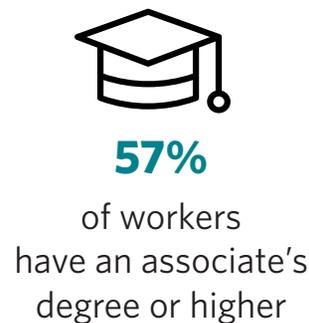


Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).



In 2016, this cluster generated approximately

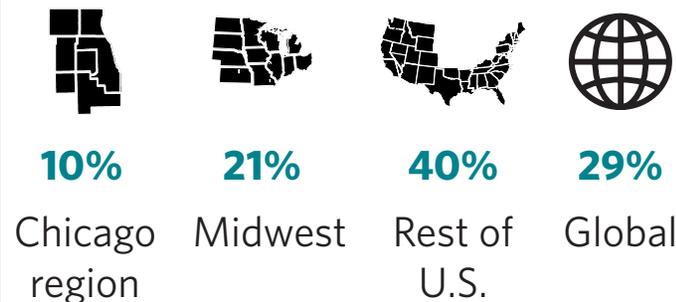
\$10.7 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value

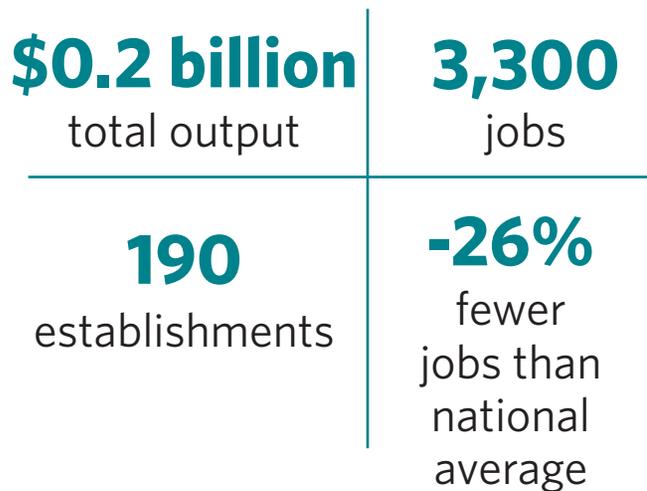


Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Apparel

This cluster manufactures clothing and fabric accessories (for example, hats, gloves, and neckties) for men, women, and children. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

- 66%** non-white
- 63%** female
- 39%** over age 50

8% commute by transit

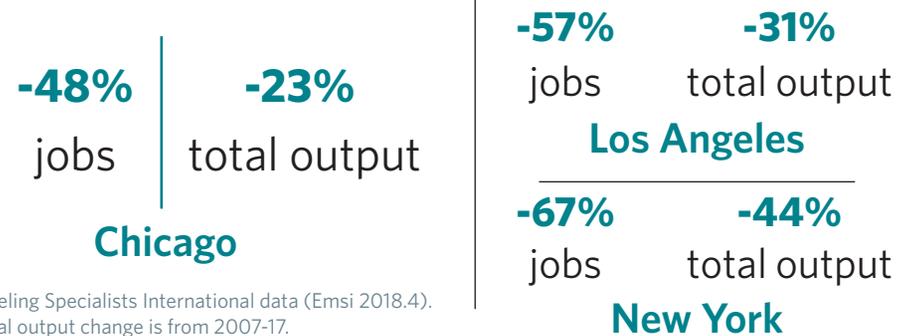


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

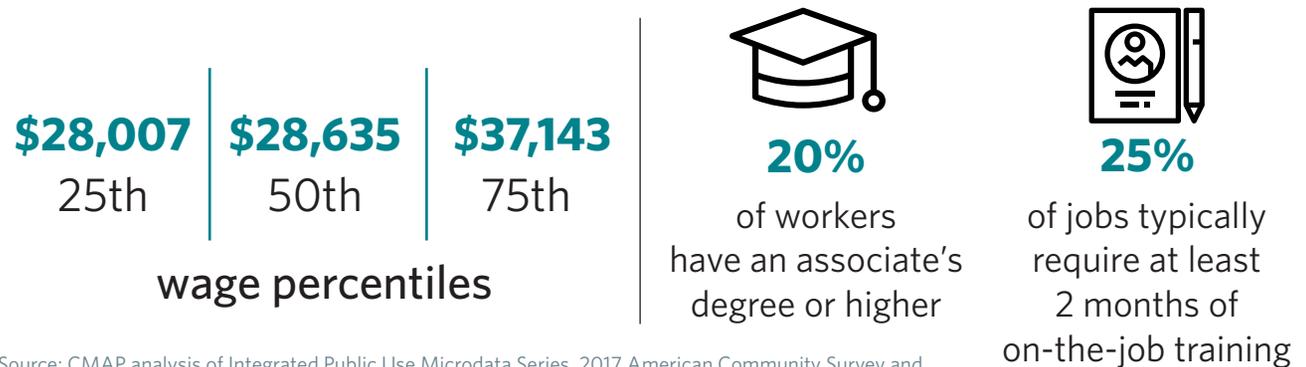
- Sewing Machine Operator**
- Hand Sewers**
- Sales Representatives**
- First-Line Supervisors**
- Inspectors and Testers**

In recent years, the cluster's competitive position **strengthened** as it remained **unspecialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

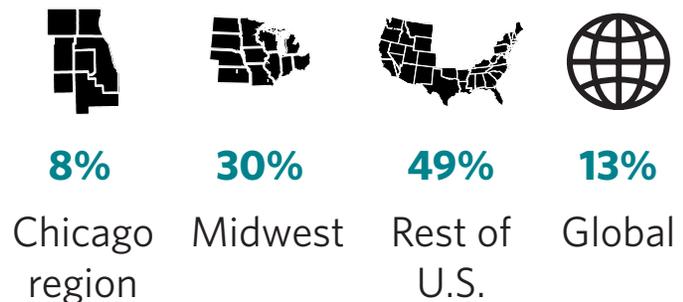
\$6.2 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value

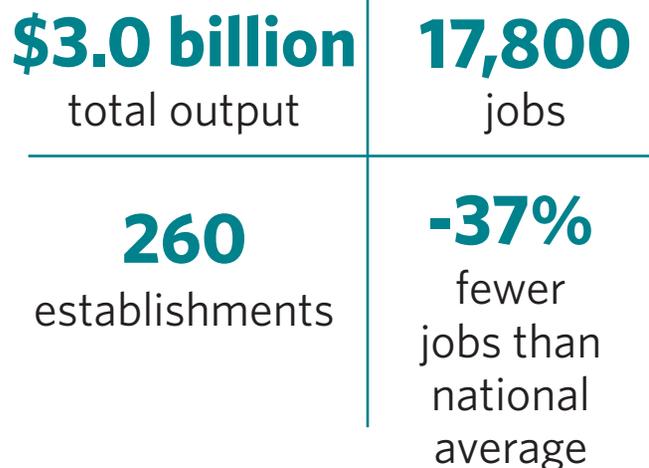


Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Automotive

This cluster manufactures completed cars, trucks, and other motorized transportation equipment (except motorcycles) and includes metal mills and foundries that produce automotive parts. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of

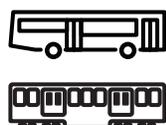


Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

- 57%** non-white
- 27%** female
- 35%** over age 50

4% commute by transit



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

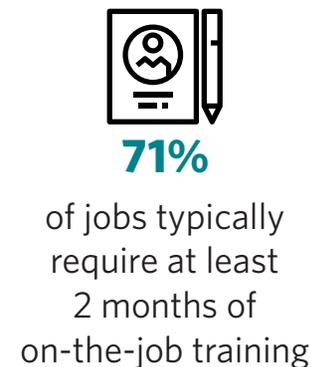
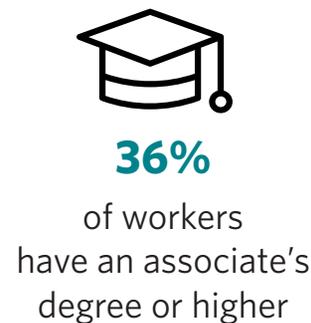
- Assemblers
- Production Workers
- Machinists
- Inspectors and Testers
- Industrial Engineers

In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

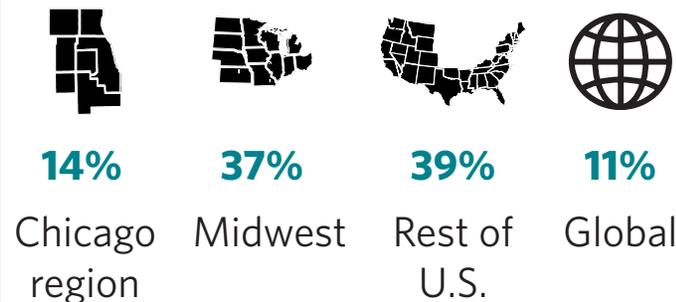
\$62.3 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value

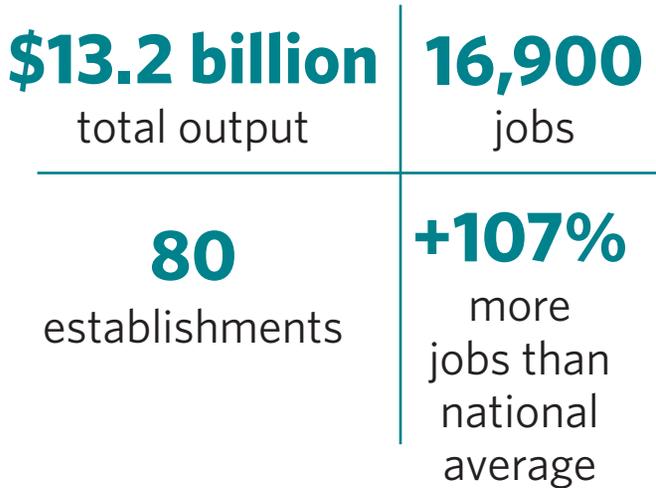


Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Biopharmaceuticals

This cluster produces complex chemical and biological substances used in medications, vaccines, diagnostic tests, and similar medical applications. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 38%** non-white
- 49%** female
- 32%** over age 50

4% commute by transit

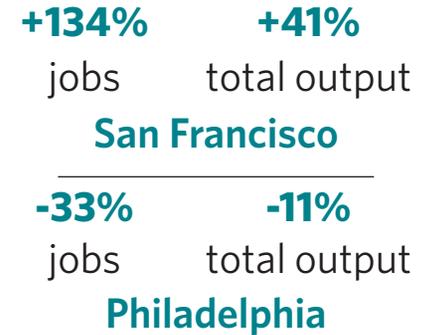


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

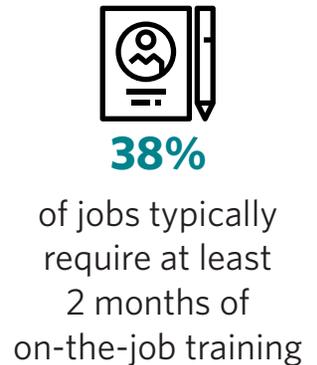
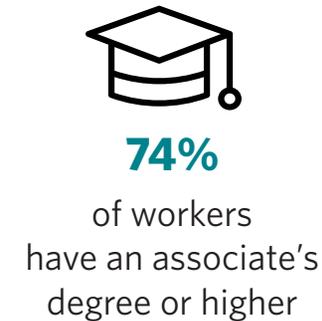
- Filling Machine Operator
- Inspector
- Sales Representatives
- Chemists
- Machine Setters

In recent years, the cluster's competitive position **held steady** as it remained **specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

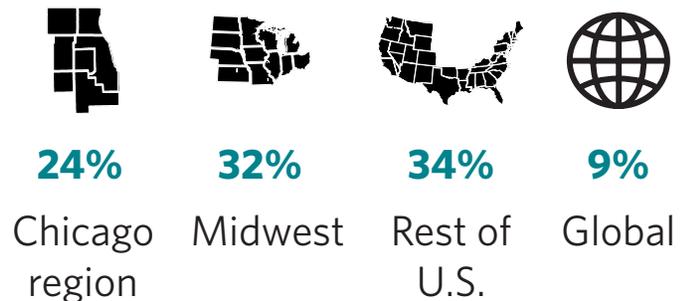
\$44.0 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value

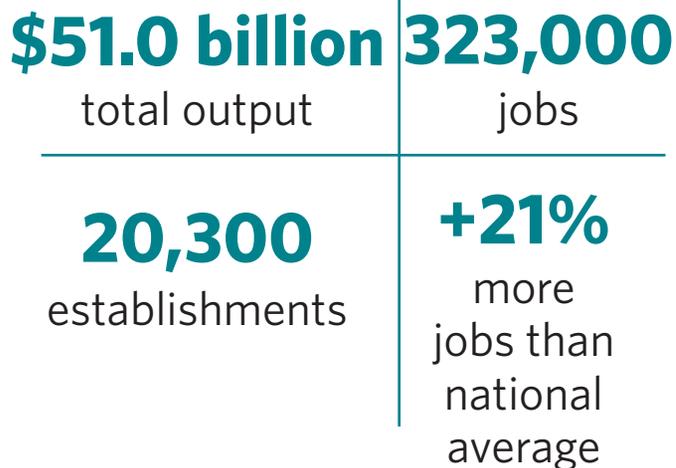


Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Business Services

This cluster supports other aspects of a business like corporate headquarters or assist unrelated companies through consulting, legal, computer, engineering and architectural, and other services. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Largest occupations

- Management Analysts
- Software Developers
- Computer System Analysts
- Customer Service Representatives
- Business Operations Specialists

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 38%** non-white
- 41%** female
- 30%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

21%

commute by transit



In recent years, the cluster's competitive position **held steady** as it remained **specialized** in the national context.

+17%
jobs

Chicago

+14%
total output

+39%
jobs

+36%
total output

Washington, D.C.

+40%
jobs

+110%
total output

San Francisco

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.

\$41,663

25th

\$68,080

50th

\$88,702

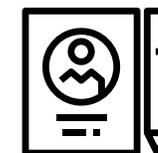
75th

wage percentiles



68%

of workers have an associate's degree or higher



16%

of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Communication Inputs

This cluster involves goods and services used for communications, including cable, wireless, and satellite services, as well as telephone, broadcasting, and wireless communications equipment. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of

\$5.2 billion
total output

9,900
jobs

390
establishments

+13%
more jobs than national average

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Telecom Equipment Installers
- Customer Service Representatives
- Sales Representatives
- Business Operations Specialists
- Software Developers

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **as** racially diverse than the regional labor force.

44% non-white

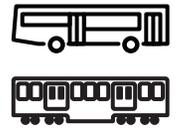
35% female

31% over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

12%

commute by transit



In recent years, the cluster's competitive position **held steady** as it remained **specialized** in the national context.

-56%

jobs

Chicago

-5%

total output

-60%

jobs

+29%

total output

Dallas

-59%

jobs

-7%

total output

Washington, D.C.

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.

\$50,761

25th

\$61,367

50th

\$85,559

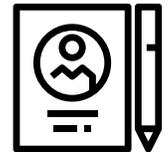
75th

wage percentiles



55%

of workers have an associate's degree or higher



37%

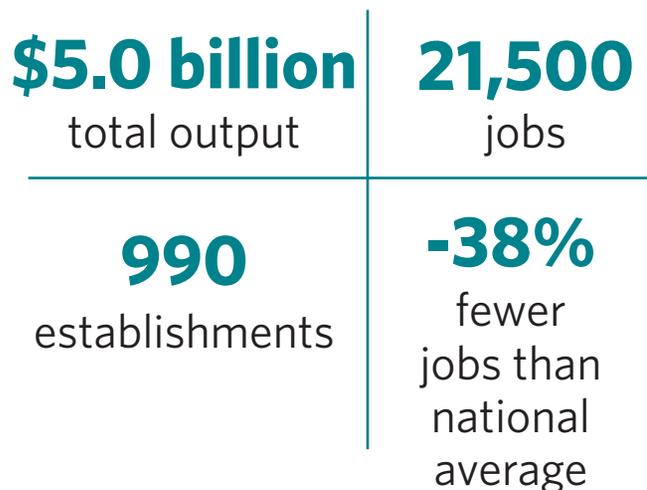
of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Computer Technology

This cluster manufactures information technology and analytical products like computers, software, audio visual equipment, laboratory instruments, and related standard and precision electronics like circuit boards. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 38%** non-white
- 30%** female
- 41%** over age 50

7% commute by transit



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Application Developers
- Electrical Assemblers
- Fabricators
- IT Systems Developers
- Industrial Engineers

In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.

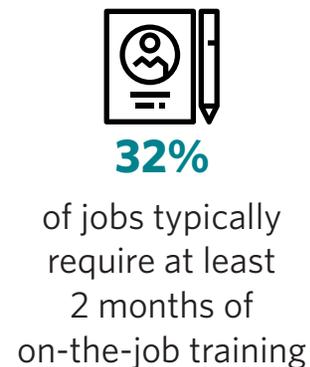
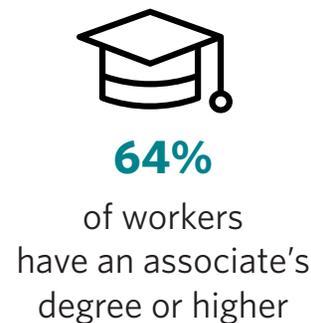


Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).



In 2016, this cluster generated approximately

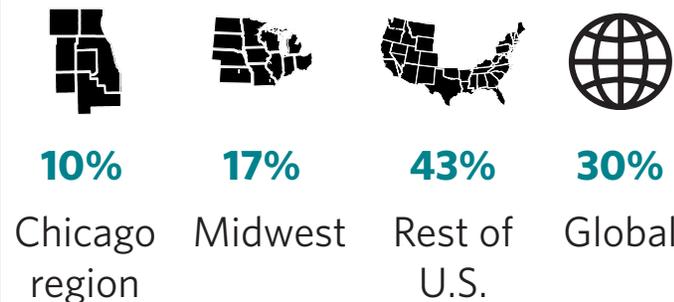
\$38.8 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value

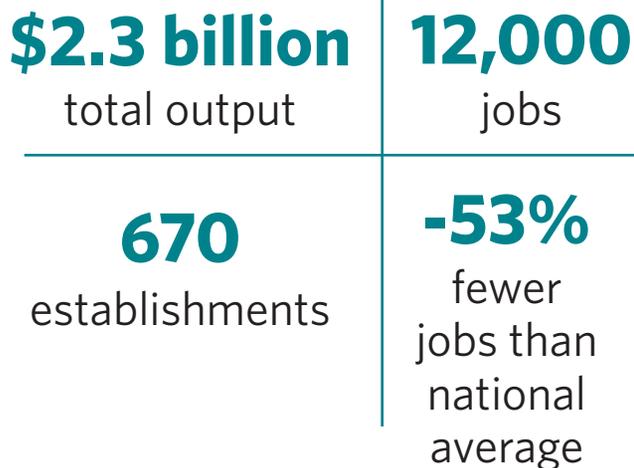


Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Construction

This cluster provides construction materials, components, and products like pipelines or heat exchangers, as well as services like building services for homes and industrial buildings. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Construction Laborers
- Equipment Operators
- Construction Managers
- Carpenters
- Electrical Power-Line Installers

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 37%** non-white
- 10%** female
- 32%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

4%

commute by transit



In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.

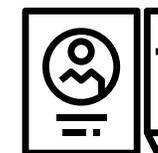


Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



22%
of workers have an associate's degree or higher



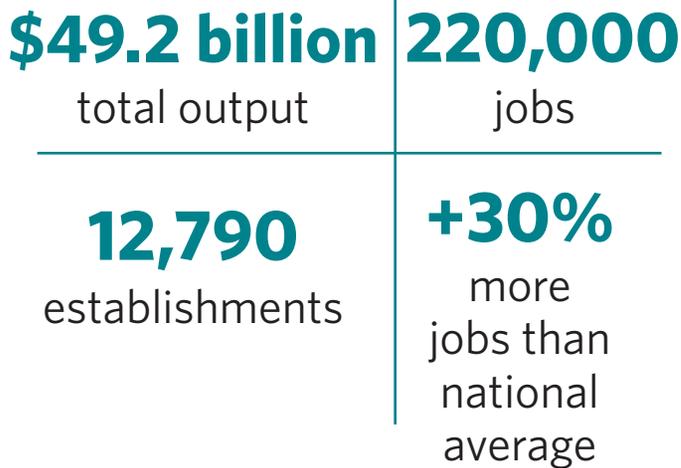
52%
of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Distribution and E-Commerce

This cluster includes traditional wholesalers as well as mail order houses and electronic merchants that buy, hold, and distribute products or provide support services like packaging and labeling. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Largest occupations

- Sales Representatives
- Laborers and Stock Movers
- Stock Clerks and Order Fillers
- Packers and Packagers
- Shipping and Receiving Clerks

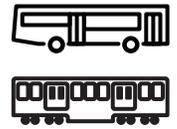
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **as** racially diverse than the regional labor force.

- 42%** non-white
- 36%** female
- 33%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

8%
commute by transit



In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.

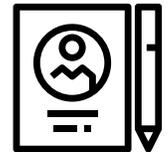


Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



44%
of workers have an associate's degree or higher



31%
of jobs typically require at least 2 months of on-the-job training

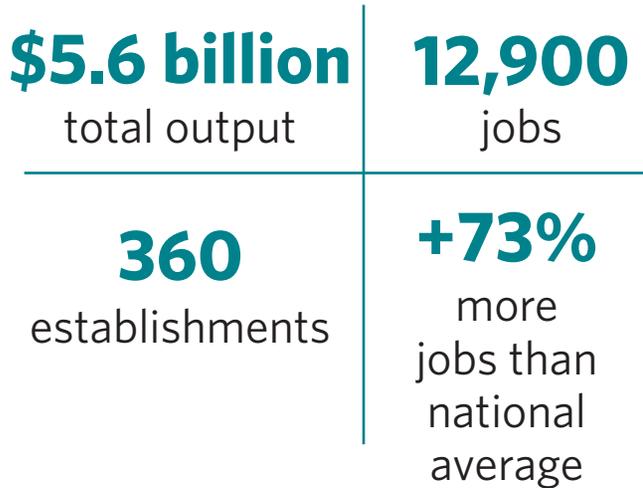
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Downstream Chemicals

This cluster manufactures complex chemical products for end users. These products include adhesives, beauty products, cleaners, dyes, paints, and lubricating oils. The technical report, Metropolitan Chicago's traded industry clusters, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

52% non-white

37% female

39% over age 50

4% commute by transit

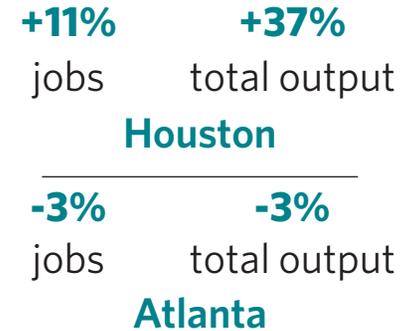


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Machine Setters
- Filling Machiner Operators
- Production Workers
- First-Line Supervisors
- Material Movers

In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



36%

of workers have an associate's degree or higher



52%

of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$39.1 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



8%

Chicago region



57%

Midwest



28%

Rest of U.S.



6%

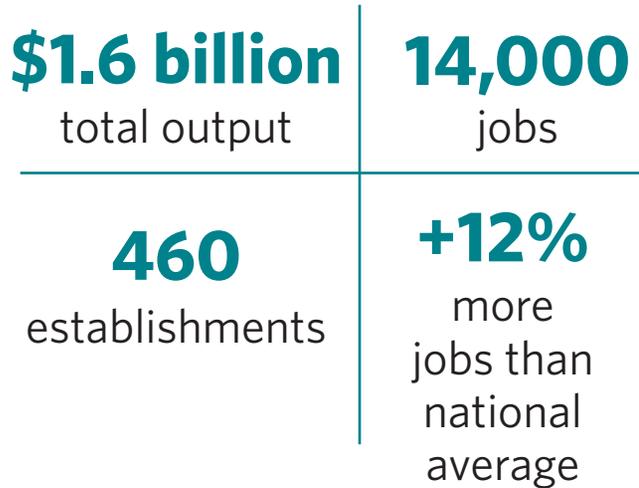
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Downstream Metals

This cluster manufactures metal containers, prefabricated metal structures, and end-user metal products, like ammunition, kitchenware, hardware, and metal home finishings. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

54% non-white

23% female

39% over age 50

4%
commute
by transit

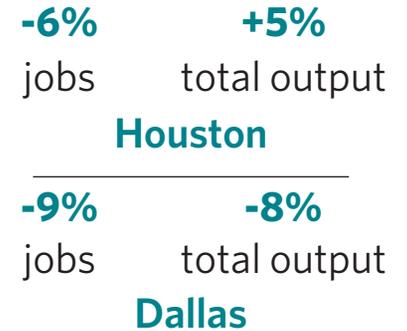


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Assemblers
- Machinists
- Welders and Solderers
- Machine Setters
- First-Line Supervisors

In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



24%

of workers
have an associate's
degree or higher



63%

of jobs typically
require at least
2 months of
on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$8.5 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



15%

Chicago
region



31%

Midwest



35%

Rest of
U.S.



19%

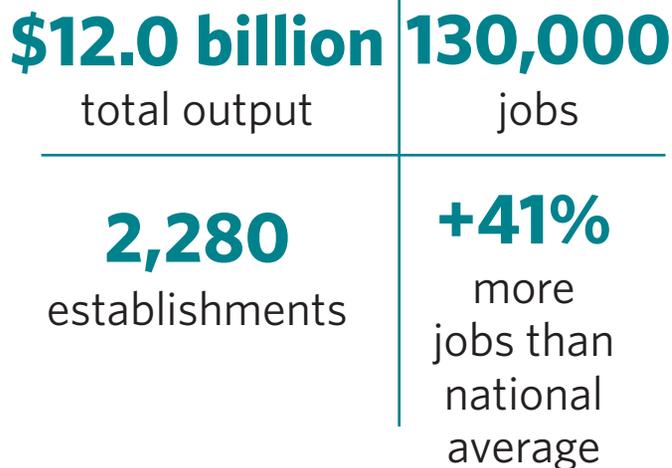
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Education and Research

This cluster contains educational and training institutions, related supporting establishments, and research and development institutions in physical and life sciences, engineering, and social sciences. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Largest occupations

- Postsecondary Teachers
- Administrative Assistants
- Education Administrators
- Business Operations Specialists
- Operations Managers

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 36%** non-white
- 55%** female
- 32%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

19%

commute by transit



In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.



80%
of workers have an associate's degree or higher



9%
of jobs typically require at least 2 months of on-the-job training

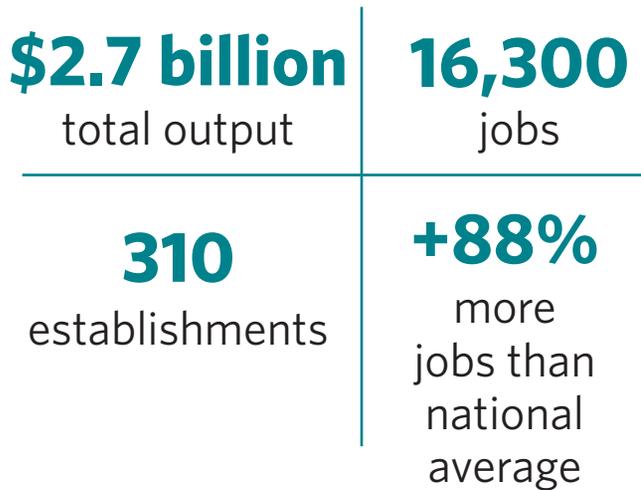
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Electrical Equipment

This cluster manufactures electronic components wiring devices, fiber optic cables, switchboards, lighting fixtures, electronic motors, transformers, and related products. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

48% non-white

35% female

40% over age 50

5%
commute
by transit

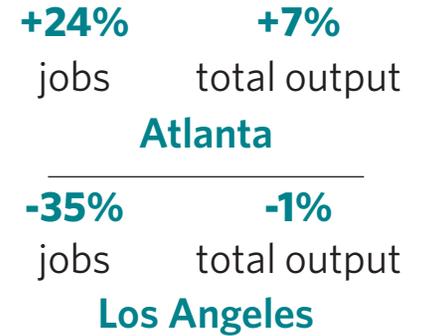


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Electrical Assemblers
- Machinists
- First-Line Supervisors
- Mechanical Engineers
- Sales Representatives

In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



40%

of workers
have an associate's
degree or higher



54%

of jobs typically
require at least
2 months of
on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$31.2 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



9%

Chicago
region



15%

Midwest



41%

Rest of
U.S.



35%

Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Environmental Services

This cluster contains establishments primarily engaged in collection, treatment, processing, and disposal of hazardous and non-hazardous waste. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of

\$0.6 billion
total output

4,600
jobs

180
establishments

+38%
more jobs than national average

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Refuse Collectors
- Heavy Truck Drivers
- Material Movers
- Hazardous Material Removal Workers
- Operations Managers

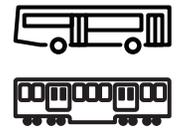
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

48% non-white
19% female
30% over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

3%
commute by transit



In recent years, the cluster's competitive position **held steady** as it remained **specialized** in the national context.

-3%
jobs

Chicago

+15%
total output

+86%
jobs

+92%
total output

Houston

-2%
jobs

+21%
total output

Boston

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.

\$42,091

25th

\$51,343

50th

\$63,496

75th

wage percentiles



27%

of workers have an associate's degree or higher



30%

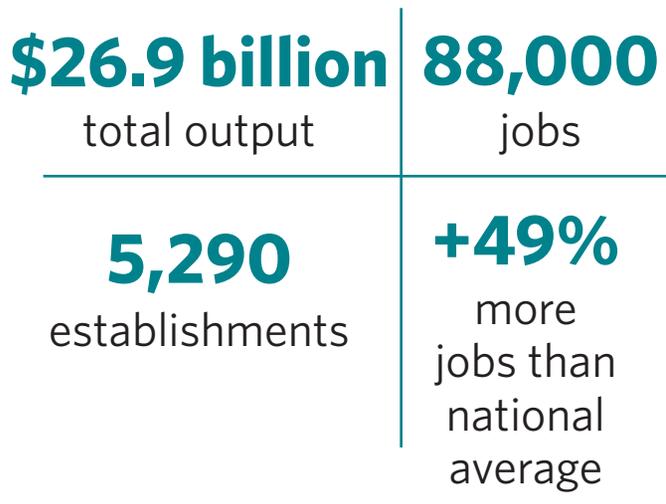
of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Finance

This cluster supports the transaction and growth of financial assets for businesses and individuals. These firms include securities brokers, dealers, and exchanges; credit institutions; and financial investment support. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Largest occupations

- Financial Services Sales Agents
- Personal Financial Advisors
- Customer Service Representatives
- Financial Analysts
- Loan Officers

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

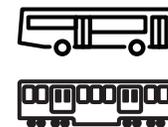
Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 34%** non-white
- 48%** female
- 28%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

29%

commute by transit



In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.



70%
of workers have an associate's degree or higher



38%
of jobs typically require at least 2 months of on-the-job training

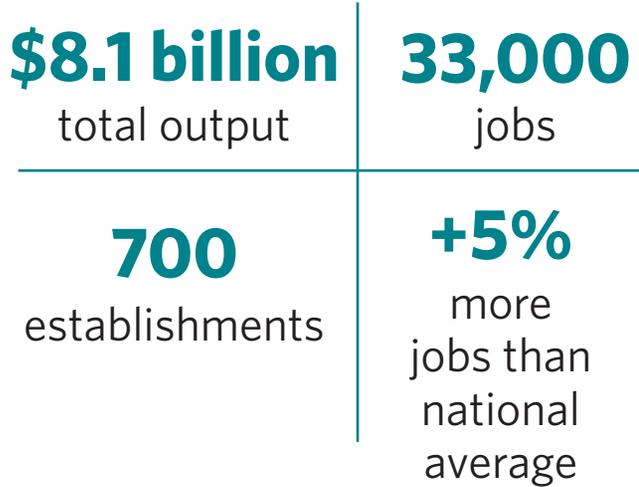
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Food Processing

This cluster refines raw food materials and manufactures downstream food products for end users, such as specialty foods, animal foods, baked goods, beverages, packaged fruits and vegetables, and processed dairy products. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

61% non-white

40% female

30% over age 50

9% commute by transit

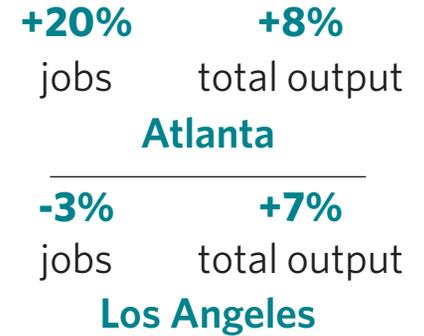


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Packaging Machine Operators
- Food Batchmakers
- Hand Packagers
- Stock Movers
- Inspectors and Testers

In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



33%

of workers have an associate's degree or higher



50%

of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$84.6 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



25%

Chicago region



31%

Midwest



32%

Rest of U.S.



12%

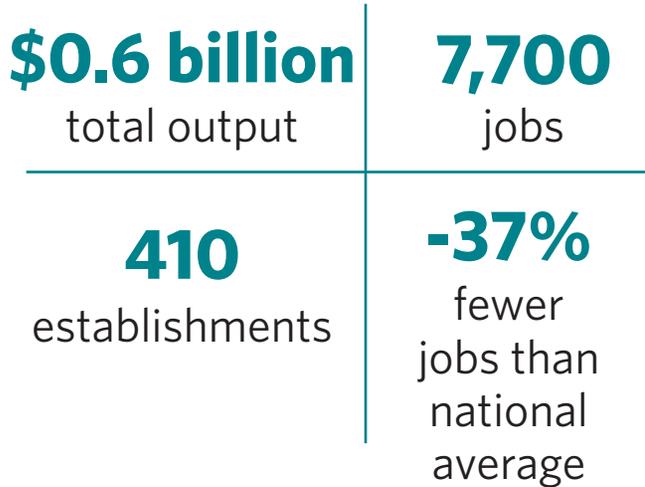
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Furniture

This cluster manufactures residential and office furniture, cabinets, and shelving of various materials as well as manufactured homes. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

- 53%** non-white
- 26%** female
- 35%** over age 50

6% commute by transit

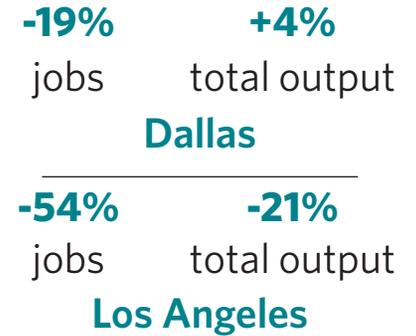


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Cabinetmakers
- Fabricators
- Laborers and Movers
- Upholsterers
- Carpenters

In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



26% of workers have an associate's degree or higher



61% of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

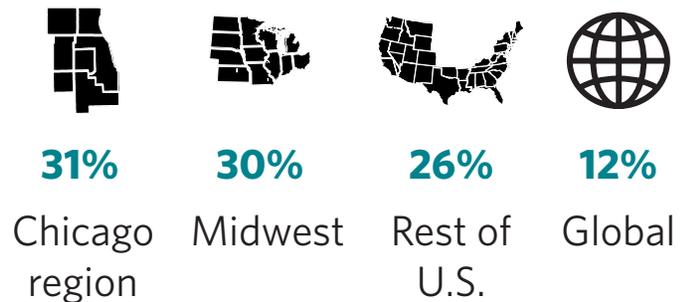
\$13.8 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value

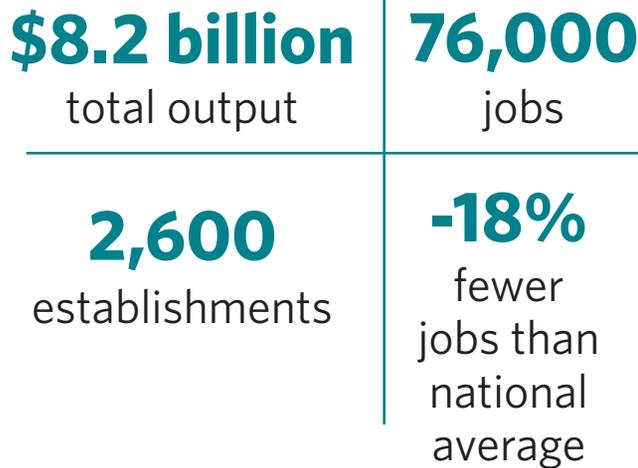


Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Hospitality and Tourism

This cluster includes services and venues related to recreational travel, including hotels, sport venues, casinos, museums, and other attractions, as well as reservation services and tour operators. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Housekeeping Cleaners
- Hotel Desk Clerks
- Travel Agents
- Waiters and Waitresses
- Maintenance and Repair Workers

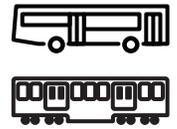
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **as** racially diverse than the regional labor force.

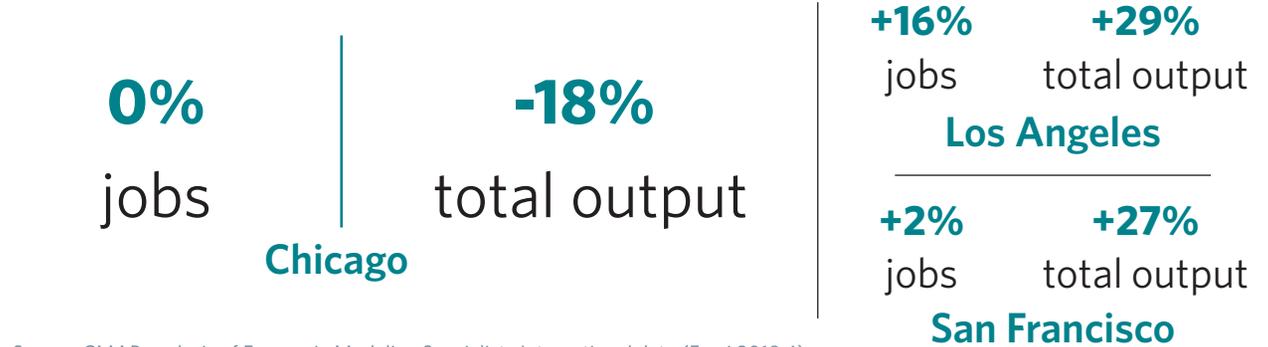
- 42%** non-white
- 49%** female
- 25%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

15%
commute by transit

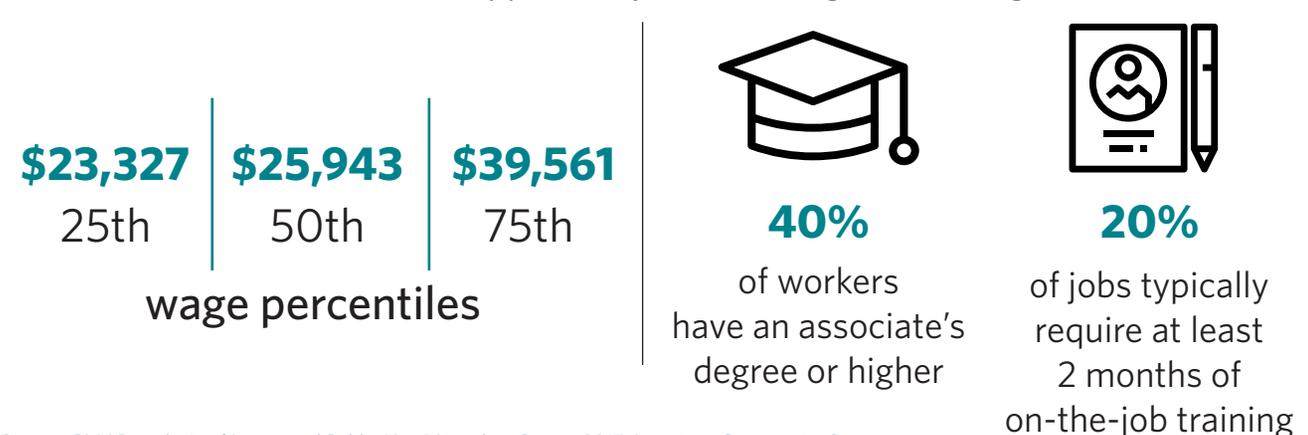


In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.

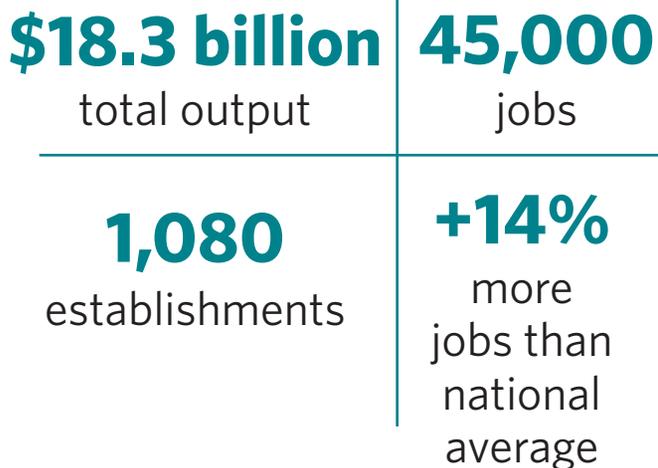


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Insurance

This cluster provides a range of insurance types, as well as support services such as reinsurance and claims adjustment. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Claim Adjusters and Examiners
- Insurance Sales Agents
- Claim Processing Clerks
- Insurance Underwriters
- Management Analysts

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 31%** non-white
- 55%** female
- 38%** over age 50

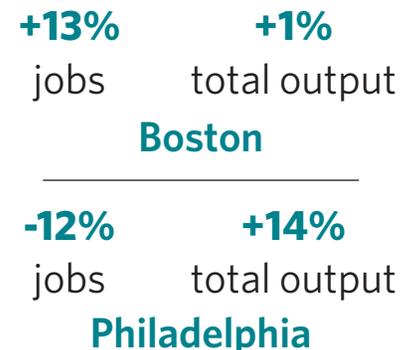
Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

20%

commute by transit



In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.



66%
of workers have an associate's degree or higher



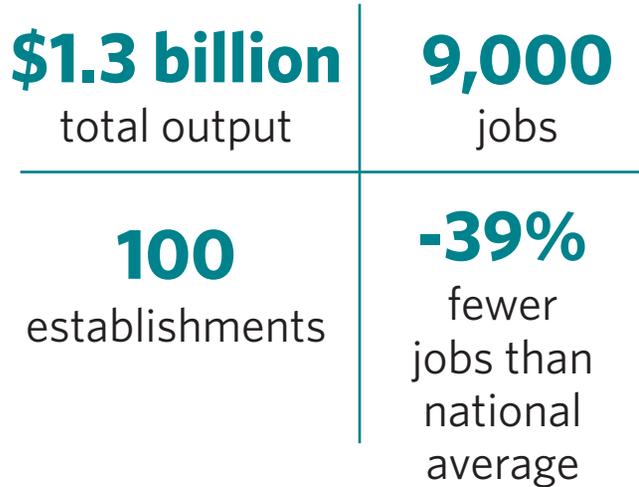
44%
of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Livestock Processing

This cluster contains establishments engaged in processing meat from livestock and livestock wholesaling. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

- 72%** non-white
- 38%** female
- 38%** over age 50

9% commute by transit



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Slaughters
- Hand Packagers
- Meat Cutters and Trimmers
- Packaging Machine Operators
- Butchers

In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).



15%
of workers have an associate's degree or higher



29%
of jobs typically require at least 2 months of on-the-job training

In 2016, this cluster generated approximately

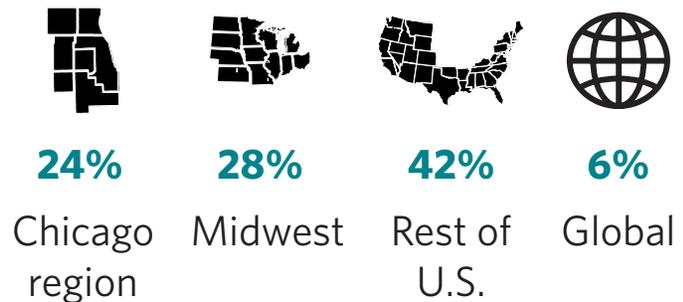
\$23.2 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value

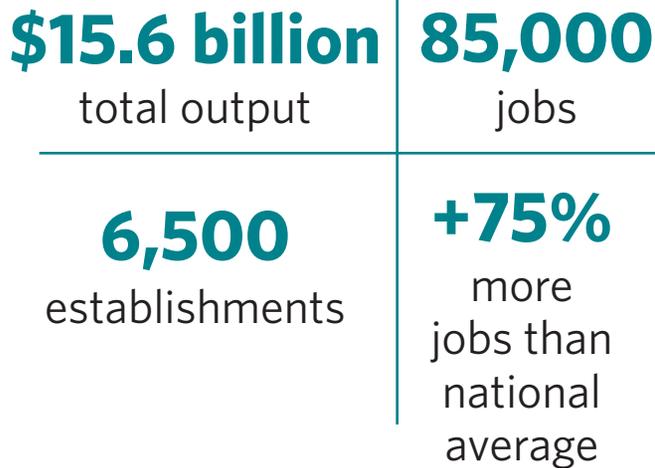


Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Marketing and Publishing

This cluster provides physical and graphical design services, digital and hard copy publishing, and marketing including advertising creation, marketing research, media buying, and public relations. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Advertising Sales Agents
- Graphic Designers
- Management Analysts
- Market Research Analysts
- Marketing Specialists

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

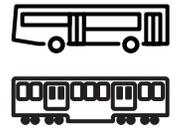
Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 26%** non-white
- 53%** female
- 27%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

26%

commute by transit



In recent years, the cluster's competitive position **held steady** as it remained **specialized** in the national context.

+6%
jobs

Chicago

+14%
total output

+88%
jobs

+470%
total output

San Francisco

+14%
jobs

+47%
total output

New York

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.

\$41,663
25th

\$52,425
50th

\$73,533
75th

wage percentiles



77%

of workers have an associate's degree or higher



20%

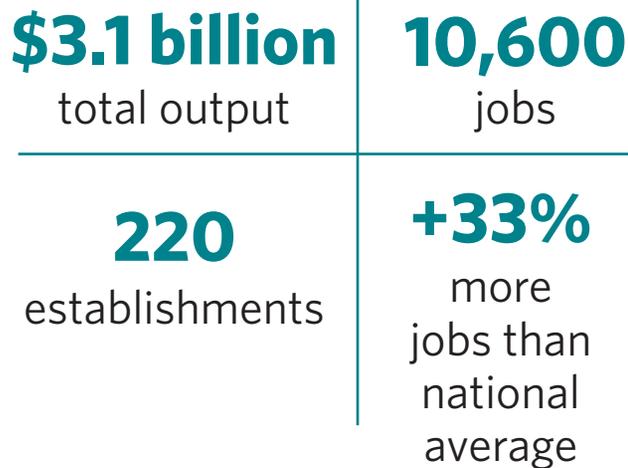
of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Medical Devices

This cluster manufactures surgical, medical, dental, optical, ophthalmic, and veterinary instruments and supplies. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **as** racially diverse than the regional labor force.

- 41%** non-white
- 40%** female
- 38%** over age 50

4% commute by transit

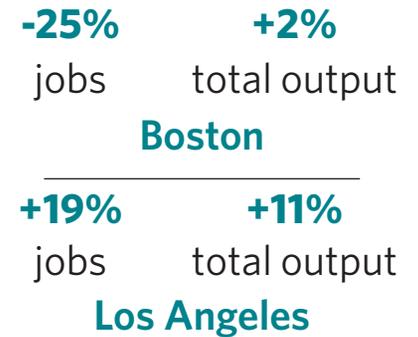


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Assemblers
- Dental Lab Technicians
- Inspectors and Testers
- Machinists
- Ophthalmic Lab Technicians

In recent years, the cluster's competitive position **strengthened** as it became **more specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



57%
of workers have an associate's degree or higher



55%
of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$73.5 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



28%

Chicago region



29%

Midwest



34%

Rest of U.S.



9%

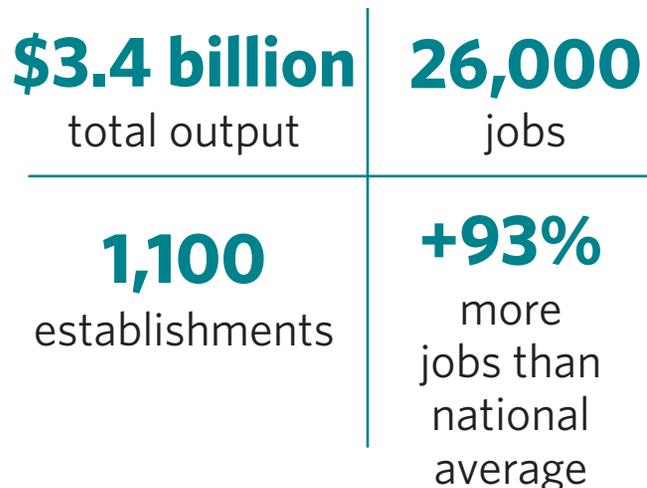
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Metalworking Technology

This cluster produces machine tools and process metal for use in metalworking, as well as downstream metal fasteners and hand tools. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **as** racially diverse than the regional labor force.

41% non-white

19% female

41% over age 50

3% commute by transit

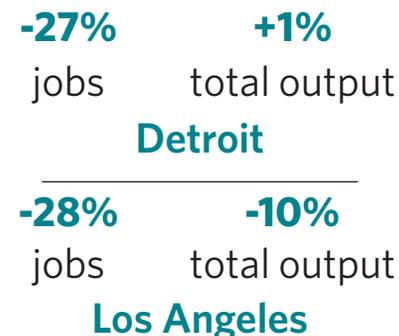


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Machinists
- Machine Setters
- Tool and Die Makers
- First-Line Supervisors
- Inspectors and Testers

In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



27%

of workers have an associate's degree or higher



66%

of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$22.7 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



14%

Chicago region



29%

Midwest



32%

Rest of U.S.



25%

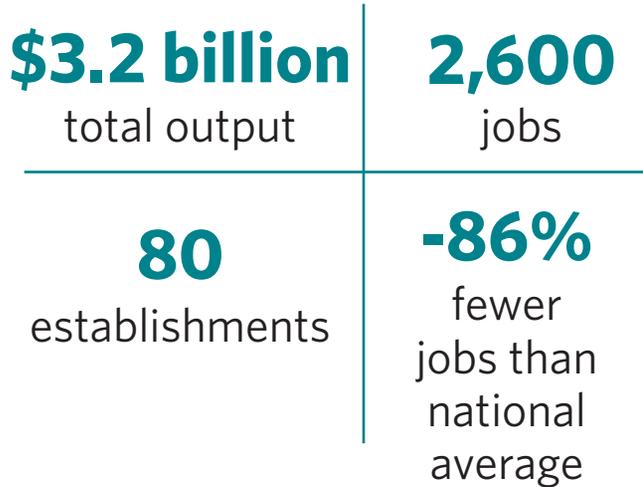
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Oil and Gas

This cluster includes firms involved in locating, extracting, refining, and transporting petroleum products, as well as those that provide the necessary equipment and support services. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

26% non-white

23% female

38% over age 50

4%
commute
by transit

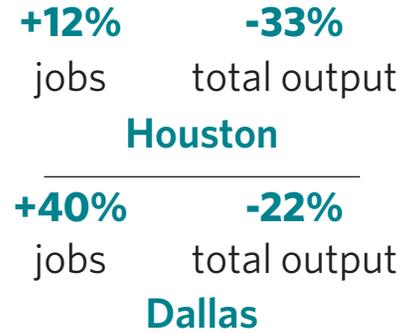


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Refinery Operators
- Industrial Machinery Mechanics
- Blending Machine Operators
- Operations Managers
- Heavy Truck Drivers

In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



54%

of workers
have an associate's
degree or higher



50%

of jobs typically
require at least
2 months of
on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$80.4 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



35%

Chicago
region



13%

Midwest



20%

Rest of
U.S.



32%

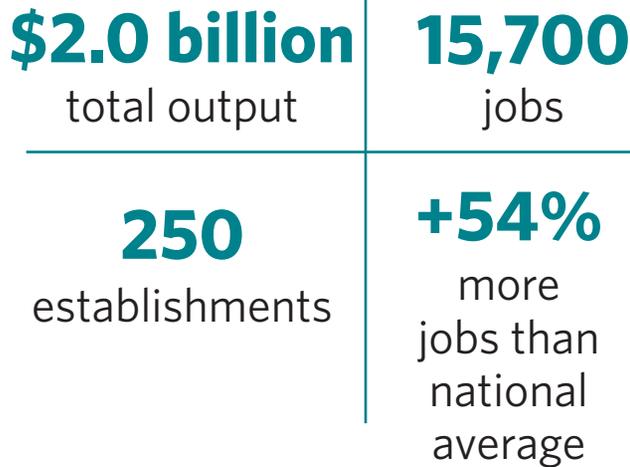
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Paper and Packaging

This cluster contains the paper mills and manufacturers of paper products used for shipping, packaging, containers, office supplies, personal products, and similar products. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

64% non-white

31% female

37% over age 50

5%
commute
by transit

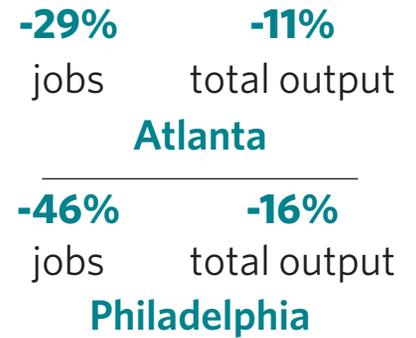


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Machine Setters
- Printing Press Operators
- Stock and Material Movers
- Hand Packagers
- First-Line Supervisors

In recent years, the cluster's competitive position **held steady** even though as it became **more specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



24%

of workers
have an associate's
degree or higher



55%

of jobs typically
require at least
2 months of
on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$28.2 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



22%

Chicago
region



34%

Midwest



34%

Rest of
U.S.



9%

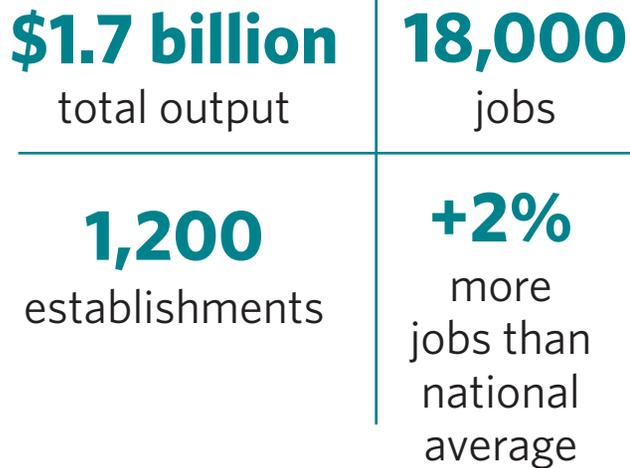
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Performing Arts

This cluster produces, promotes, and supports live artistic performances, including those by theater companies, dance troupes, musicians, and independent artists. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Musicians and Singers**
- Writers and Authors**
- Actors**
- Fine Artists and Illustrators**
- Ushers and Ticket Takers**

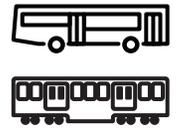
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 29%** non-white
- 39%** female
- 27%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

15%
commute by transit



In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.

+28%
jobs

Chicago

+25%
total output

+45%
jobs

+49%
total output

Los Angeles

+29%
jobs

+40%
total output

New York

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.

\$28,248
25th

\$31,461
50th

\$39,654
75th

wage percentiles



63%
of workers have an associate's degree or higher



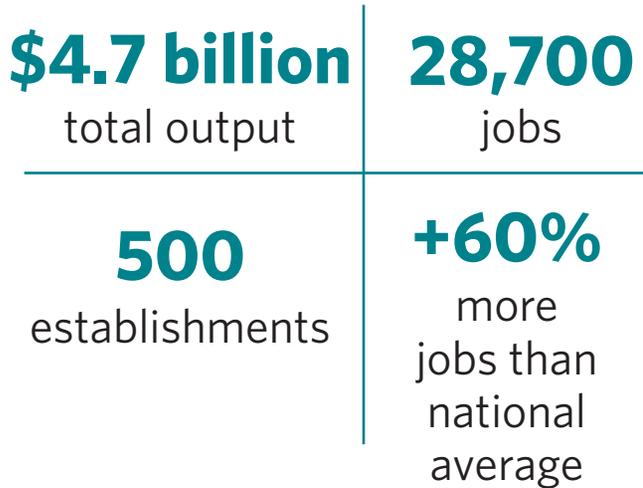
44%
of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Plastics

This cluster manufactures plastic materials, components, resins, and products, as well as the industrial machines used to manufacture plastics. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

54% non-white

33% female

38% over age 50

4% commute by transit

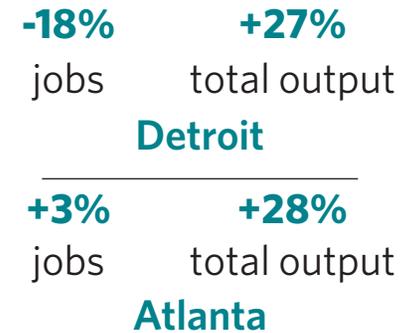


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Assembler and Fabricators
- Machine Setters
- Hand Packagers
- Inspectors and Testers
- First-Line Supervisors

In recent years, the cluster's competitive position **held steady** as it remained **specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



28%

of workers have an associate's degree or higher



58%

of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$39.5 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



16%

Chicago region



30%

Midwest



39%

Rest of U.S.



14%

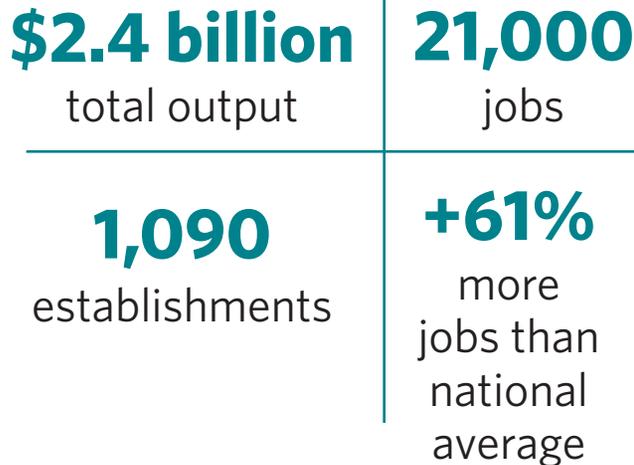
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Printing Services

This cluster provides commercial printing, digital printing, and binding services, as well as upstream inputs like ink and prepress services. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Largest occupations

- Printing Press Operators
- Binding and Finishing Workers
- Graphic Designers
- Sales Representatives
- Hand Packagers

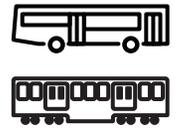
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

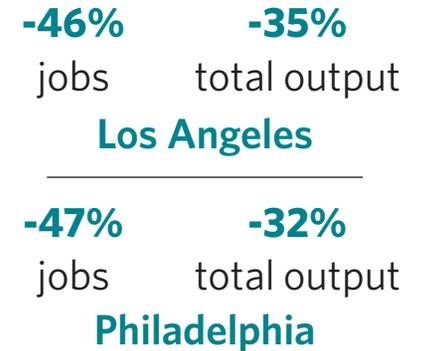
- 38%** non-white
- 33%** female
- 41%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

7%
commute by transit



In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.



39%
of workers have an associate's degree or higher



49%
of jobs typically require at least 2 months of on-the-job training

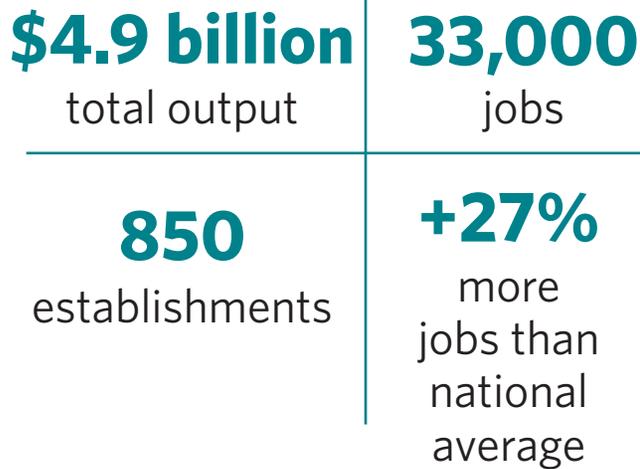
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Production and Heavy Machinery

This cluster produces machines designed to manufacture parts and devices used in industrial, agricultural, construction, commercial industry, material handling, and related purposes. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

48% non-white

28% female

39% over age 50

4%
commute by transit

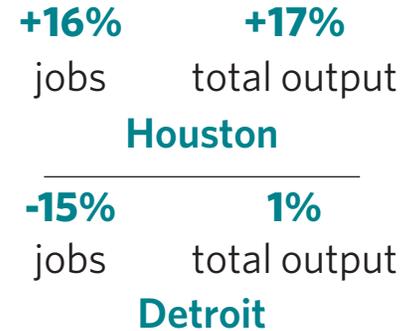


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Assemblers and Fabricators
- Welders and Solderers
- Mechanical Engineers
- Sales Representatives
- First-Line Supervisors

In recent years, the cluster's competitive position **held steady** as it **remained specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).



37%

of workers have an associate's degree or higher



60%

of jobs typically require at least 2 months of on-the-job training

In 2016, this cluster generated approximately

\$58.8 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



13%

Chicago region



29%

Midwest



31%

Rest of U.S.



27%

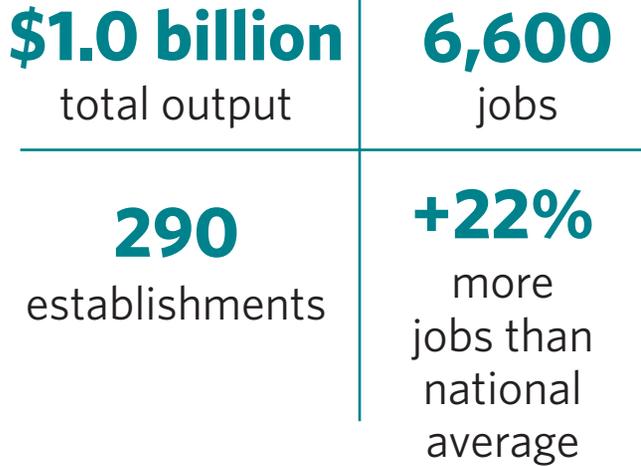
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Recreational Goods

This cluster manufactures end use products for recreational and decorative purposes, such as toys, bicycles, motorcycles, sporting goods, office supplies, home accessories, and certain small, simple electric goods. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of

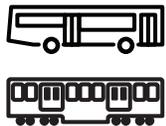


Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

- 51%** non-white
- 32%** female
- 35%** over age 50

8% commute by transit

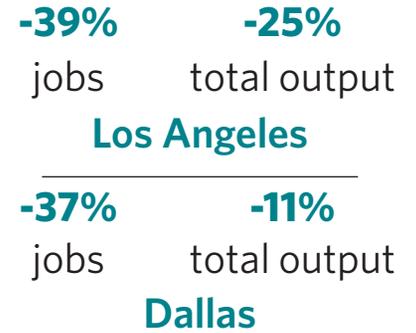


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Assemblers and Fabricators**
- Machine Setters**
- Operations Managers**
- Stock and Material Movers**
- Machinists**

In recent years, the cluster's competitive position **held steady** as it **remained specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).



38%

of workers have an associate's degree or higher



58%

of jobs typically require at least 2 months of on-the-job training

In 2016, this cluster generated approximately

\$29.8 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



16%

Chicago region



27%

Midwest



44%

Rest of U.S.



12%

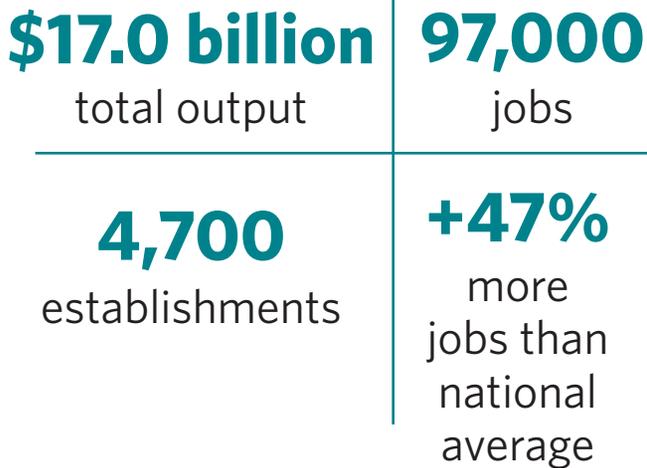
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Transportation and Logistics

This cluster contains all air, rail, bus, water, and freight transportation services, as well as related operation and support activities such as inspections, maintenance, security, and loading/unloading. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Heavy Truck Drivers
- Freight and Material Movers
- Pilots and Flight Engineers
- Cargo and Freight Agents
- Aircraft Mechanics and Technicians

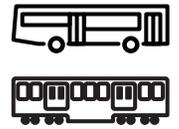
Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **as** racially diverse than the regional labor force.

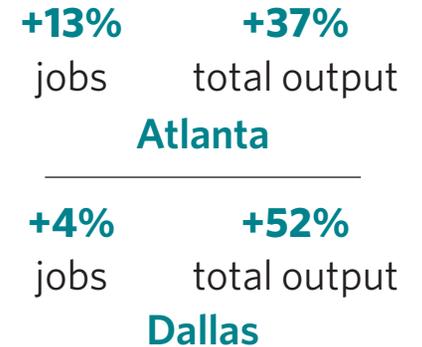
- 42%** non-white
- 24%** female
- 34%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

9%
commute by transit



In recent years, the cluster's competitive position **strengthened** as it became **more specialized** in the national context.

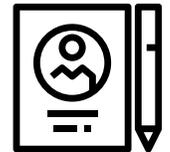


Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



32%
of workers have an associate's degree or higher



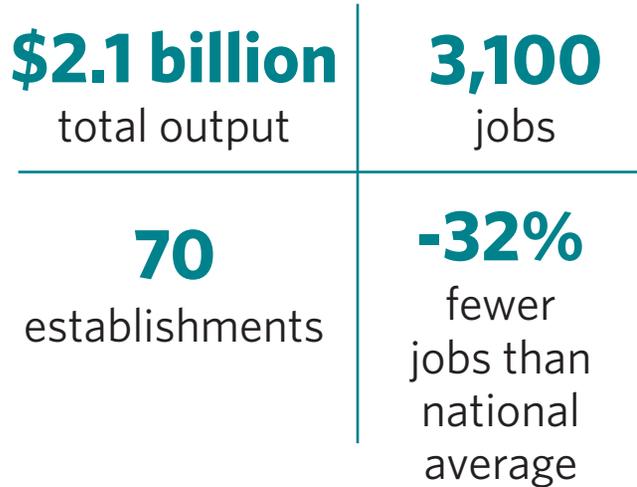
36%
of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Upstream Chemicals

This cluster manufactures basic organic and inorganic chemicals or gases, in particular separate elements that could be used as inputs for more complex downstream chemical products. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

45% non-white

31% female

37% over age 50

2%
commute
by transit

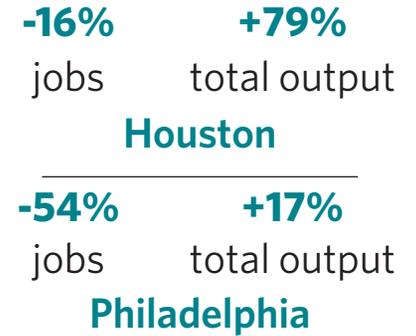


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Chemical Equipment Operators
- Blending Machine Operators
- Chemical System Operators
- Filling Machine Operators
- Chemists

In recent years, the cluster's competitive position **strengthened** as it remained **unspecialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



44%

of workers have an associate's degree or higher



52%

of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$10.2 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



11%

Chicago region



20%

Midwest



47%

Rest of U.S.



22%

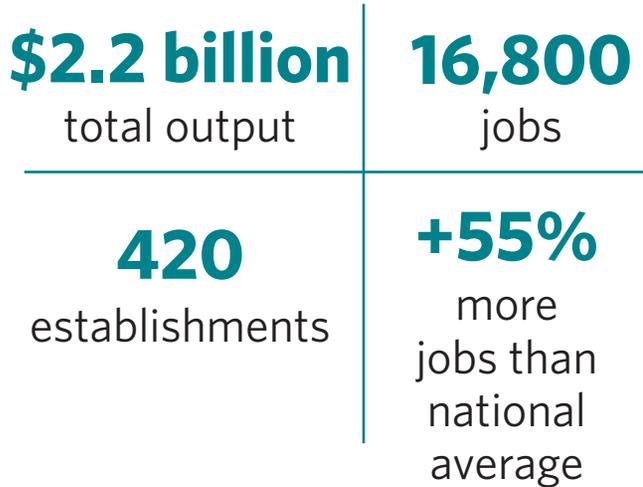
Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Upstream Metals

This cluster consists manufacturers of metal products such as pipes, metal closures, wires, springs, and related products, as well as iron and steel mills and foundries and related metal processors. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

56% non-white

20% female

44% over age 50

4% commute by transit

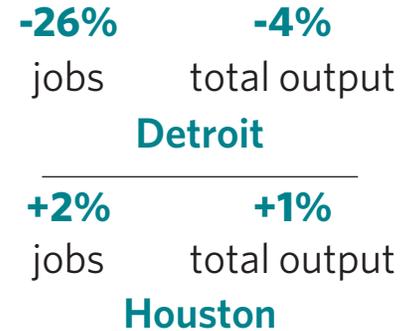


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

- Assemblers and Fabricators
- Machine Setters
- Inspectors and Testers
- First-Line Supervisors
- Welders and Solderers

In recent years, the cluster's competitive position **weakened** as it became **less specialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



32%

of workers have an associate's degree or higher



63%

of jobs typically require at least 2 months of on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

\$31.2 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



14%

Chicago region



41%

Midwest



33%

Rest of U.S.



13%

Global

Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

Video Production

This cluster produce and distribute motion pictures and other video, including specialized viewing venues like drive-in theaters. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of

\$1.1 billion
total output

4,300
jobs

530
establishments

-53%
fewer
jobs than
national
average

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Largest occupations

- Producers and Directors
- Film and Video Editors
- Actors
- Camera Operators
- Audio and Video Equipment Technicians

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **less** racially diverse than the regional labor force.

- 32%** non-white
- 35%** female
- 26%** over age 50

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

8%

commute
by transit



In recent years, the cluster's competitive position **weakened** as it remain **unspecialized** in the national context.

-10%
jobs

Chicago

+11%
total output

+31%
jobs

-1%
total output

Los Angeles

+40%
jobs

+27%
total output

New York

Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **less** opportunity than the regional average.

\$36,343

25th

\$52,425

50th

\$54,710

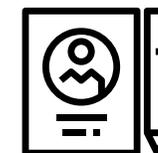
75th

wage percentiles



63%

of workers
have an associate's
degree or higher



17%

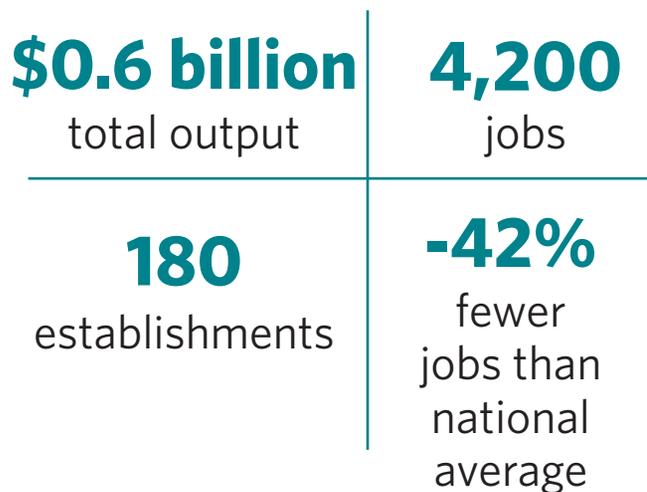
of jobs typically
require at least
2 months of
on-the-job training

Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

Vulcanized and Fired Materials

This cluster produces construction and other materials at extremely high temperatures, such as goods made of tile, brick, ceramic, glass, and rubber. The technical report, *Metropolitan Chicago's traded industry clusters*, offers extensive data on the characteristics and performance of the Chicago region's core industrial assets since 2001, available for download at <https://cmap.is/Traded-Clusters>.

In the Chicago region in 2017, this cluster consisted of



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).

Workers in this cluster tend to be **more** racially diverse than the regional labor force.

- 50%** non-white
- 33%** female
- 43%** over age 50

6% commute by transit

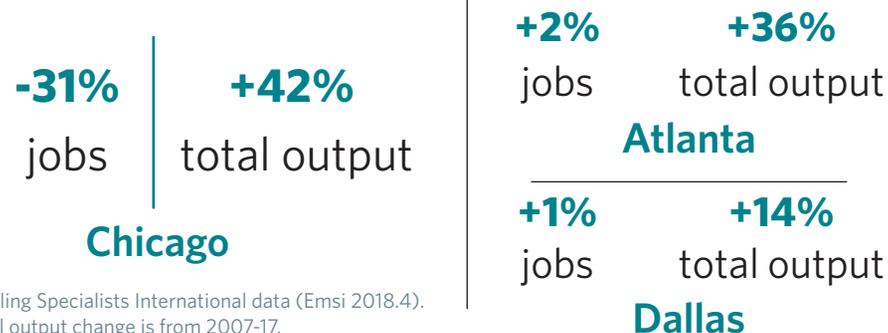


Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey data.

Largest occupations

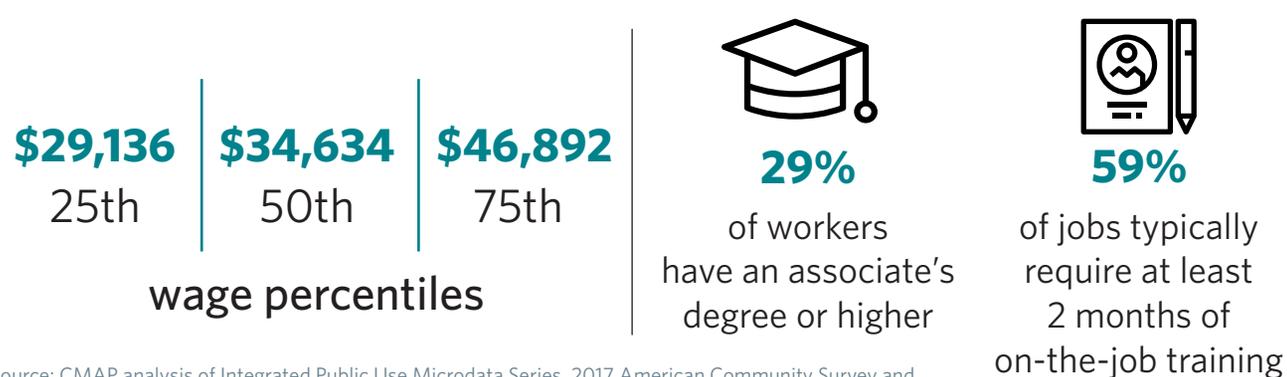
- Assemblers and Fabricators
- Heavy Truck Drivers
- Tire Builders
- Molders and Casters
- Machine Setters

In recent years, the cluster's competitive position **held steady** as it remained **unspecialized** in the national context.



Source: CMAP analysis of Economic Modeling Specialists International data (Emsi 2018.4).
Note: Job change is from 2001-17, and total output change is from 2007-17.

Middle-skill workers have **greater** opportunity than the regional average.



Source: CMAP analysis of Integrated Public Use Microdata Series, 2017 American Community Survey and Economic Modeling Specialists International data (Emsi 2018.4).

In 2016, this cluster generated approximately

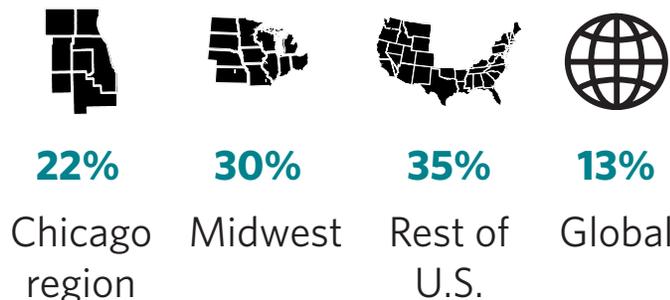
\$6.0 billion

in freight shipments that originate, terminate, or circulate regionally.

Freight mode share, by value



Freight trade geography, by value



Source: CMAP analysis of Freight Analysis Framework data (FAF 4.4.1).
Note: Data includes only the Illinois portion of the U.S. Census Bureau combined statistical area. Freight data is not provided for service clusters.

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Visit this full technical report and the executive summary at <https://cmap.is/Traded-Clusters>.

The Chicago Metropolitan Agency for Planning (CMAP) is our region's comprehensive planning organization. The agency and its partners developed and are now implementing ON TO 2050, a new long-range 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.

