

Rust and Renewal: A Cincinnati Retrospective

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Gary Wagner | *February 2018*

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Executive Summary

Much like that of the United States, the economic landscape of Cincinnati has been reshaped as the region has transitioned from a diversified industrial base to a heavily service-oriented economy. This report evaluates the performance of the Cincinnati metropolitan statistical area (MSA) on key economic indicators such as employment, unemployment, population, real per capita income, and educational attainment during the period from 1969 to 2016. It also explores more recent developments in the MSA's economy and discusses the region's prospects for future growth. Comparisons are made not only to the performance of all metropolitan areas in the United States, but also to a subset of historically manufacturing-intensive metropolitan areas this report terms "the industrial heartland."

The key results of our analysis of the Cincinnati MSA's economic performance are the following:

- In terms of population, employment, real per capita income, and educational attainment, the Cincinnati MSA has outperformed the typical industrial heartland metropolitan area but has underperformed relative to the average metropolitan area in the nation as a whole.
- Much like the industrial heartland, the Cincinnati MSA was harder hit in terms of job losses by the national recessions in the early 1980s than by the Great Recession.
- Although the Cincinnati MSA remains a manufacturing-intensive region relative to the nation, it is now solidly a modern service-oriented metropolitan area led by business-management, financial, and accounting activities.
- The region has a culture of innovation, with patents being granted at a higher rate to businesses and individuals within the Cincinnati MSA than to those within the typical industrial heartland metropolitan area. However, the distribution of patents is highly concentrated among a few organizations, a situation which could result in the MSA's future growth prospects' being more vulnerable to disruptions.
- Cincinnati has made solid strides toward reclaiming itself as a center for the arts and for unique architecture in the Midwest. Combined with investments in workforce development and education programs to boost productivity, the MSA can become a more attractive place to live and work with more inclusive opportunities.

Introduction

Much like that of the United States, the economic landscape of Cincinnati is being reshaped constantly as the region has transitioned from a diversified industrial base to a heavily service-oriented economy. This report evaluates the performance of the Cincinnati metropolitan statistical area (MSA) on key economic indicators such as employment, unemployment, population, real per capita income, and educational attainment during the period from 1969 to 2016.¹ It also explores more recent developments in the MSA's economy and discusses the region's prospects for future growth. Comparisons are made not only to the performance of all metropolitan areas in the United States, but also to a subset of historically manufacturing-intensive metropolitan areas this report terms "the industrial heartland."²

While the Cincinnati MSA has grown during the past half-century, the region generally has underperformed relative to the average US metropolitan area but has outperformed the typical metropolitan area in the industrial heartland. The latter half of the twentieth century was a difficult period of economic transition for mature industrial metropolitan areas as the relative importance of manufacturing began to decline from its peak in the 1950s. Technological innovation, increased foreign competition, and several deep national recessions in the 1970s and early 1980s hit these industrial metro areas particularly hard. In fact, the term "Rust Belt" became common vernacular to broadly characterize these deindustrial changes.

Although Cincinnati has retained some of its manufacturing heritage, the MSA has progressed into a modern service-oriented landscape dotted with a blend of consumer products and services, financial- and business-management activities, transportation, and specialized manufacturing. By expanding on a solid base of innovation and continuing to promote workforce development and targeted efforts to update the region's cultural amenities, the Cincinnati MSA will be well positioned to attract and retain workers and firms.

The Cincinnati MSA's longer-term economic performance

Although the objective of this report is to examine how the Cincinnati MSA's economy has evolved more recently, it is valuable to briefly map the area's economic development.

With an advantageous location in the heart of the country and alongside the Ohio River, Cincinnati expanded rapidly in the early to mid-1800s, serving as a major gateway to markets in the southern states and to what was then the American West. One commodity in particular, salted and cured pork, helped to spur Cincinnati's growth from the 46th largest urban area in the nation in 1810 (with a population of 2,540) to the 6th largest in 1850 (with a population of more than 115,000).³

Cincinnati's status as a major meat processing hub was relatively short-lived as the expansion of railroad systems, refrigeration, and the Civil War shifted this activity to Chicago initially and then, later, farther west. However, the industry left an indelible imprint that persists today because two immigrants, William Procter and James Gamble, capitalized on the industry's fat and oil byproducts to form a soap and manufacturing company in 1837.⁴ The Procter & Gamble Company, which is still headquartered in Cincinnati, became a Fortune 500 company and remains a leading innovator and manufacturer of consumer products sold around the world.

As the population in the nineteenth century shifted westward, Cincinnati benefited greatly from this migration, and numerous machine shops—including the Cincinnati Milling Machine Company; Cincinnati Machines; Lodge & Shipley Machine Tool Co.; Steptoe, McFarlan & Co.; and Niles Tool Works—began producing precision parts and equipment such as fasteners, screws, milling machines, lathes, drills, and steam engines and components, to name just a few.⁵ The industry continued to grow in prominence, both nationally and internationally, and Professor J.W. Roe of Yale University described the region in 1916 as "the largest tool building center in the world," with more than 15,000 people employed in approximately 40 firms.⁶

The mechanization of the automobile industry, the growth of steel producers in the United States, and the need for precision machine tools to support the efforts of World Wars I and II intensified demand for the sector’s output and workers. Between 1939 and 1942, machine tool employment increased nationally by a factor of three before finally peaking at an estimated 125,000 workers in 1952.⁷ If one considers manufacturing employment more broadly, Cincinnati’s manufacturing roots become even more evident. For instance, in just the city of Cincinnati, there were more than 1,300 manufacturing establishments in 1947 that employed an estimated 77,383 workers, or roughly 38 percent of the city’s workforce.⁸

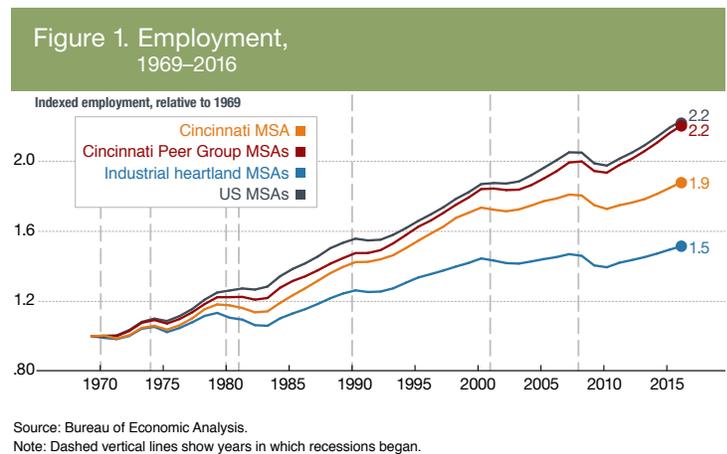
Although it may be somewhat common, particularly in the industrial heartland, to associate the decline in US manufacturing with the high-profile struggles of the automobile and steel industries in the 1970s and 1980s, the sector’s importance actually began to diminish several decades earlier, after peaking at more than 32 percent of all nonfarm (peacetime) jobs in 1953. This peak timing corresponds closely to the peak population in many of the industrial heartland metro areas, including that of Cincinnati (503,988 in 1950), and reflects the beginning of several decades of (sometimes challenging) economic transformation.

Employment growth

Figure 1 illustrates annual total employment growth in the Cincinnati MSA relative to selected peer groups during the period from 1969 to 2016. The values are indexed relative to 1969 levels, so any value between 1.0 and 2.0 indicates that employment levels have increased between 1 percent and 99 percent of the employment levels seen in the respective regions in 1969. More specifically, subtracting 1 from any value in the chart and then multiplying that figure by 100 will yield the percentage change relative to 1969 levels.

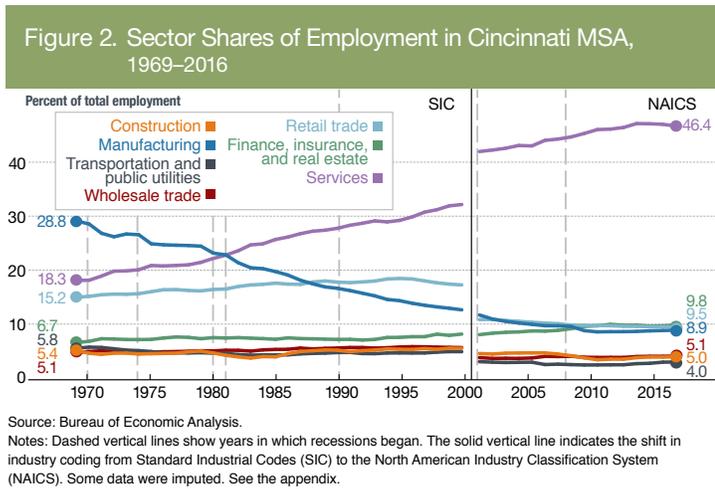
The Cincinnati MSA index value is 1.9 in 2016, indicating that total employment has grown by nearly 90 percent since 1969 (from 715,347 to 1,340,108). While this is appreciably faster than the rate of employment growth for the industrial heartland MSAs during the same period (50 percent), it is also well below the rate of growth for both the nation’s average MSA and the MSAs comprising the Cincinnati Peer Group, which is a collection of 11 similarly sized metro areas (in terms of population) to the Cincinnati MSA that have been relied on in other reports to benchmark the region’s progress.⁹

While employment levels have increased in every region during the sample period displayed (figure 1), growth has been uneven over time and across different regions. The vertical dashed lines indicate the starting years of national recessions, and the differential experiences during these periods is especially pronounced. For instance, the recessions that began in 1980 and 1981 hit the industrial heartland and Cincinnati MSA relatively hard. Pre-recession employment peaked in both areas in 1979 before bottoming out in Cincinnati in 1982 and in the industrial heartland in 1983. In percentage terms, Cincinnati lost 3.8 percent and the industrial heartland lost 6.5 percent of employment, respectively, between the peaks and troughs. Cincinnati’s Peer Group also experienced employment losses during this period, but they were much more modest at slightly more than 1 percent.



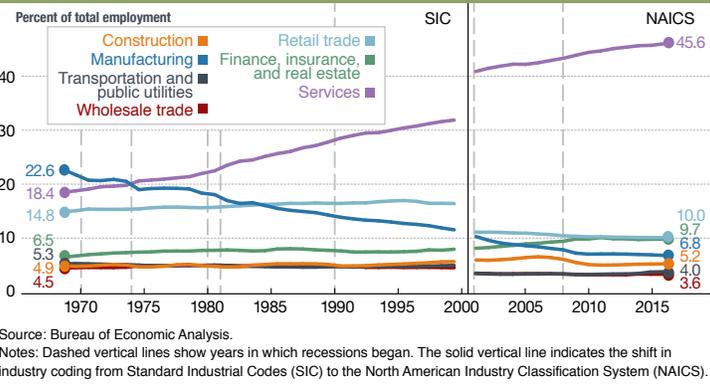
Unlike the relatively mild 1990 and 2001 recessions, the Great Recession did not discriminate in its severity across regions. Every area displayed in figure 1 suffered employment losses of at least 3 percent from prerecession peak levels (generally in 2007 or 2008). On average, employment fell by 3.7 percent in US metro areas and by roughly 4.5 percent in the industrial heartland MSAs. The Cincinnati MSA fared slightly worse than the typical metro area, with employment losses of 4.5 percent between 2007 and 2010.

The structure or composition of economic activity has evolved over time in the Cincinnati MSA, as well. Figures 2 and 3, which plot the share of total employment in various sectors for the Cincinnati MSA and the nation annually from 1969 to 2016, clearly illustrate the transitions from a manufacturing-based economy to a service-oriented one.¹⁰



In 1969, the manufacturing sector was the largest source of employment for both the Cincinnati MSA and the nation, accounting for 28.8 percent and 22.6 percent of all employment, respectively. By 2016, these figures had fallen to 8.9 percent for the Cincinnati MSA and 6.8 percent for the nation. To put these figures in perspective, roughly one in every three people was employed in manufacturing in the Cincinnati MSA in 1969, while only one in 12 works in the sector today.

Figure 3. Sector Shares of Employment in US, 1969–2016



For many sectors—such as retail trade; finance, insurance, and real estate; construction; and transportation and public utilities—the Cincinnati area has held roughly the same employment shares as the nation in both 1969 and 2016. While the Cincinnati MSA’s employment mix more closely matches the employment mix of the nation today than it did in 1969, there are a few notable differences. First, Cincinnati has a larger and more stable share of employment in the wholesale trade sector, which includes establishments that provide or distribute merchandise, maintain inventories, or offer services to other establishments as an intermediate step in the distribution of merchandise. Second, the sector, which employed more than 68,000 people in Cincinnati in 2016, accounts for 5.1 percent of the region’s employment, compared to only 3.6 percent for the nation. Third, the service sector, which has been the fastest-growing source of employment nationwide, has grown faster in the Cincinnati MSA than in the nation as a whole during the past half-century. Accounting for just 18 percent of employment in both Cincinnati and the nation in 1969, the service sector is now home to 46.4 percent of the employment in Cincinnati and 45.6 percent in the nation.¹¹

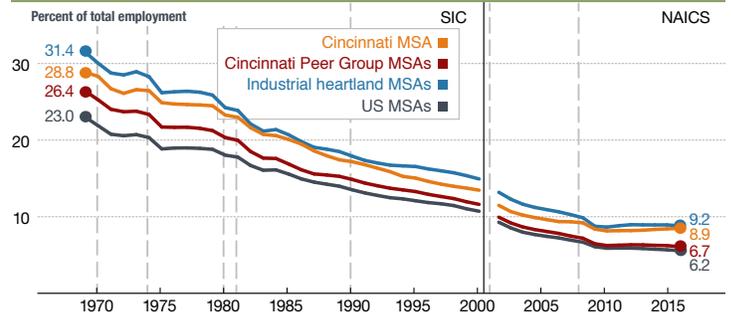
Manufacturing’s decline

The reductions in the share of employment in manufacturing for every area examined in the previous section are stark and warrant further investigation. It is important, however, to provide additional context to these figures because manufacturing employment and manufacturing output provide different perspectives on how the sector has evolved over time.

Adjusted for inflation, manufacturing output—the market value of all manufacturing products produced within the borders of the United States—accounts for roughly 12 percent of real GDP.¹² This figure has been remarkably stable going back as far as 1947, a year that also predates peak manufacturing employment in the nation. Meanwhile, the decline in manufacturing employment seen in the Cincinnati MSA and the industrial heartland has occurred more broadly, as every US region has followed the same general downward trend during the past half-century (figure 4).

So how do we reconcile the fact that manufacturing employment, both in absolute numbers and as a share of total employment, is declining at the same time that the value of the products the nation manufactures has remained a relatively constant fraction of the overall value of the basket of goods and services it produces? The answer is that productivity gains in the manufacturing sector during the past half-century have afforded producers with the opportunity to manufacture the same or even additional output with fewer workers. A similar transformation took place in the agricultural sector a century earlier, when farm employment as a share of total employment is estimated to have fallen from more than 80 percent of all jobs in 1810 to less than 33 percent by 1910.¹³

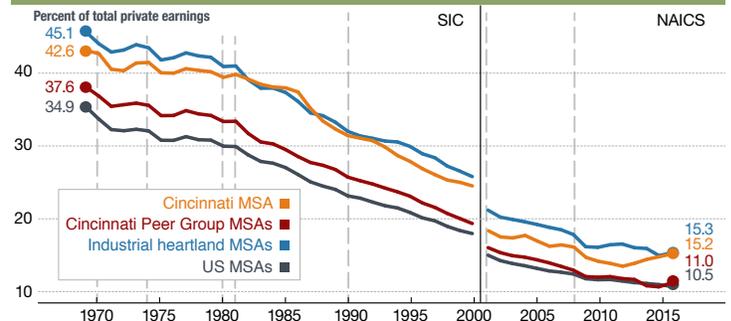
Figure 4. Manufacturing Share of Employment, 1969–2016



Source: Bureau of Economic Analysis.
 Notes: Dashed vertical lines show years in which recessions began. Group averages are weighted by population. The solid vertical line indicates the shift in industry coding from Standard Industrial Codes (SIC) to the North American Industry Classification System (NAICS). Some data were imputed. See the appendix.

One consequence of the decline in manufacturing’s share of employment is that this sector’s relative importance in generating earnings also has declined. In 1969, for instance, more than 45 percent of all earnings in the typical industrial heartland MSA was generated by employment in the manufacturing sector (figure 5). In that same year in the Cincinnati MSA, 42.6 percent of earnings came from the manufacturing sector.¹⁴ While every region depicted in figure 5 experienced a sharp downward trend in relative manufacturing earnings, the Cincinnati MSA’s downward trend accelerated relative to the other areas’ in the mid- to late 1980s, when the earnings share dropped from 37 percent in 1986 to 31 percent in 1990. This was the largest drop in manufacturing earnings for the MSA in any five-year period dating back to 1969.

Figure 5. Manufacturing Share of MSA Earnings, 1969–2016

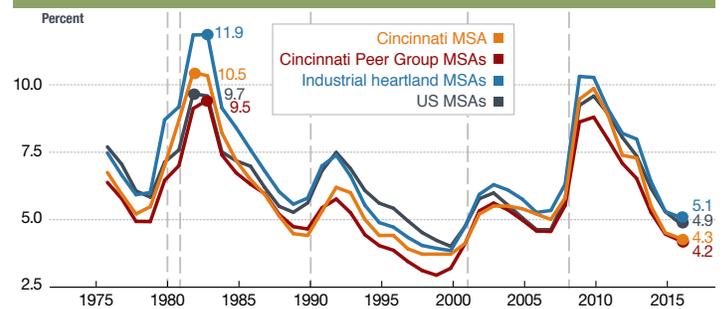


Source: Bureau of Economic Analysis.
 Notes: Dashed vertical lines show years in which recessions began. Group averages are weighted by population. The solid vertical line indicates the shift in industry coding from Standard Industrial Codes (SIC) to the North American Industry Classification System (NAICS). Some data were imputed. See the appendix.

Metropolitan areas, particularly in the industrial heartland, began experiencing significant employment losses when they became, in a broad sense, less attractive relative to other areas. Researchers have identified several factors that likely played at least some role in the demise of manufacturing. First, there is evidence that manufacturing firms in the industrial heartland tended to be more insulated from competition, both for workers and among competing producers, a situation that lowered firms' incentive to innovate and adopt new technologies. Then, as competition began to increase from forces such as globalization and nonunionized labor, many firms found themselves at a severe competitive disadvantage. For example, many of the Cincinnati MSA's machine tool manufacturers lagged their international competitors in adopting computer numeric controls in the 1960s and 1970s, and this delay ultimately shifted economic activity away from the region toward international producers.¹⁵

In addition, cost reductions and innovations in transportation reduced the Midwest's (and Cincinnati's) location-specific advantages of access to waterways and railroads for moving raw and finished goods. These advances in transporting products not only provided a cost advantage to many areas without a long manufacturing history, such as those in the Sunbelt, but they also contributed significantly to the reallocation of economic activity within metropolitan areas from urban to suburban zones. For instance, in the Queensgate West industrial cluster in Cincinnati, an urban area that had been predominately industrial since the 1800s, both the lack of available space to expand and an aging public infrastructure played roles in firms' relocating outside of the city's traditional urban core.¹⁶

Figure 6. Unemployment Rate, 1976–2016



Source: Bureau of Economic Analysis.

Notes: Dashed vertical lines show years in which recessions began. Group averages are weighted by population.

Unemployment rates

Since 1976, Cincinnati consistently has fared better than the industrial heartland overall in terms of an annual average unemployment rate, but it has fared less well than MSAs outside of the industrial heartland during the two recessionary periods beginning in 1980 and 1981 and during the Great Recession.¹⁷ In the years following these recessionary periods, however, unemployment rates in all of the regions depicted in figure 6 returned to prerecessionary levels relatively quickly. For the industrial heartland, research has indicated that the unemployment rate has not remained elevated following severe negative shocks, such as the 1980 and 1982 recessions, in part because of population losses that stabilize the area's labor forces at lower levels.¹⁸

It should be noted that the unemployment rate peaked in the industrial heartland and the Cincinnati MSA in the years immediately following the 1982 recession. This recession, which was particularly pronounced in the Midwest, was the only time between 1969 and 2016 in which the annual unemployment rate in the Cincinnati MSA exceeded 10 percent, having peaked at 10.5 percent in 1982.

Although the typical industrial heartland MSA also experienced the highest unemployment rates of the groups shown in figure 6 during the Great Recession, there was less variation across regions in the most recent downturn. Unemployment rates varied only from a low of 8.8 percent in the Cincinnati Peer Group to a high of 10.3 percent in the average industrial heartland MSA. In the 1982 recession, the unemployment gap between regions was roughly 2.5 percentage points (11.9 in the industrial heartland versus 9.5 in the Cincinnati Peer Group).

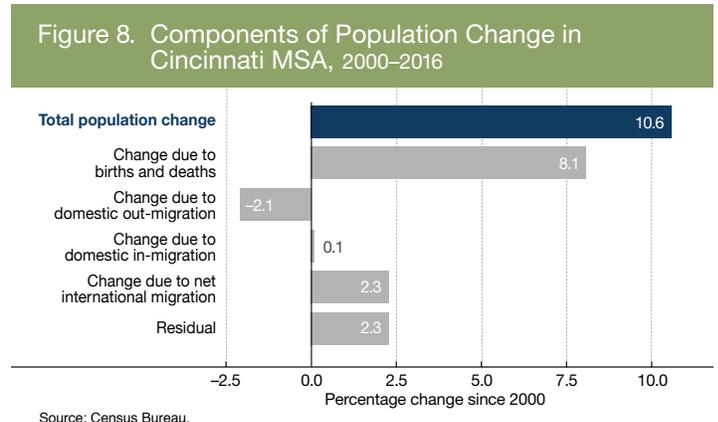
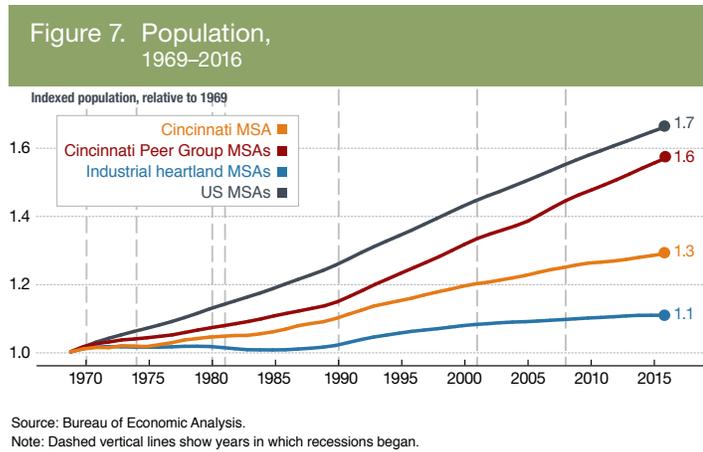
The unemployment rates in the regions also appear to be more tightly linked after 2000 than in the preceding years. This may be because service-oriented sectors tend to be less vulnerable (but not immune) to business-cycle fluctuations.

Population

Indexed to its 1969 levels, population growth in the Cincinnati MSA and in the industrial heartland has lagged that of other regions during the sample period (figure 7). In fact, in the industrial heartland, the population never exceeded its 1969 level by more than 2 percent until 1991. The Cincinnati MSA experienced similar, albeit slightly higher, population growth during the same period. In 1990, the MSA’s population was only 10 percent higher than the 1969 estimate of 1.7 million, a figure that trailed growth in both the Cincinnati Peer Group (14.7 percent) and in the US metro average (26 percent). Population growth expanded in the Cincinnati MSA from 1990 to 2016, but, again, the pace has exceeded only the growth rate in the average industrial heartland MSA.

Across the industrial heartland and the Cincinnati MSA, when manufacturing firms began closing or relocating to other regions, some workers remained chronically unemployed because they did not possess the skills needed to transition to different occupations. Many individuals with more marketable skills (or human capital) pursued opportunities outside of the industrial heartland. The decline in population within urban areas caused by residents’ relocation to the expanding suburbs and even to other regions dampened city revenue collections, contributed to budget deficits and spending reductions, and often resulted in cutbacks to public infrastructure maintenance and investment. Such cutbacks further enhanced the relative attractiveness of suburban locations to existing firms and residents.

The sources of population change for the Cincinnati MSA from 2000 to 2016 also provide an interesting view of the dynamics of the region. During this period, as illustrated in figure 8, Cincinnati’s population increased by 10.6 percent. Most of this change, 8.1 percent, is attributable to births and deaths, also referred to as “natural increase.” Net international migration to the MSA accounts for 2.3 percent of the population gains, but these gains are nearly offset by a 2.1 percent reduction in the population as a result of domestic out-migration. Any other change in the population is labeled as residual.



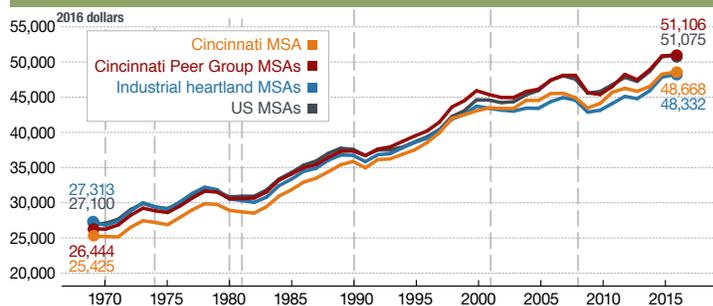
Despite the population gains since 2000, it is evident from the domestic out-migration and in-migration figures that more people residing within the United States are leaving the Cincinnati MSA than are moving into it.¹⁹ This might suggest, at least to some extent, that the Cincinnati MSA may lack some of the amenities offered by other areas, it may have larger disamenities that make the region a less desirable place to live and work, or it may be slower in transitioning from older amenities to more modern amenities. While quality job opportunities and proximity to relatives are documented factors that influence location decisions, other amenities or disamenities such as the availability of leisure activities, traffic and congestion, crime rates, housing options, and educational opportunities are also important. Increasing or improving the region's amenities may prove to be a fruitful strategy for boosting the below-average population growth of the past half-century.

Real per capita personal income

Over time, the Cincinnati MSA generally has exhibited a lower real per capita personal income than that of the average US metropolitan area (figure 9). However, in percentage terms, the Cincinnati MSA's inflation-adjusted per person income grew 91 percent between 1969 and 2016, a pace that is slightly faster than the US metro average (88 percent) and well above the industrial heartland average (77 percent).

If we exclude the period from 1969 to 1990, during which population growth was extremely slow in the region, there is a noticeable resurgence in real income gains in the Cincinnati MSA. These gains track the national gains very closely. From 1991 to 2016, real per capita income expanded by 38 percent in the Cincinnati MSA, in the average US metro area, and in the Cincinnati Peer Group. Moreover, the income gap between the US metro average and the Cincinnati MSA decreased from a high of nearly 10 percent in 1971 to just below 5 percent in 2016.

Figure 9. Real per Capita Personal Income, 1969–2016

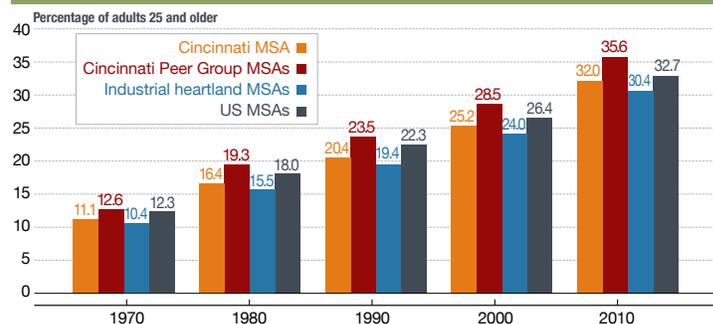


Sources: Bureau of Economic Analysis and Bureau of Labor Statistics via Haver Analytics.

Notes: Dashed vertical lines show years in which recessions began. Group averages are weighted by population.

Over long periods of time, real income gains tend to be very closely related to gains in productivity. However, since productivity estimates are unavailable at the metro level, indicators such as educational attainment or the number of patents generated in a region can be insightful because research suggests that they correlate strongly with productivity growth.²⁰ Figure 10 shows the percentage of adults in selected regions who are age 25 and older and hold at least a bachelor's degree.

Figure 10. Percentage of Adults with a Bachelor's Degree or Higher, 1970–2010



Source: Integrated Public Use Microdata Series.

Educational attainment levels have risen across all regions since 1970, with the Cincinnati MSA remaining in the same relative position during that time: lower educational attainment than the average US metro areas and the Cincinnati Peer Group MSAs and higher than the industrial heartland MSAs. In 2010, Cincinnati had an estimated 32.0 percent of adults age 25 and older holding at least a bachelor's degree. The Cincinnati MSA has gained some ground relative to the nation in this metric during the past 40 years; however, the region has fallen further behind the Cincinnati Peer Group in educational attainment and now trails the average Peer Group MSA by nearly 4 percentage points (35.6 percent compared to 32.0 percent).

Recent developments and future prospects

In addition to broader trends, more recent within-industry shifts in the manufacturing and service sectors can be examined using data from the Quarterly Census of Earnings and Wages (QCEW), which is published by the Bureau of Labor Statistics. The QCEW provides county-level counts of employment and wages in detailed sectors for more than 95 percent of the jobs in the United States dating back to 1990.

Table 1, which shows the top 20 reported establishment groupings of manufacturing and service sectors for the Cincinnati MSA in 1990 and 2016, highlights the strong links to the area's industrial heritage.²¹ Average annual weekly wages are also provided for each reported sector and are in 2016 dollars.

It should be noted that all sectors are ranked in terms of their location quotient, which is simply a ratio of the employment share of a sector in a given region to the employment share of that sector in the rest of the nation. If a sector's regional location quotient is greater than 1.0, then that sector is more highly concentrated within the region relative to its concentration in the rest of the nation. In other words, the region is considered to be specializing in sectors with a location quotient greater than 1.1. A ratio value that is less than 1.0 indicates that the sector is relatively less concentrated in the region compared to its concentration in the rest of the nation.

In 1990, half of the Cincinnati region's top 20 reported specialty sectors were in manufacturing, including 3 of the top 5: chemical manufacturing, paper manufacturing, and beverage and tobacco product manufacturing. Collectively, these sectors accounted for more than 37,000 jobs. Although three manufacturing sectors remained among the top five reported specialty sectors in 2016—paper manufacturing, primary metal manufacturing, and chemical manufacturing—these sectors accounted for some 23,000 jobs. The MSA in 2016 is also more specialized in service-sector activities than in manufacturing-sector activities, with 11 of the region's top reported specialty sectors falling into the service classification.

The manufacturing sectors present among the top sectors for both 1990 and 2016 are chemical, paper, beverage and tobacco product, machinery, primary metal, transportation equipment, fabricated metal product, and electrical equipment and appliance manufacturing. Each of these sectors experienced notable decreases in employment levels between 1990 and 2016, ranging from an 11 percent employment decrease in beverage and tobacco product manufacturing to a 51 percent employment decrease in chemical manufacturing. In terms of absolute jobs, the chemical manufacturing sector shrank from more than 23,000 jobs in 1990 to around 11,000 jobs by 2016. Even though Cincinnati claims considerably more economic activity in chemical manufacturing than the nation as a whole, that sector's location quotient decreased significantly, from 2.87 to 1.89, between 1990 and 2016. In contrast, one manufacturing sector that remained relatively resilient during this time period, fabricated metal product manufacturing, is a direct descendant of the region's machine tool past. The sector employed 13,855 workers in 2016, compared to 16,052 in 1990.

Table 1. Top 20 Manufacturing and Service Sectors in Cincinnati MSA by Location Quotient

1990					2016				
Rank	NAICS sector	Location quotient	Employment	Real mean annual weekly wages (\$)	Rank	NAICS sector	Location quotient	Employment	Real mean annual weekly wages (\$)
1	Performing arts and spectator sports	4.28	20,656	393.10	1	Management of companies and enterprises	2.37	39,725	2,679.00
2	Chemical manufacturing	2.87	23,442	930.40	2	Paper manufacturing	2.12	5,891	1,110.25
3	Paper manufacturing	2.02	10,588	1,085.16	3	Nonstore retailers	1.97	7,974	779.50
4	Water transportation	1.89	914	996.99	4	Primary metal manufacturing	1.92	5,391	1,621.50
5	Beverage and tobacco product manufacturing	1.85	3,327	1,058.53	5	Chemical manufacturing	1.89	11,522	2,085.75
6	General merchandise stores	1.78	36,561	527.66	6	Museums, historical sites, zoos, and parks	1.86	2,211	592.00
7	Machinery manufacturing	1.75	19,823	1,111.34	7	Transportation equipment manufacturing	1.84	22,447	1,736.50
8	Primary metal manufacturing	1.71	9,256	1,387.34	8	Beverage and tobacco product manufacturing	1.59	2,951	1,117.25
9	Transportation equipment manufacturing	1.61	28,042	509.75	9	Couriers and messengers	1.58	7,535	876.50
10	Printing and related support activities	1.53	10,232	945.56	10	Amusements, gambling, and recreation	1.41	17,035	374.00
11	Air transportation	1.43	5,833	1,146.70	11	Hospitals	1.34	49,641	1,103.25
12	Nursing and residential care facilities	1.27	19,365	449.13	12	Fabricated metal product manufacturing	1.30	13,885	1,091.50
13	Miscellaneous manufacturing	1.27	7,200	908.36	13	Machinery manufacturing	1.30	10,483	1,286.00
14	Amusements, gambling, and recreation	1.26	8,420	368.30	14	Merchant wholesalers, durable goods	1.30	28,616	1,265.50
15	Fabricated metal product manufacturing	1.26	16,052	957.04	15	Insurance carriers and related activities	1.27	21,818	1,495.25
16	Electronic markets and agents and brokers	1.16	8,113	1,062.66	16	Electrical equipment and appliance manufacturing	1.24	3,549	1,073.00
17	Hospitals	1.16	31,013	785.28	17	Transit and ground passenger transportation	1.20	4,271	465.00
18	Electrical equipment and appliance manufacturing	1.13	5,558	961.63	18	Credit intermediation and related activities	1.20	23,397	1,214.25
19	Merchant wholesalers, durable goods	1.09	22,753	1,118.23	19	Merchant wholesalers, nondurable goods	1.16	17,806	1,263.25
20	Health and personal care stores	1.08	7,009	619.50	20	Textile mills	1.11	948	1,345.75

Sources: Bureau of Labor Statistics' CPI and Quarterly Census of Earnings and Wages.

Notes: Wage data are in 2016 dollars and were deflated using the consumer price index for all urban consumers. Industries are defined using the 3-digit North American Industry Classification System (NAICS).

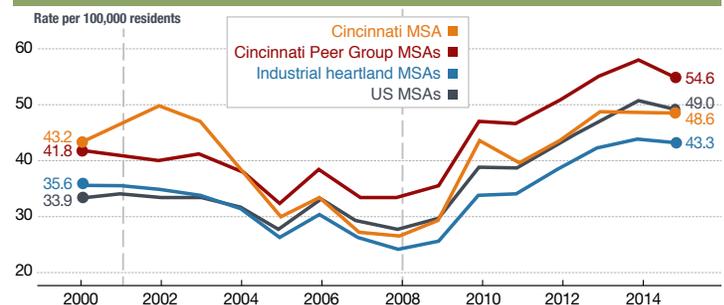
In terms of services, in addition to their becoming a larger share of the MSA's economy over time, the region's top reported service specialty sectors have changed more than the MSA's top manufacturing sectors. Of the 10 service sectors originally ranked among the top 20 in 1990, only 3 were among the top specialty sectors by 2016. These recent top specialty sectors are amusements, gambling, and recreation; hospitals; and merchant wholesalers for durable goods. Each of these sectors saw meaningful increases in employment levels and location quotients, and the hospital sector also experienced a notable increase in real wages. This information suggests that compared to manufacturing sector composition, regional service sector composition is more dynamic over time and may be a key source of economic growth and opportunities for the future.

Although the Cincinnati MSA remains manufacturing intensive relative to the nation, it has followed the nation through significant changes within the past half-century and is now solidly a modern service-oriented region. In just the past generation (since 1990), the Cincinnati MSA has transitioned from having an economy dominated by specialized manufacturing in chemicals, paper, machinery, and primary metals to a leading metropolitan area in financial, accounting, and business management activities (NAICS 551). This last sector has one of the highest average real weekly wages (\$2,679) in the MSA and employs roughly 40,000 people in the Cincinnati region, slightly less than 2 percent of the sector's national total. The business management activities sector also has the largest location quotient in the MSA for reported sectors at 2.37, illustrating the region's relative strength as a management center. While the MSA is home to a wide range of both privately and publicly held firms, some of the MSA's concentration in management activities no doubt derives from the fact that many of the region's largest publicly traded companies such as Procter & Gamble, Kroger, and Western & Southern Financial Group can trace their roots to Cincinnati's rapid expansion in the 1800s.

In a broader sense, the longer-run growth prospects for any region depend on the region's ability to continue to produce innovative goods and services and to deliver amenities that make the MSA an attractive place to live and work. And to a certain extent, the identity of a city is a product of the amenities (or disamenities) it has to offer. Among Cincinnati's assets is its rich cultural history that manifests through local arts and architecture. In recent years, much of Cincinnati's creative culture has been revamped through urban development efforts, such as the renovation of Music Hall, that may help the region reclaim itself as a center for the arts and for unique architecture in the Midwest.

While a local arts renaissance may help make Cincinnati a more desirable destination, business innovation and entrepreneurship are key in propelling the MSA forward. A reliable indicator of innovation coming from a particular region is the rate of patents granted in that region.²² For the most recent data available (2015), businesses and individuals in the Cincinnati MSA were granted patents at a rate of 48.6 per 100,000 residents. While this rate is an improvement from that of 2000, when the region's rate was 43.2 patents per 100,000 residents, the pace of innovation has slowed relative to the US metro and Cincinnati Peer Group averages during this period. As figure 11 shows, the Cincinnati MSA's relative decline in innovation was driven by a reduction in granted patents between 2002 and 2005.

Figure 11. Patents per 100,000 Residents, 2000–2015



Sources: US Patent and Trademark Office and Bureau of Economic Analysis.
Notes: Dashed vertical lines show years in which recessions began. Group averages are weighted by population.

In addition to the region's overall relative reduction in patent innovation, more than 40 percent of patents within the MSA are granted to only two companies: Procter & Gamble and General Electric (table 2). These two companies have very strong ties to the Cincinnati MSA, but if they were to relocate their research and development activity or slow their historical rate of innovation, their doing so could yield serious consequences for the MSA's future growth prospects.

Table 2. Top 10 Patent Awardees in Cincinnati MSA, 2000–2015

Organization	Total patents awarded 2000–2015	Share of MSA patents awarded (%)
Procter & Gamble Company	3,723	27.6
General Electric Company	2,051	15.2
Ethicon Endo-Surgery, Inc.	1,133	8.4
Individually owned patent	1,055	7.8
Hill-Rom Services	350	2.6
Equistar Chemicals, LP	218	1.6
University of Cincinnati	152	1.1
International Paper Co.	120	0.9
Devicor Medical Products, Inc.	107	0.8
Children's Hospital Medical Center (Cincinnati)	86	0.6

Source: US Patent and Trademark Office.

Innovation is also important for the MSA's manufacturing establishments if they are to avoid the consequences of overreliance on obsolete technology and operation processes such as factory closure and real estate abandonment. Despite manufacturing's decline in Cincinnati and throughout the rest of the nation, manufacturing firms can still contribute to the economy in meaningful ways. According to a recent publication by the National Academy of Engineering (NAE), manufacturers should consider adopting practices such as lean production to maintain or enhance their competitive edge.²³ The NAE also recommends that companies codify and teach best practices for innovation and increase their understanding

of customer needs and economic patterns in order to tap into potentially underserved market segments. Finally, as innovation and processes evolve within industries, companies should consider additional investments in workforce development and education programs to boost productivity.²⁴ Such programs could include stand-alone programs or private–public partnerships such as the Cincinnati Youth Collaborative (CYC), which facilitates a worksite mentoring program wherein regional employers meet regularly with students to assist them with college and career preparedness.²⁵ Expanding accessibility to meaningful educational and work opportunities is a prerequisite for greater community engagement and inclusive growth.

Cincinnati has made solid strides in recent years toward reclaiming itself as a center for the arts and for unique architecture in the Midwest. Combined with strategic investments in workforce development and education programs to boost productivity, the MSA can extend its culture of innovation and become an even more attractive place to live and work with more inclusive opportunities.

- ¹ A metropolitan statistical area, or MSA, is a collection of counties defined by the Census Bureau as a single labor market that incorporates both urban and suburban residential and business areas by accounting for commuting patterns. Formally known as the Cincinnati–Middletown, OH–KY–IN metropolitan statistical area (which for brevity is referred to as the Cincinnati MSA in this report), the MSA includes Dearborn, Ohio, and Union Counties in Indiana; Boone, Bracken, Campbell, Gallatin, Grant, Kenton, and Pendleton Counties in Kentucky; and Brown, Butler, Clermont, Hamilton, and Warren Counties in Ohio. The MSA, referred to locally as Greater Cincinnati, had a total population of 2,114,580 in the 2010 US Census, making it the 27th most populous MSA in the nation. Cincinnati is the largest city in the MSA by a considerable margin, with a population of 296,943 in the last census.
- ² This area includes MSAs that were part of a concentration of manufacturing activity situated along the Great Lakes to the north and the Ohio River to the south and from upstate New York in the east to Wisconsin and Illinois in the west. For more information on the MSAs included in and the economic performance of the region, see Mark E. Schweitzer, “Manufacturing Employment Losses and the Economic Performance of the Industrial Heartland.” Federal Reserve Bank of Cleveland, Working Paper No. 17-12 (2017).
- ³ Even today, Cincinnati is often referred to as “Porkopolis” because of its pork processing legacy. For more information on how this activity helped to shape Cincinnati’s economic landscape, see Jimmy M. Skaggs, *Prime Cut: Livestock Raising and Meatpacking in the United States, 1607–1983* (Texas A&M University Press, 2000), 33–44.
- ⁴ Procter & Gamble, “Our History—How It Began,” Company History Fact Sheet. https://www.pg.com/en_US/downloads/media/Fact_Sheets_CompanyHistory.pdf
- ⁵ See J.W. Roe, *English and American Tool Builders* (McGraw-Hill, 1916). As examples, the Cincinnati Milling Machine Company is now known as Milacron, Inc. It remains headquartered in Cincinnati and primarily services the plastics and fluid technology industries. Cincinnati Machines has retained its name; it remains headquartered in the metro area and provides machine tools to a variety of industries.
- ⁶ Roe, *English and American Tool Builders*, 266.
- ⁷ Max A. Rutzick, “Manpower Requirements in the Machine-Tool Industry,” *Monthly Labor Review*, Vol. 73, No. 6 (December 1951), 672–675. See also Arthur J. Alexander, *Adaptation to Change in the U.S. Machine Tool Industry and the Effects of Government Policy*, RAND Corporation (September 1990). According to the Bureau of Labor Statistics, the United States had an annual average payroll employment of 15,290,000 in manufacturing in 1952.
- ⁸ These figures are from the county and city data books obtained from the University of Virginia website at <http://ccdb.lib.virginia.edu/>. (The University of Virginia service has been discontinued, but archived copies of the data books can be retrieved from other locations. See the website for details.) The number of employed people in the city of Cincinnati in 1950 (the closest available date to 1947) was 201,825. By 1977, the number of manufacturing establishments in the city had fallen to 942.
- ⁹ The Cincinnati Peer Group figures are the population-weighted averages of the following 11 metropolitan statistical areas: Austin, TX, MSA; Charlotte, NC, MSA; Cleveland, OH, MSA; Columbus, OH, MSA; Denver, CO, MSA; Indianapolis, IN, MSA; Louisville, KY, MSA; Minneapolis–St. Paul, MN, MSA; Pittsburgh, PA, MSA; Raleigh, NC, MSA; and St. Louis, MO, MSA. The industrial heartland figures are also population-weighted averages.
- ¹⁰ If deemed necessary, the Bureau of Economic Analysis will suppress data for metropolitan areas so that individual establishments cannot be identified. The employment composition figures in this report were constructed from 544 observations from 18 NAICS sectors (2001–2016) and 8 SIC sectors (1969–2000). For the Cincinnati MSA, 26 observations were suppressed (4.8 percent of the total number). Suppressed observations were imputed at the NAICS (North American Industry Classification System) and/or SIC (Standard Industrial Classification) subsector level using the Kalman smoother available from the imputeTS R package. See the appendix for a detailed breakdown of the missing observations per subsector and an assessment of the imputations.
- ¹¹ The notable break in the employment shares for retail trade and services that occurred in 2001 is the result of reorganizing industries from the Standard Industrial Classification (SIC) system to the North American Industry Classification System (NAICS). Under the SIC system, the management of companies was assigned to the category of the business’s primary output. NAICS created a distinct category for these activities, which are a strength of the Cincinnati MSA’s; the creation of this new category explains the sharp increase in the nation’s share of service-sector employment between 2000 and 2001.
- ¹² YiLi Chien, “Is US Manufacturing Really Declining?” Federal Reserve Bank of St. Louis, On the Economy Blog (April 2017). <https://www.stlouisfed.org/on-the-economy/2017/april/us-manufacturing-really-declining>
- ¹³ Stanley Lebergott, “Labor Force and Employment, 1800–1960,” in Dorothy S. Brady, ed., *Output, Employment, and Productivity in the United States after 1800*. National Bureau of Economic Research (1966). <http://www.nber.org/chapters/c1567.pdf>

- ¹⁴ Manufacturing employment and earnings for the Cincinnati MSA were suppressed by the Bureau of Economic Analysis in 2015. Those values were imputed using the Kalman smoother available from the imputeTS R package. See appendix for additional information about the imputations.
- ¹⁵ See Heinrich Arnold, “The Recent History of the Machine Tool Industry and the Effects of Technological Change,” University of Munich, Institute for Innovation Research and Technology Management, Working Paper No. 2001-14 (2001).
- ¹⁶ The city of Cincinnati conducted a detailed survey and analysis of the Queensgate industrial area that is available online at <https://www.cincinnati-oh.gov/planning/assets/File/Queensgate%20West%20Industrial%20Development%20Plan%201977.pdf>.
- ¹⁷ The Bureau of Labor Statistics (BLS) currently publishes unemployment rates at the MSA level only, a practice it has employed since 1990. In this analysis we also use earlier data no longer published that were provided by the BLS, along with a description of known problems in the data. Incompatibilities with the current approach to unemployment statistics were examined, and data were dropped for certain MSAs in which population changes made the unemployment rate unreliable.
- ¹⁸ See Olivier Blanchard and Bruce Katz, “Regional Evolutions,” Brookings Papers on Economic Activity, Vol. 1992, No. 1 (1992).
- ¹⁹ The Census Bureau defines “domestic migration” as the movement of people, regardless of origin, within national boundaries, whereas “international migration” refers to the movement of people across national borders.
- ²⁰ Jonathan T. Rothwell, José Lobo, and Deborah Strumsky, “The Role of Invention in U.S. Metropolitan Productivity” (December 1, 2014). <https://ssrn.com/abstract=2175310> or <http://dx.doi.org/10.2139/ssrn.2175310>
- ²¹ One limitation of the QCEW data is that the Bureau of Labor Statistics will suppress employment and wage data to ensure the confidentiality of respondents because the data are not estimates. Suppressed data generally become more of a concern as the level of sectoral detail increases or as the level of geography becomes smaller. The QCEW data examined in this report are the annual averages of all of the reported quarterly values for every sector for which data were published for the Cincinnati MSA in 1990 and 2016. In other words, if all four quarters of a sector’s values were suppressed in, for example, 1990, then that sector is omitted from the analysis. If only two quarterly values are reported for a sector, then the annual average is the mean of the two reported quarters.
- ²² The patent data in this report include only utility patents from the US Patent and Trademark Office. Utility patents are more commonly known as patents for invention and are issued for the design or improvement of new processes, machines, materials, and so on. A description of the different types of patents is available from the Patent and Trademark Office website at <https://www.uspto.gov/web/offices/ac/ido/oeip/taf/patdesc.htm>.
- ²³ National Academy of Engineering, *Making Value for America: Embracing the Future of Manufacturing, Technology, and Work* (National Academies Press, 2015), 103.
- ²⁴ National Academy of Engineering, *Making Value for America: Embracing the Future of Manufacturing, Technology, and Work*.
- ²⁵ Information on the worksite mentoring program is available on the Cincinnati Youth Collaborative website at <https://www.cycyouth.org/what-we-do/mentoring/>.