

# TECHNOLOGY POLARIZES JOB OPPORTUNITIES IN THE CHICAGO REGION

*This Policy Update is the second in a series examining occupation and employment patterns in metropolitan Chicago over the past several decades. The [first Policy Update](#) examined labor market trends at the national level and reviewed economic literature explaining these trends. This second update hones in on how our unique industrial mix and workforce shaped employment trends in the region. The [third](#) compares shifts in peer metropolitan areas.*

Middle skill job opportunities have become harder to find. Between 1980 and 2016, the U.S. labor market exhibited patterns of what economists have termed ‘polarization’ with stronger demand for workers on both the low and high ends of the skill distribution. Many factors—cyclical, structural, and policy-related—have contributed to these trends. These factors occur at both the national and regional levels, leading to disparate patterns of employment across metropolitan areas in the nation.

The Chicago region has not been immune to the job polarization observed nationally. Technology in particular drove patterns of polarization in metropolitan Chicago, as elsewhere. But this analysis found that production jobs were particularly affected by polarization in the region. Metropolitan Chicago’s historical concentration of manufacturing jobs exacerbated the effects of a structural shift toward a service-based economy. The loss of middle skill jobs presents a challenge for the region. Middle skill jobs are often accessible to workers with less than a college degree and provide more opportunities for [career advancements](#) than low skilled jobs. Understanding the forces behind these trends can guide policy recommendations to increase the resilience and inclusiveness of the region’s workforce.

### Technology changed jobs at all skill levels

Technology has the potential to complement the tasks of some workers, making them more productive. It also has the potential to substitute for the tasks of others. The influence of technology and other forces on the demand for an occupation is illustrated in Figure 1.

#### Change in share of employment in the Chicago region, 1980-2016, by occupational skill level

Note: The geography for the Chicago region differs from traditional U.S. Census Bureau definitions and changes slightly over time. See About the Data section for more information. Median occupational wage in 1980 is used as a proxy for skill.

Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 1980-2000 Decennial Census and 2010-16 American Community Survey data.

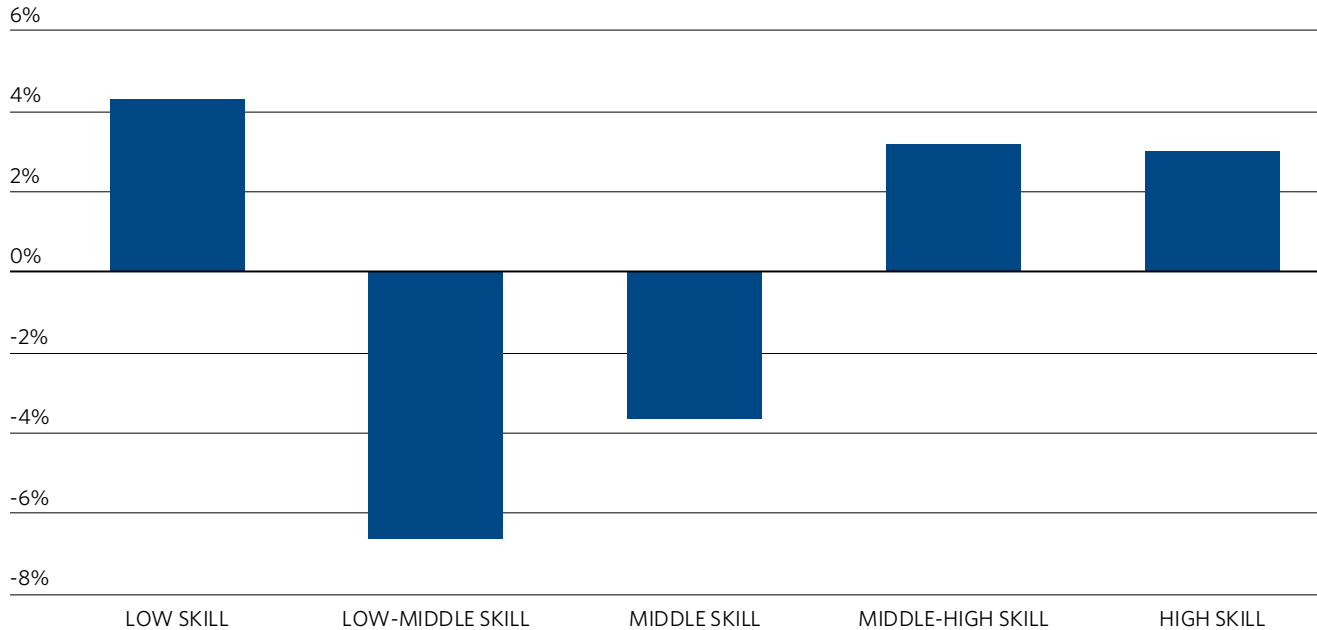
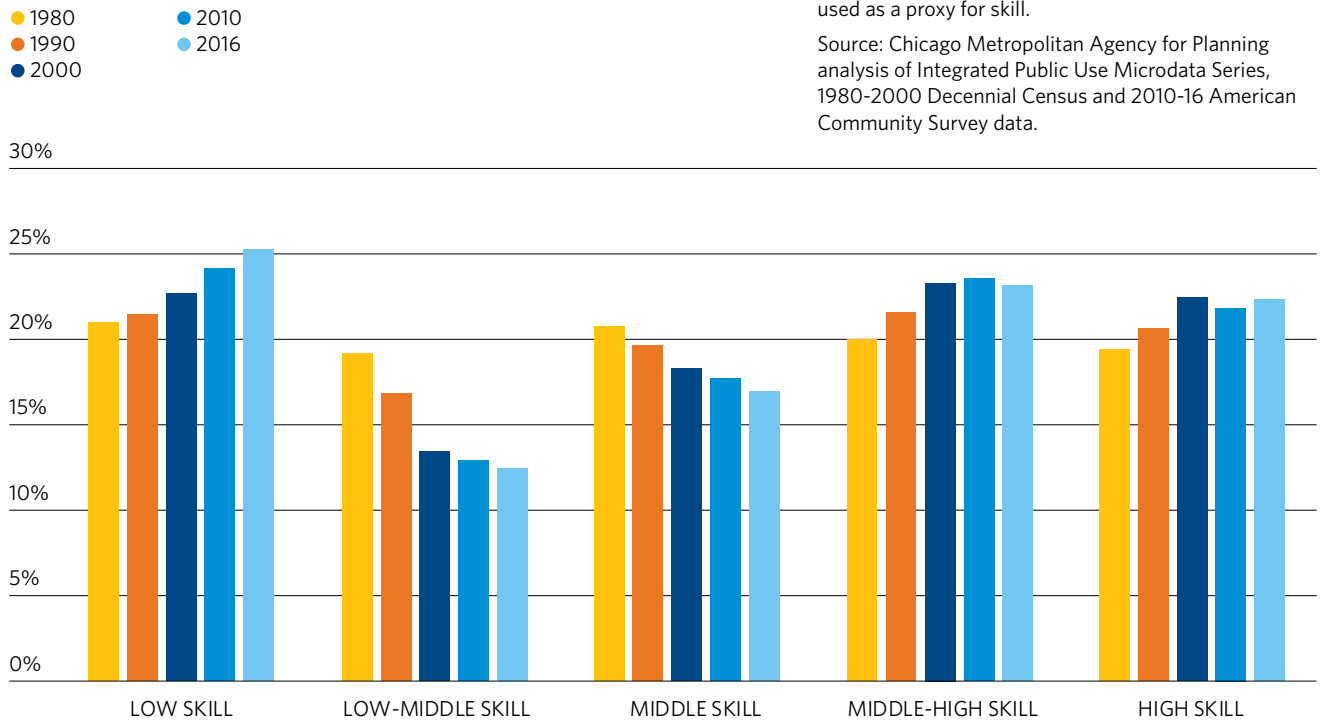


Figure 1 shows the change in employment across five occupational “skill buckets” as a share of total employment in the Chicago region. Similar to the nation, regional job opportunities are polarizing. Employment increased by approximately four percentage points in the lowest skill jobs and two percentage points in the highest skill jobs between 1980 and 2016. These trends were offset by a declining share of middle skill jobs. Employment in the low-middle skill bucket fell by over seven percentage points.

The main challenge in studying job polarization is identifying the sources of these employment shifts. Many factors drive employment, including demographic shifts, public policies at all levels, changes in consumer preferences for goods and services, or a globalizing economy. These factors, and the respective employment shifts, have not been uniform over time.

### Share of employment in the Chicago region, 1980-2016, by occupational skill level



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Figure 2 separates the data from Figure 1 into the intervening decades and shows that the majority of growth in middle-high and high skill jobs occurred between 1980-2000, as workplaces rapidly adopted computers. Advancements in technology complemented high skill occupations, increasing the relative demand for these workers compared to middle and low skill. For example, consider the job of an insurance actuary—a high skill, high wage occupation that involves building complex datasets and then performing stress and scenario tests to understand the financial risks that companies could face under extreme circumstances. To support the increasingly powerful computers that run statistical models built by actuaries, firms may hire additional data analysts and programmers. The value of better information can be substantial and companies may hire more actuaries to provide them with a competitive edge. Economists refer to these forces as skill-biased technological change (SBTC).

In the Chicago region, [Computer Occupations](#) increased in employment share by over two percentage points in the 1980s and 1990s and were the largest contributor to the growth in employment share in the high skill bucket. Technology-based disruption to the high skill labor market was significant over the 20-year period in the 1980s-90s. After 2000, the effects of SBTC slowed: the share of middle-high and high skill employment leveled off at 23 and 21 percent, respectively.

[Technology](#) had the converse effect on middle skill jobs. Employment share in low-middle and middle skill occupations fell in every period between 1980 and 2016. As technology became more affordable, companies increasingly used computers to replicate the tasks performed by middle skill workers, decreasing the demand for such labor. Such automation had the greatest effect on the demand for jobs with tasks that can be standardized and replicated by a computer, such as [Production](#) and [Office & Administrative Support](#) occupations. These occupations accounted for almost 80 percent of the total decline in low-middle and middle skill employment between 1980-2016. Unlike SBTC, automation continues to influence employment patterns. The employment share of low-middle and middle skill occupations fell by approximately two percentage points between 2010-16.

Figure 2 also illustrates the substantial growth of low skill occupations since 1980. If trends continue, low skill occupations could comprise over a quarter of total employment by 2020. This growth reflects both the long-term structural trend toward a service-based economy and a shift in consumers' demands for goods and services. SBTC increased the share of high-wage earners, which increased the demand for workers in [personal services](#), such as fitness coaches, housekeepers, and hairstylists. Changing preferences are reflected in the data: Other [Personal Care and Service Workers](#) were the second fastest growing low skill occupation between 1980 and 2016.

### Off-shoring and deindustrialization also drove polarization

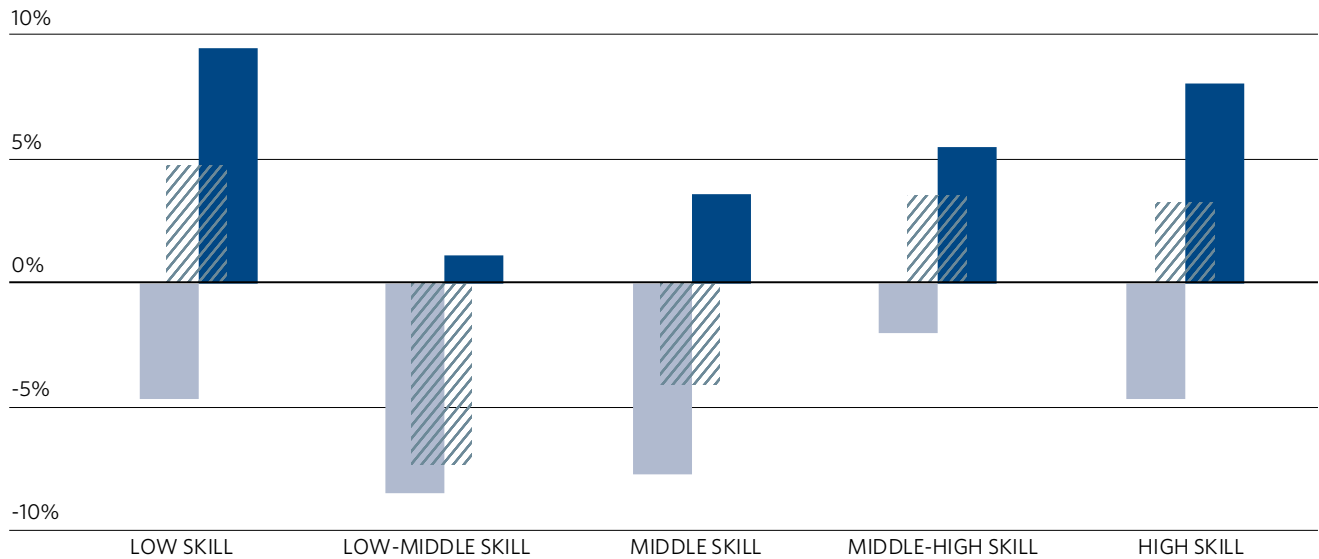
Theories of job polarization suggest that occupations with similar skills and tasks will respond to technological change in the same manner, but the growth rates of occupations may still vary widely within a skill bucket. Figure 3 illustrates this variation by separating each skill bucket's change in employment share by the direction of change.

#### Change in share of employment in the Chicago region, 1980-2016, by occupational skill level and direction of change

- Decline
- Growth
- ▨ Net change

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Source: Chicago Metropolitan Agency for Planning analysis of Integrated Public Use Microdata Series, 1980-2000 Decennial Census and 2010-16 American Community Survey data.



The dark blue and gray bars are the sum of occupations within each skill bucket that gained and lost employment share, respectively. The hashed bars represent net effect, as in Figure 1. Despite an overall pattern of job polarization, some high and low skill occupations actually decreased in employment share between 1980-2016. Data reveal that additional forces were at play, such as off-shoring and deindustrialization.

Off-shoring, which occurs when businesses base part of the company's processes abroad, enables firms to take advantage of lower costs and thereby decreases the demand for domestic labor. Occupations that do not require face-to-face interaction are particularly susceptible to replacement by cheaper labor abroad. Unlike automation, the negative employment impacts of off-shoring extend to high skilled, high wage jobs. For example, the share of engineers fell in the Chicago region between 1980-2016. Similarly, with modern information technology, a [radiologist](#) can read scans from anywhere in the world with a reliable internet connection.

The decline in manufacturing occupations, across all skill levels, points to the substantial impact of deindustrialization on employment changes in metropolitan Chicago. Advancements in technology have reduced shipping costs, increased reliability, and eased communication, increasing the feasibility of moving entire facilities abroad. Off-shoring of entire facilities is especially prominent in industries such as manufacturing that benefit most from [technological progress](#). It therefore disproportionately affect regions with historical strengths in goods-producing industries. Unlike automation, deindustrialization decreases the demand for all occupations employed by production industries, even related low skill and high skill occupations. For example, employment of production supervisors—a high skill occupation—fell by nearly two percentage points between 1980-2016. Overall, the decline in production occupations accounted for almost half of the loss observed in the lowest skill bucket in Figure 3.

### **Looking ahead**

Patterns of job polarization challenge efforts to increase economic mobility and decrease inequality, [limiting the potential growth](#) of the region and further underscoring CMAP’s prioritization of inclusive growth in the forthcoming [ON TO 2050](#) plan. The region should continue to identify and prioritize [industry clusters](#) that support regional economy opportunity, as well as cultivate strong relationships between educational institutions and the private sector.

The loss of middle skill workers is not unique to the Chicago region, and a subsequent Policy Update, the [final in this series](#), will examine patterns of polarization in peer metropolitan regions.

### **About the Data**

Employment in this analysis is restricted to workers between the ages of 18-64 who are currently employed and work more than 20 hours a week. Military occupations are excluded. Median occupational wages in 1980 are used as a proxy for skill. The geography of the Chicago region used in the analysis differs from traditional U.S. Census Bureau definitions and changes slightly over time due to data restrictions. The counties used in all years are Cook, DuPage, Grundy, Kane, Kendall, McHenry, Lake and Will. The 1980 analysis includes LaSalle County and the 1990 analysis includes DeKalb County.



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