THE WAY WE WERE

THE CHANGING GEOGRAPHY OF US MANUFACTURING FROM 1940 TO 2016

GEORGETOWN UNIVERSITY

Center
on Education
and the Workforce

McCourt School of Public Policy

Anthony P. Carnevale
Ban Cheah
Neil Ridley
Jeff Strohl
Kathryn Peltier Campbell

JPMorgan Chase & Co.

2019

THE WAY WE WERE

THE CHANGING GEOGRAPHY OF US MANUFACTURING FROM 1940 TO 2016

Acknowledgments

We are grateful to JPMorgan Chase & Co. for the generous support that made this report possible, particularly to Sarah Steinberg, who contributed her insight and feedback as the report was developed.

The staff of the Georgetown University Center on Education and the Workforce was instrumental in the production of this report from conception to publication. In particular, we would like to thank

- Andrea Porter for strategic guidance;
- Nicole Smith for economic methodology;
- Megan Fasules and Artem Gulish for data analysis;
- Martin Van Der Werf and Gayle Cinquegrani for editorial and qualitative feedback;
- Hilary Strahota, Vikki Hartt Salinkas, Emma Wenzinger, and Frank Zhang for communications efforts, including design development and public relations; and
- Joe Leonard and Coral Castro for assistance with logistics and operations.

Many others contributed their thoughts and feedback throughout the production of this report. We especially are grateful to our talented designers, editorial advisors, and printers, whose efforts were vital to its successful completion.

The views expressed in this publication are those of the authors and do not necessarily represent those of JPMorgan Chase & Co. or any of its officers or employees. All errors and omissions are the responsibility of the authors.

CONTENTS

FIGURES

THE WAY WE WERE

Those who experienced the energy crisis of the 1970s may remember its impact on the automobile industry, the symbolic heart of American manufacturing. The oil shortages that prompted long lines at the gas pump coincided with the peak of manufacturing employment and the beginning of fierce international competition as consumers began buying more fuel-efficient foreign cars.[1]

Those times had striking meaning for people who worked or lived in automobile manufacturing communities like Flint, Michigan. In Flint, as in similar cities and towns across the country, production workers experienced mass layoffs and declining opportunity caused by reduced demand and by changes in how goods are produced.[2]

As the industry sought to keep pace with international competition, it adopted automation and just-in-time inventory techniques pioneered by the Japanese while also moving some production facilities abroad. These practices bolstered industry output, but required fewer workers. While they preserved the automobile industry, they also hollowed out the workforce in Flint and similar communities.[3]

This bittersweet story is typical of many cities, counties, and states that experienced the evolution of manufacturing in the late 20th and early 21st centuries. But while the story's main themes apply broadly across the country, the exact details are geographically specific. This report shows how the geography of manufacturing has changed over time, and provides data at the state and county levels for the 18 states in which manufacturing was the largest employer at the beginning of the 21st century.

The evolution of manufacturing across the American landscape has involved three connected trends in manufacturing: a decline in share of economic output as the role of services in the economy grew; a decline in share of the workforce; and a rise in output per worker that has allowed manufacturing to increase its overall output even as its relative importance in the economy and share of the workforce have fallen.[4] These trends help explain both how manufacturing lost its position as the crown jewel of the American economy, and how it has avoided plummeting into obsolescence.

1 The peak of manufacturing in terms of number of workers employed occurred in 1979; Carnevale et al., *Upskilling and Downsizing in American Manufacturing*, 2019.
2 Eisenstein, "Flint Deals with General Motors Layoffs," 1990.
3 Uchitelle, *Making It*, 2017; Russo and Linkon, "The Social Costs of Deindustrialization," 2009.
4 For a more detailed discussion of national trends in manufacturing and their relationship to workers' education levels, see Carnevale et al., *Upskilling and Downsizing in American Manufacturing*, 2019.

The Glory Days of Industry

Manufacturing's ascent began in the 1800s, as the United States transformed from an agrarian to an industrial economy. While agriculture dominated commodity production in the early 19th century, it became less important as the nation industrialized.[5] By the beginning of the 20th century, manufacturing was the largest sector of the US economy, generating 25 percent of all economic output[6] and employing 20 percent of all workers.[7] This relative growth continued during the first decades of the 20th century. By 1940, the industry generated 27 percent of total economic output,[8] and 23 percent of workers were employed in manufacturing.[9]

The transformation of the US economy was accompanied by a shift in the geographical distribution of the population. In 1840, almost 90 percent of the population lived in rural areas. A century later, this number had fallen to 43 percent.[10] As manufacturing became concentrated in the northeastern and Great Lakes states, cities like Gary, Detroit, Cleveland, Buffalo, Pittsburgh, Newark, and Baltimore became synonymous with industry.[11] Factories had adopted assembly line techniques and standardization to mass produce consumer goods, and the automobile industry epitomized factory production.

Manufacturing output and employment declined during the Great Depression, but by 1940, the industry was beginning to experience a resurgence.[12] Industrial production rose dramatically during World War II, in part due to changes that streamlined production in support of the war effort. For example, shipbuilding was transformed from what was essentially a craft into a factory process: a shipyard could produce a warship in as little as five days using new mass-production techniques, compared to six months using the old techniques.[13] By 1947, manufacturing's share of economic output had risen to a peak of 39 percent.[14]

The Rise of Services

After the war, manufacturing gained strength as demand for goods increased.[15] But this relative strength was not to last. By the beginning of the new millennium, manufacturing output had fallen to 23 percent of the economy.[16] While it was still the largest sector, its share had diminished as services industries like finance, insurance, real estate, rental, and leasing experienced rapid growth. Overall, the services sector more than doubled its output share from 20 percent in 1947 to 44 percent in 2000.[17]

5 Gallman, "Commodity Output," 1960, Table 4. Data on services output are not available for this time period.
6 Kuznets et al., *National Income and Its Composition,* 1941, Table 12.
7 Georgetown University Center on Education and the Workforce analysis of US Census Bureau, *Bicentennial Edition: Historical Statistics of the United States, Colonial Times to 1970,* Table Ba814-830.
8 Georgetown University Center on Education and the Workforce analysis of US Census Bureau, *Bicentennial Edition: Historical Statistics of the United States, Colonial Times to 1970,* Table Ca35-53.
9 Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.
10 Georgetown University Center on Education and the Workforce analysis of US Census Bureau, *Urban and Rural Population and Housing Unit Counts 1790 to 1990*, 1993.
11 Many of these cities were simultaneously experiencing demographic change as a result of the Great Migration of Black workers from the rural South to urban areas in the North and West, as described in Wilkerson, *The Warmth of Other Suns*, 2010.
12 Manufacturing employment was already on the rise by 1939; Carnevale et al., *Upskilling and Downsizing in American Manufacturing*, 2019.
13 Thompson, "How Much Did the Liberty Shipbuilders Learn?" 2001.
14 Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Interactive Access to Industry Economic Accounts Data: GDP by Industry (Historical), 2018.
15 Carter et al., *The Historical Statistics of the United States: Millennial Edition,* 2006.
16 Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Interactive Access to Industry Economic Accounts Data: GDP by Industry, 2018.
17 Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Industry Data and Industry Data (Historical). This analysis focuses on the year 2000 because China's 2001 entry into the World Trade Organization marked a turning point with large effects on the labor market; see Autor et al., "The China Shock," 2016.

Manufacturing's smaller output share corresponded with its reduced role in the workforce. By 2000, the share of all workers employed in manufacturing had fallen to 14 percent even as it remained the largest employer in 18 states. Meanwhile, employment in services had grown from 21 percent of the labor force in 1940 to 49 percent.[18]

At the same time as the economy shifted from manufacturing to services, the geography of manufacturing changed. By 2000, the Northeast was no longer the heart of the industry, and manufacturing employment had become more concentrated in the Midwest. It had also shifted to the Southeast as foreign and US companies chose to build plants in lower-cost production sites. Lured by subsidies, lower wages, and the opportunity to unshackle themselves from union contracts, companies like The Stanley Works in New Britain, Connecticut, and Rubbermaid in Wooster, Ohio, moved their production south and west.[19]

The decline in manufacturing's relative importance in terms of both output and employment has continued into the first decades of the 21st century. By 2016, manufacturing output shrank to 18 percent of the economy, while services industries comprised 49 percent of the economy's output.[20] Employment in manufacturing had fallen to 10 percent of all workers, while more than 50 percent of workers were employed in the services sector.[21]

Adapting to a New Reality

In response to the changes described above, corporations have adopted productivity-enhancing automation and computer technology. They also laid off workers no longer needed to meet production goals and sold companies that did not meet shareholder expectations. These decisions have shored up the industry, but they have also breached the implicit social contract that had bonded corporations and workers in the postwar economy.[22]

Productivity and output have increased, but the number of manufacturing employees has fallen. In 2016, output was $5.6 trillion—more than triple the $1.6 trillion of 1947.[23] During the same period, the number of manufacturing employees fell from 15 million to 12 million.[24]

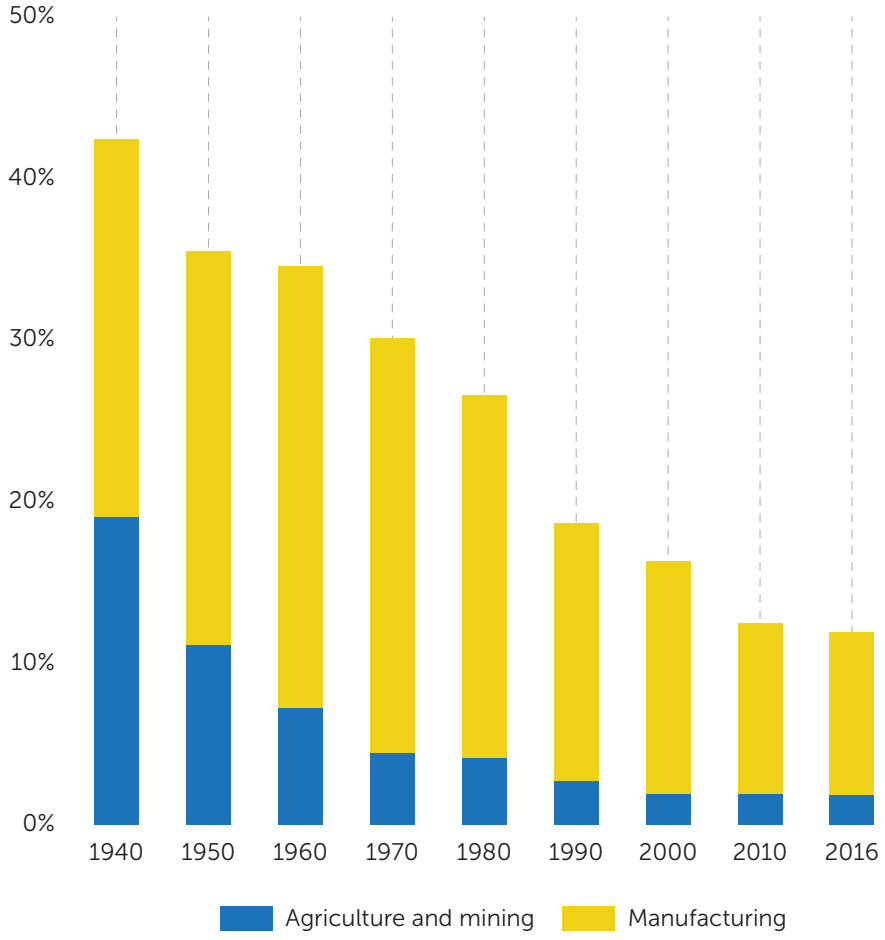
Today, things are very different from the way they once were: the economy is more diversified, and manufacturing is no longer a primary source of employment within specific regions or individual states. In 1940, manufacturing was concentrated in 15 northeastern, mid-Atlantic, and Great Lakes states.[25] As of 2016, Indiana and Wisconsin are the only states where manufacturing still provides the largest share of employment.[26] The continued industrial strength in these two states reflects the enduring legacy of manufacturing in the Midwest despite the sector's overall decline.

18 Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.
19 Uchitelle, *Making It*, 2017. The Stanley Works is now Stanley Black and Decker.
20 Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Interactive Access to Industry Economic Accounts Data: GDP by Industry, 2018.
21 Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.
22 Kochan, "Wages and the Social Contract," 2007; Cappelli et al., "The Pressures to Restructure Employment," 1997.
23 Measured in 2016 dollars. Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Gross Output by Industry and Gross Output by Industry (Historical), Table 1.1.9, 2018. Data converted to 2016 dollars using Implicit Price Deflators for Gross Domestic Product.
24 Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Interactive Access to Industry Economic Accounts Data: GDP by Industry, Tables 6.4A and 6.4D, 2018.
25 Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.
26 Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.

THE NATIONAL PICTURE

The dominant industries in the United States changed dramatically during the late 20th and early 21st centuries. In 1940, 42 percent of American workers were employed in either manufacturing or agriculture and mining. This share fell to 12 percent within three quarters of a century (Figure 1). The manufacturing sector employed 23 percent of US workers in 1940; by 2016, only 10 percent worked in manufacturing.

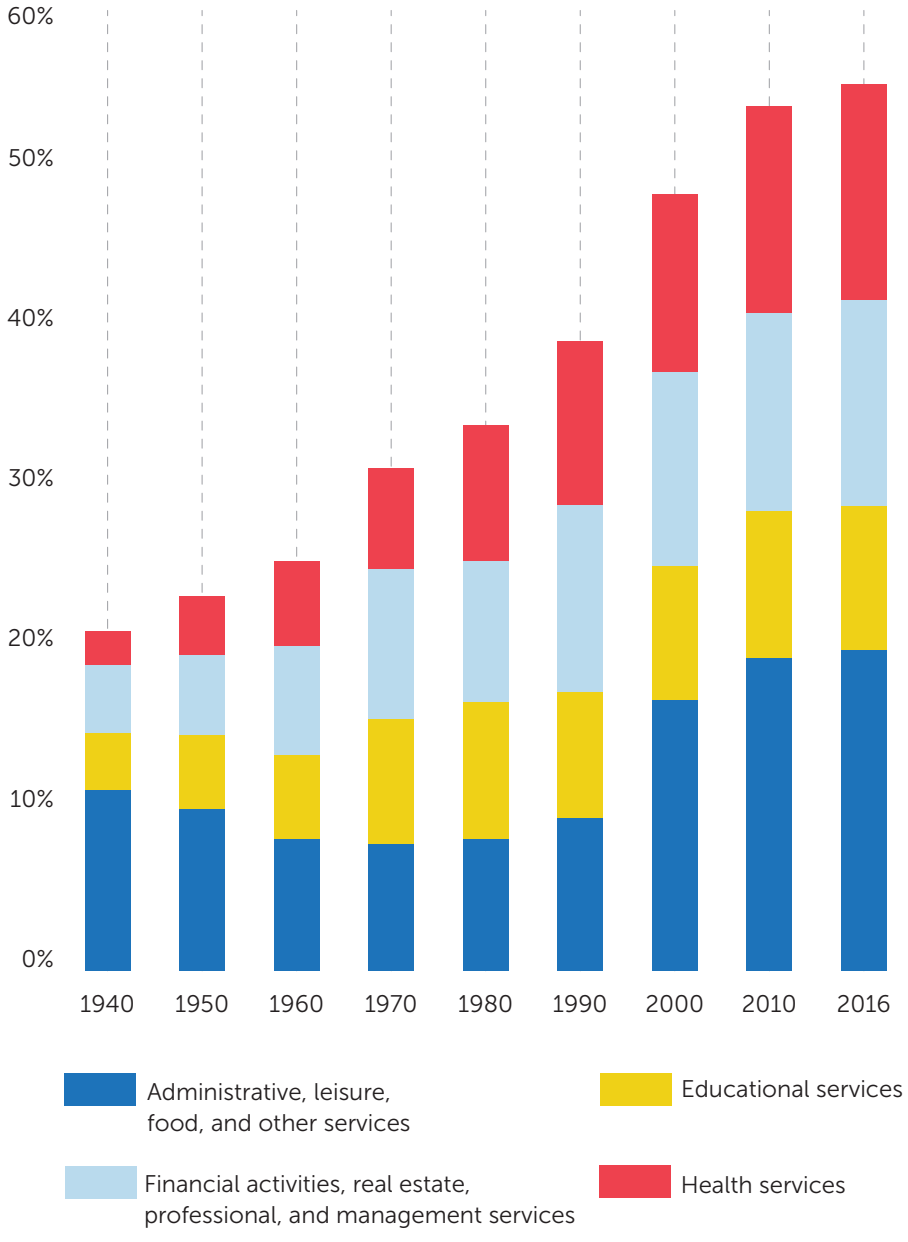
Figure 1. Employment in agriculture, mining, and manufacturing declined from 42 percent of US workers in 1940 to 12 percent in 2016.



Source: Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.

As manufacturing, agriculture, and mining employment declined as a share of the US economy, employment in the services industries grew to take their place. In 1940, only 21 percent of American workers were employed in services. By 2016, the share of US workers employed in services had risen to 55 percent. The greatest growth was in health services, which grew from 2 percent to 14 percent. The share of workers almost tripled in educational services as well as in financial activities, real estate, professional, and management services; it nearly doubled in administrative, leisure, food, and other services (Figure 2).

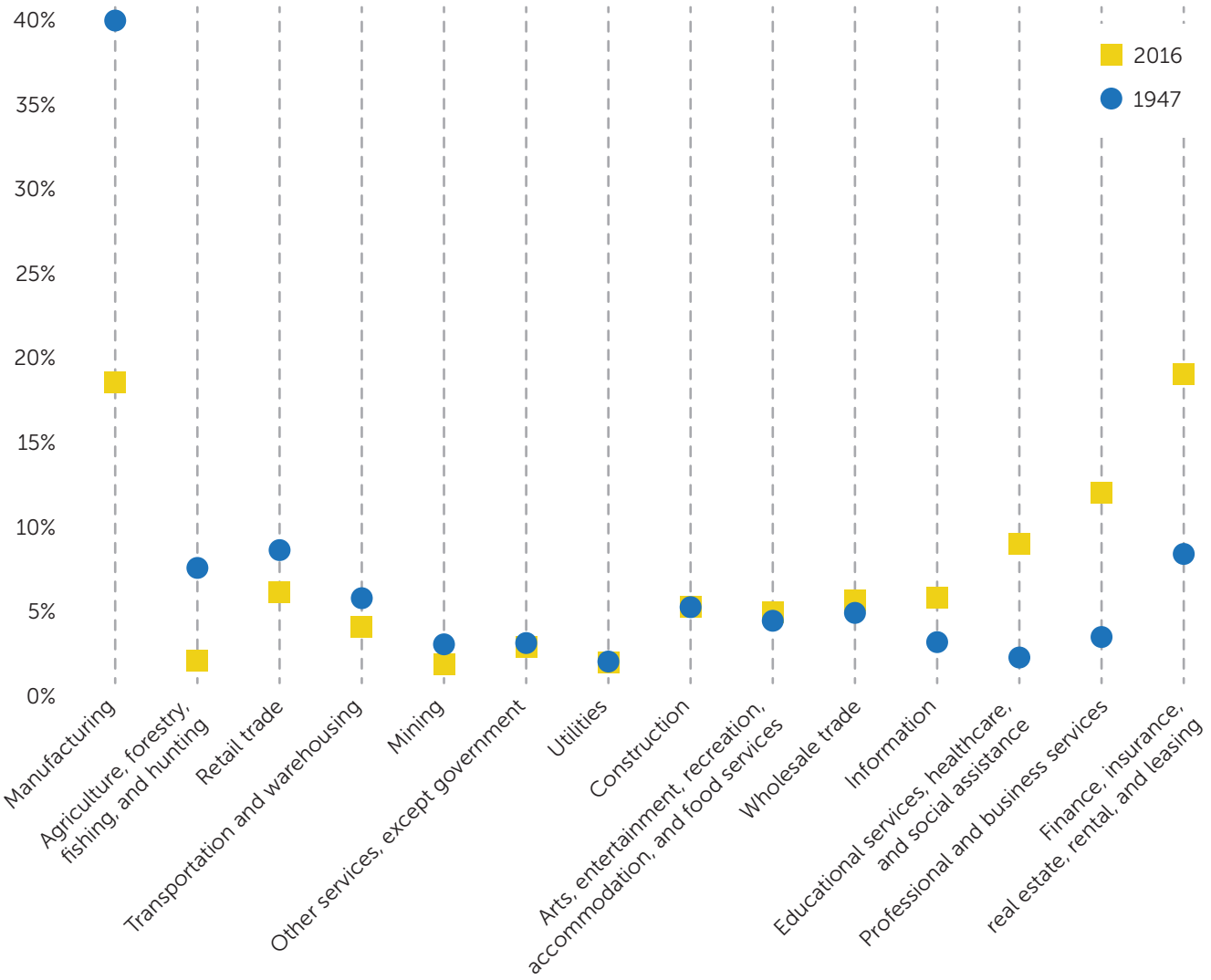
Figure 2. Employment in services has increased from 21 percent of US employment to 55 percent between 1940 and 2016.



Source: Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.

Manufacturing's declining share of the US workforce corresponded with its declining share of the country's economic output. In 1947, manufacturing comprised 39 percent of total economic output as measured by gross domestic product (GDP). In 2016, this had fallen to 18 percent. In contrast, professional and business services, combined with finance, insurance, real estate, rental, and leasing, had risen from 10 percent of the US economy's output to 30 percent (Figure 3).

Figure 3. As the economy diversified, manufacturing's share of US economic output fell from 39 percent to 18 percent between 1947 and 2016.

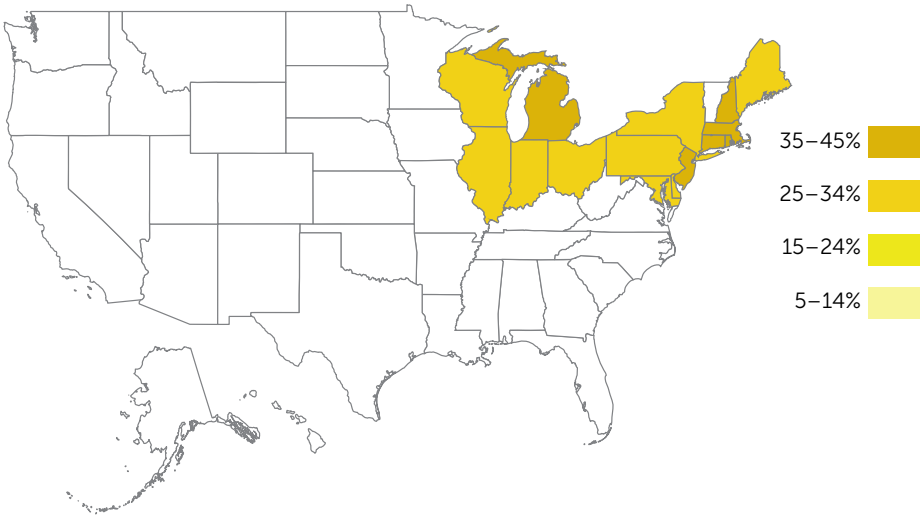


Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Gross Output by Industry and GDP by Industry (Historical).

THE CHANGING GEOGRAPHY OF US MANUFACTURING

The national trends affecting manufacturing played out in different ways across the country. In 1940, manufacturing was the largest source of jobs in 15 states. Connecticut and Rhode Island had the highest concentration of workers in manufacturing, at more than 40 percent. Maine, Massachusetts, Michigan, New Hampshire, New Jersey, Ohio, and Pennsylvania followed at more than 30 percent. Delaware, Illinois, Indiana, Maryland, New York, and Wisconsin were further down the list at more than 25 percent (Figure 4).

Figure 4. Manufacturing was the largest source of employment in 15 states in 1940.

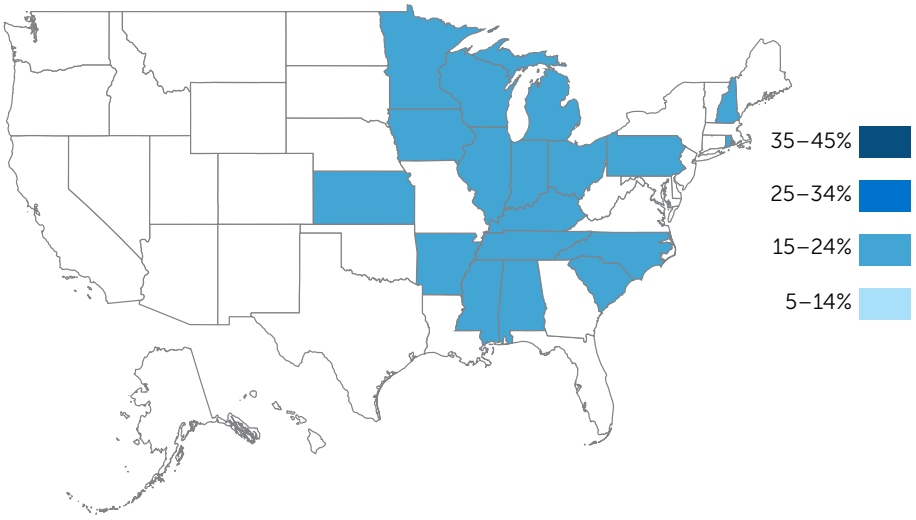


Source: Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.

Note: Figure features only states in which manufacturing was the largest source of employment in 1940.

By the end of the 20th century, the geography of manufacturing had shifted to the southeastern and central states, where labor costs were lower and subsidies were more attractive to industry. In the Northeast, manufacturing remained the largest employer in just three states: New Hampshire, Pennsylvania, and Rhode Island. In the Midwest, it was still the largest employer in Illinois, Indiana, Michigan, Ohio, and Wisconsin, and it had become the largest employer in Iowa, Kansas, and Minnesota. As of 2000, it was the largest employer in seven southeastern states: Alabama, Arkansas, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee (Figure 5).

Figure 5. By 2000, the manufacturing sector had shifted to the southeastern and central states, but remained the largest employer in 18 states.

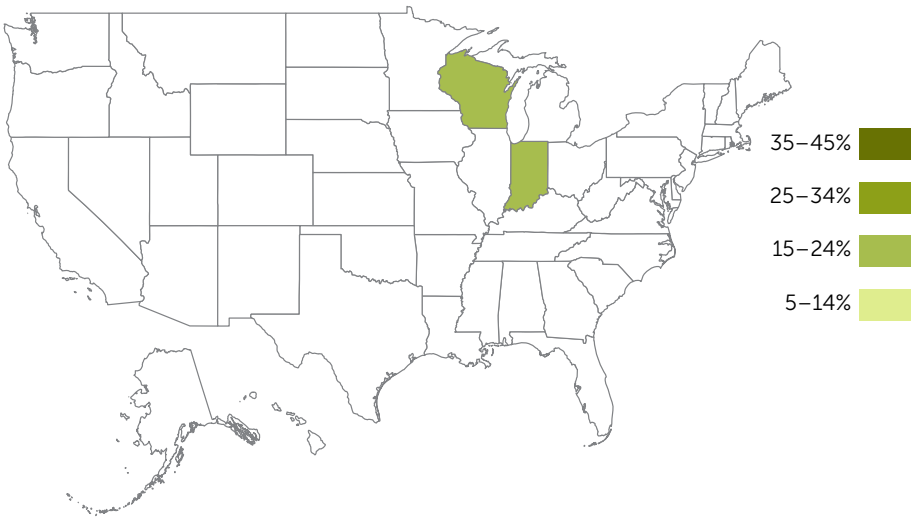


Source: Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.

Note: Figure features only states in which manufacturing was the largest source of employment in 2000.

By 2016, Indiana and Wisconsin were the only states where manufacturing was the largest source of employment. In these two states, it persisted as the leading industry even after decades of decline (Figure 6).

Figure 6. By 2016, manufacturing was the largest source of employment in two states.



Source: Georgetown University Center on Education and the Workforce analysis of Ruggles et al., IPUMS USA, 2018.

Note: Figure features only states in which manufacturing was the largest source of employment in 2016.

THE DECLINE OF MANUFACTURING IN 18 STATES FROM 2000 TO 2016

In 2000, the 18 states where manufacturing was the largest employer produced $968 billion worth of output, or 46 percent of US manufacturing output.[27] In 2016, these 18 states produced $925 billion, or 44 percent of US manufacturing output, even though manufacturing was no longer the largest employer in most of them.[28] Combined, these 18 states employed 8.8 million manufacturing workers in 2000 and 6.3 million manufacturing workers in 2016.[29]

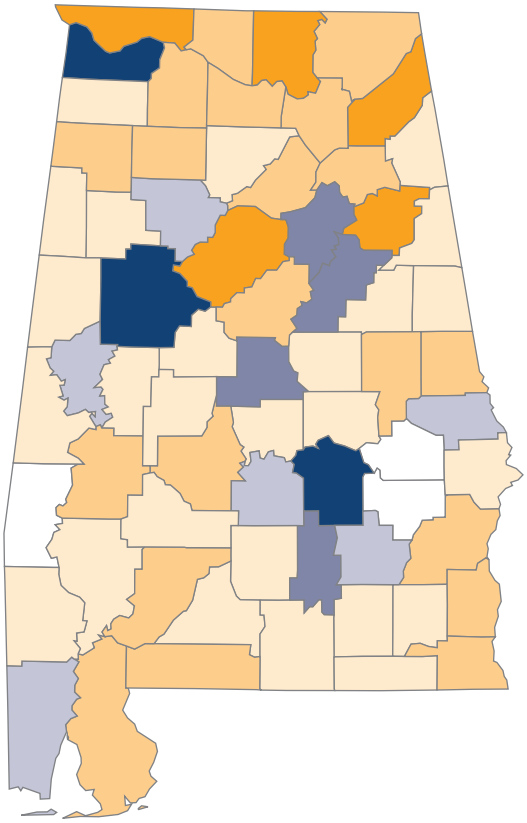
During this time period, annual output per worker in these states increased from $110,000 to $146,000.[30] This meant that even though the number of manufacturing workers fell in all 18 states between 2000 and 2016, nine of the states actually expanded their manufacturing output during the same time period.

The employment and output changes for these states are shown in the charts that follow.

27 In this section, we use a different data source from the previous sections in order to describe employment changes and industry trends. Discrepancies are due to differences in data sets: our source in the previous section used data for workers ages 18 to 64, while our source in this section uses administrative data. For a discussion of differences between household and administrative data, see Isenberg et al., "A Comparison of Person-Reported Industry to Employer-Reported Industry in Survey and Administrative Data," 2013.
28 US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State.
29 US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by NAICS Industry, Table CAEMP25N.
30 Measured in 2016 dollars.

ALABAMA

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 1,101
- 501–1,100
- 0–500

DECREASED

- (1,199)–(1)
- (3,499)–(1,200)
- (14,000)–(3,500)

- No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

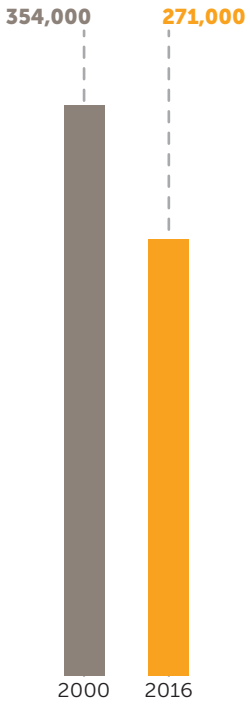
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Motor vehicles, bodies and trailers, and parts	$2.6	$6.2	**$3.6**
Chemical	$2.4	$3.4	**$1.0**
Primary metal	$2.0	$3.3	**$1.3**
Other transportation equipment	$1.4	$3.2	**$1.9**
Paper	$3.7	$2.6	**($1.0)**

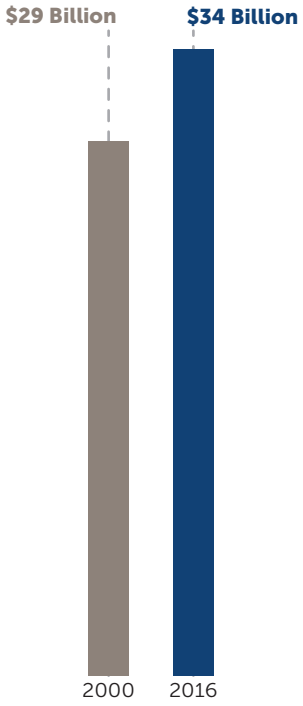
Note: Numbers are rounded.

ALABAMA

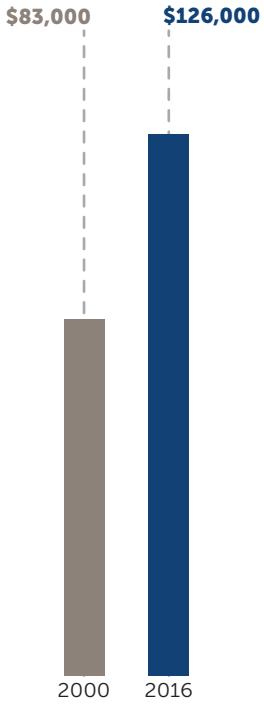
Number of manufacturing workers



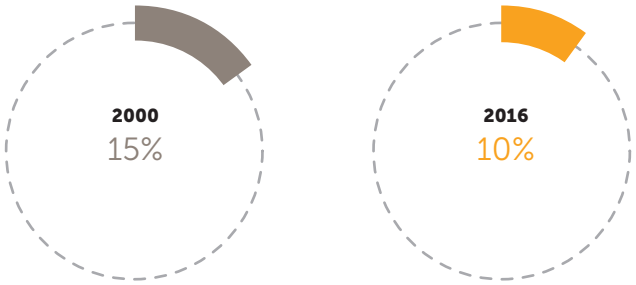
Value of manufacturing output (2016$)



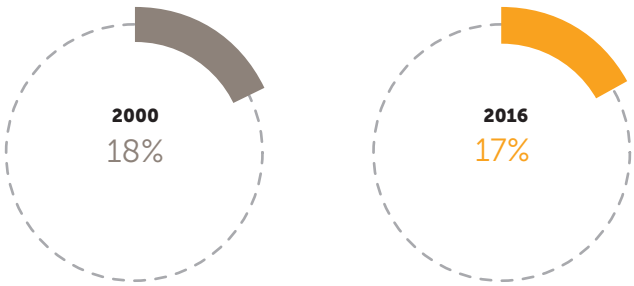
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



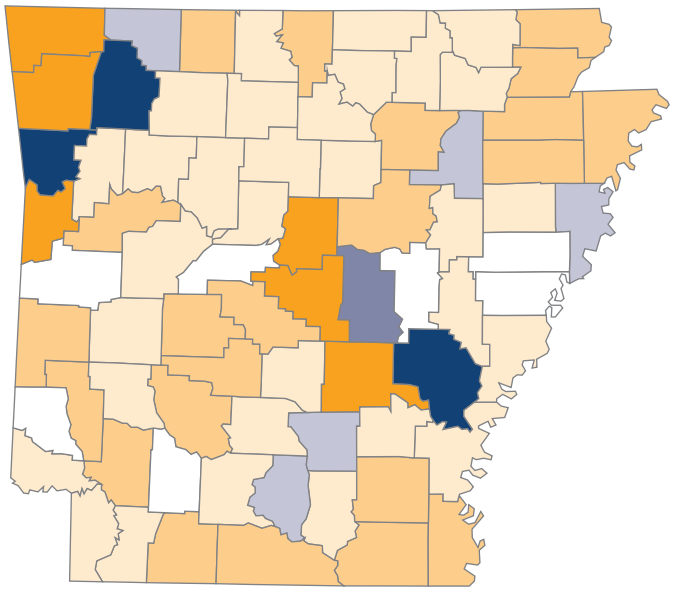
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

ARKANSAS

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 201
- 101–200
- 0–100

DECREASED

- (899)–(1)
- (4,199)–(900)
- (11,200)–(4,200)

- No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

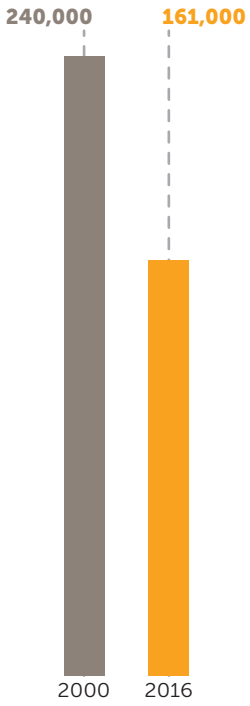
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Food and beverage and tobacco products	$3.7	$3.8	**$0.1**
Paper	$1.9	$2.0	**$0.1**
Fabricated metal products	$2.1	$1.9	**($0.2)**
Plastics and rubber products	$1.4	$1.4	**$0**
Primary metal	$1.2	$1.4	**$0.1**

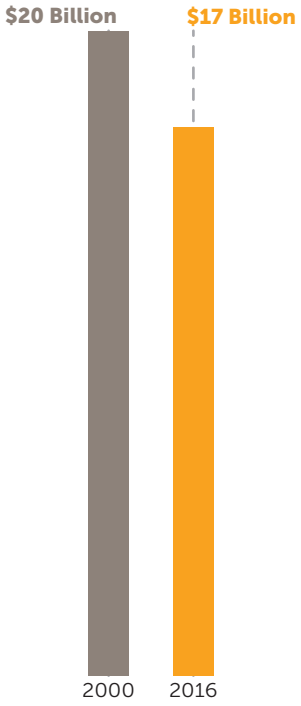
Note: Numbers are rounded.

ARKANSAS

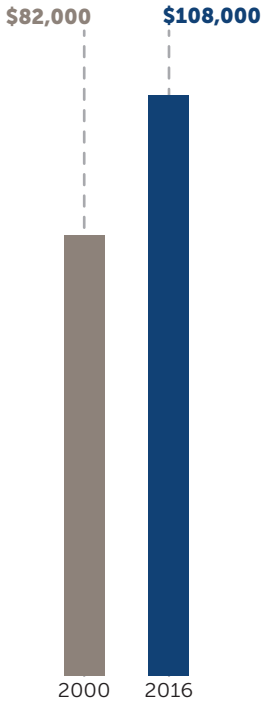
Number of manufacturing workers



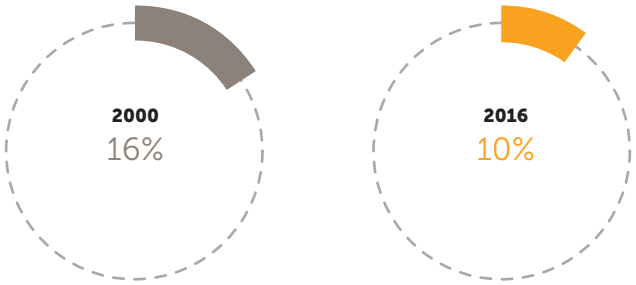
Value of manufacturing output (2016$)



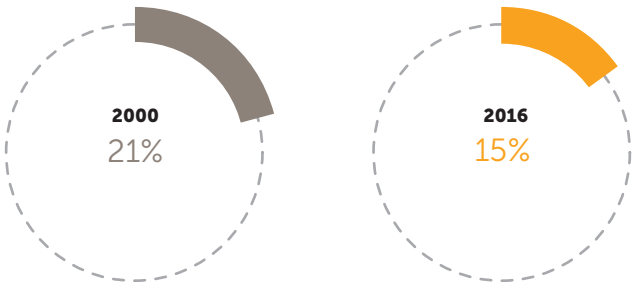
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



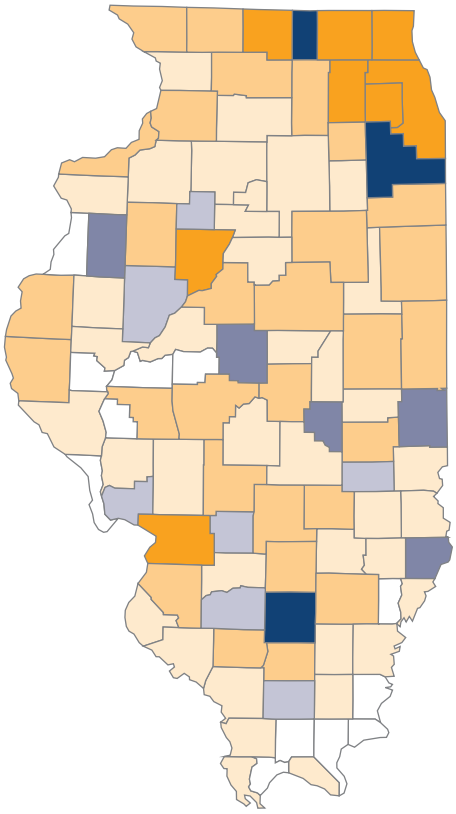
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

ILLINOIS

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 901
- 401–900
- 0–400

DECREASED

- (799)–(1)
- (4,799)–(800)
- (159,200)–(4,800)

- No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

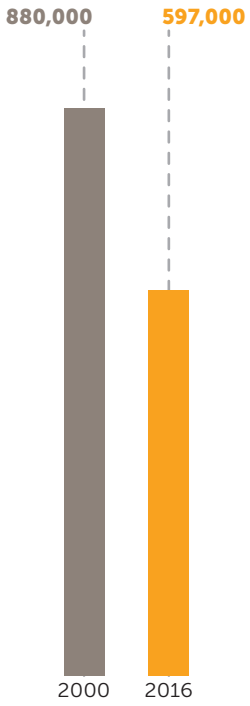
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Chemical	$11.9	$19.1	**$7.2**
Machinery	$13.6	$13.4	**($0.2)**
Food and beverage and tobacco products	$13.3	$13.3	**$0**
Fabricated metal products	$13.3	$9.7	**($3.5)**
Plastics and rubber products	$6.5	$5.7	**($0.8)**

Note: Numbers are rounded.

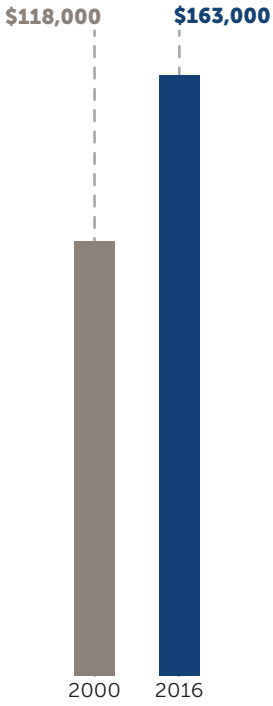
ILLINOIS

Number of manufacturing workers

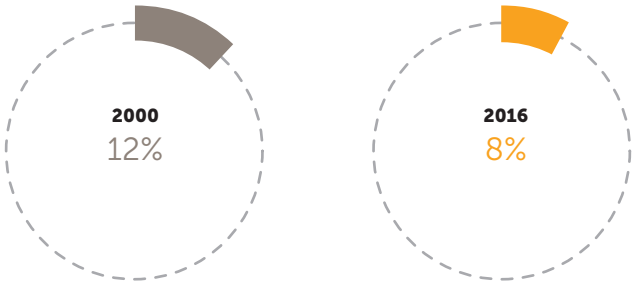


Value of manufacturing output (2016$)

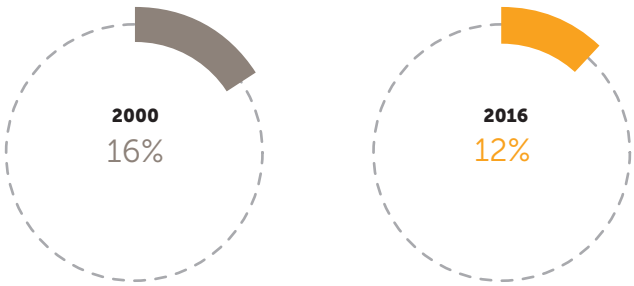
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



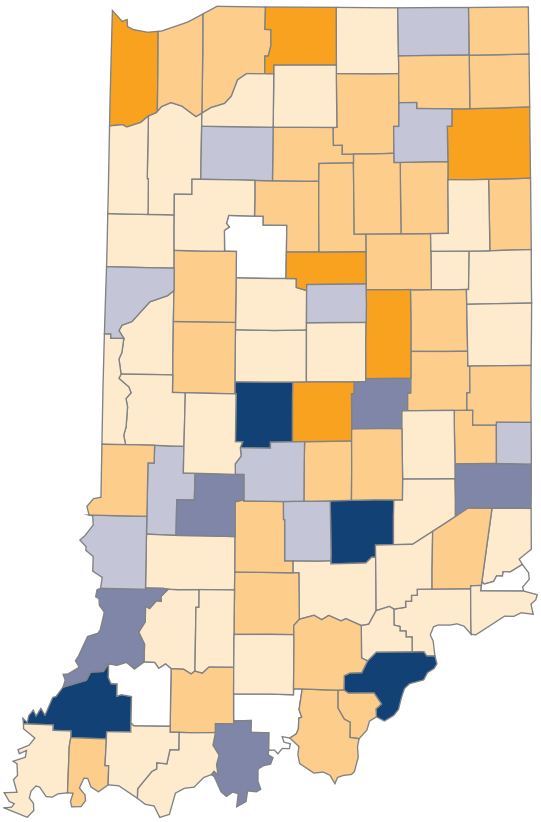
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

INDIANA

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 601
- 201–600
- 0–200

DECREASED

- (1,199)–(1)
- (4,899)–(1,200)
- (25,800)–(4,900)

- No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

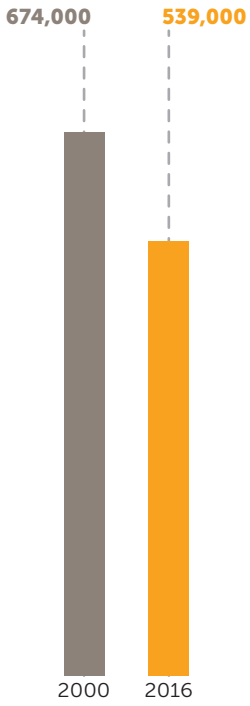
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Chemical	$17.5	$22.4	**$4.9**
Motor vehicles, bodies and trailers, and parts	$16.5	$18.3	**$1.7**
Primary metal	$7.6	$8.8	**$1.1**
Food and beverage and tobacco products	$4.3	$6.7	**$2.4**
Fabricated metal products	$7.3	$6.4	**($0.9)**

Note: Numbers are rounded.

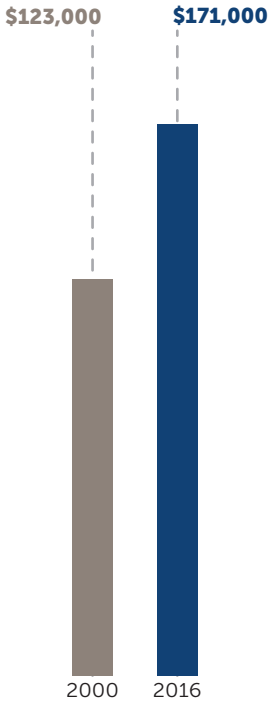
INDIANA

Number of manufacturing workers

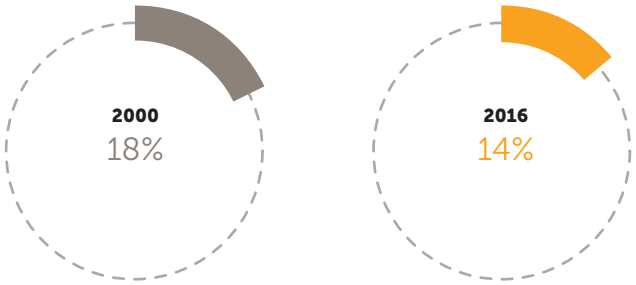


Value of manufacturing output (2016$)

Manufacturing output per worker (2016$)



Share of state's workers in manufacturing

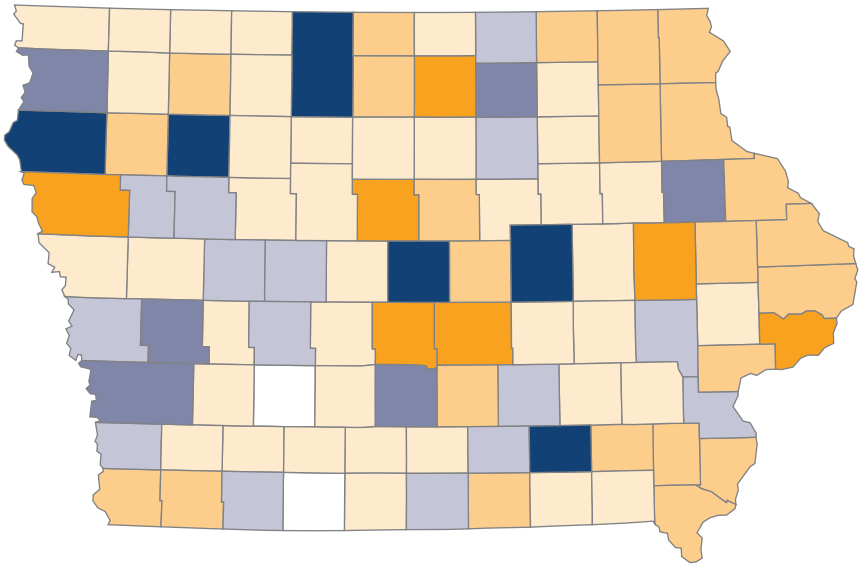


Share of state's total output from manufacturing

Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

IOWA

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 401
- 201–400
- 0–200

DECREASED

- (399)–(1)
- (1,899)–(400)
- (2,900)–(1,900)

No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

Top five manufacturing industries by 2016 output

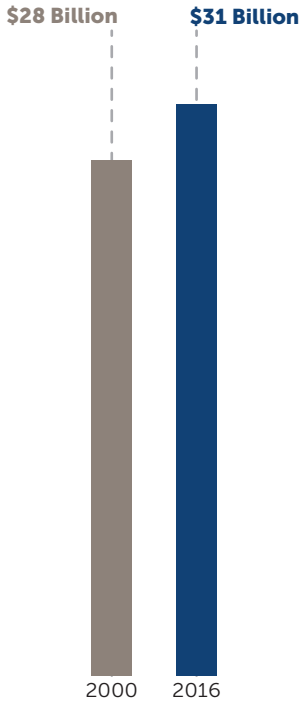
	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Food and beverage and tobacco products	$5.8	$7.5	**$1.7**
Machinery	$4.9	$6.7	**$1.8**
Chemical	$3.6	$4.7	**$1.1**
Computer and electronic products	$1.2	$1.9	**$0.7**
Fabricated metal products	$1.9	$1.7	**($0.2)**

Note: Numbers are rounded.

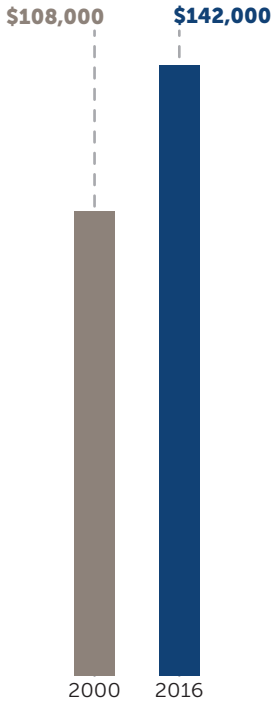
IOWA

Number of manufacturing workers

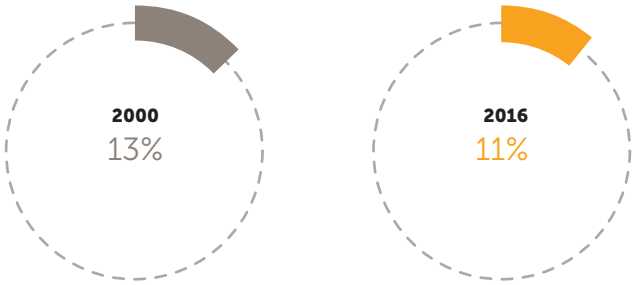
Value of manufacturing output (2016$)



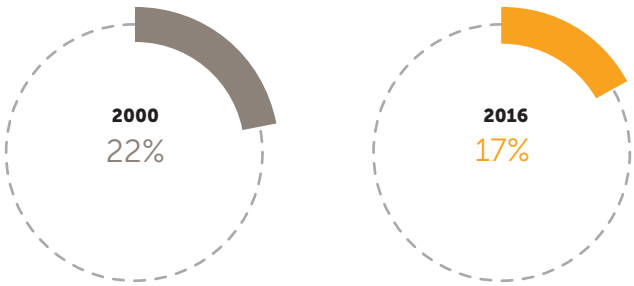
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



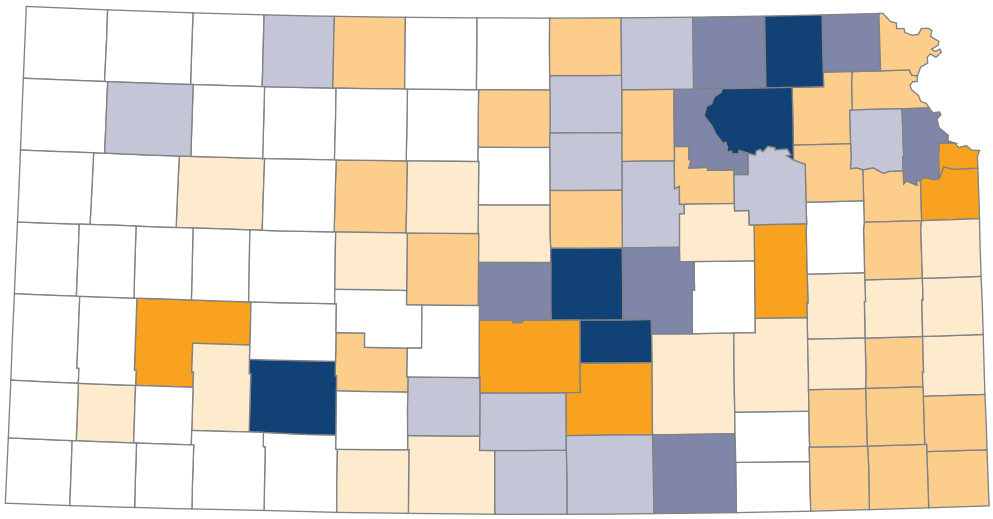
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

KANSAS

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 401
- 101–400
- 0–100

DECREASED

- (99)–(1)
- (1,999)–(100)
- (21,400)–(2,000)

No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

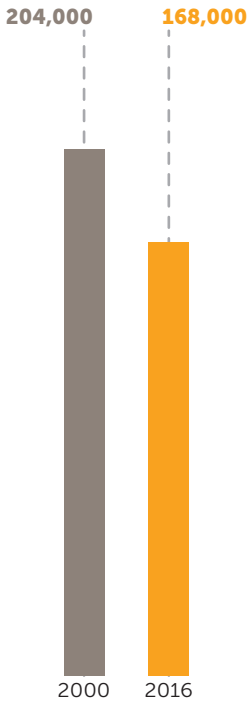
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Other transportation equipment	$6.5	$6.7	**$0.2**
Food and beverage and tobacco products	$2.4	$4.1	**$1.7**
Chemical	$1.6	$1.9	**$0.3**
Machinery	$1.5	$1.8	**$0.2**
Petroleum and coal products	$0.8	$1.7	**$0.9**

Note: Numbers are rounded.

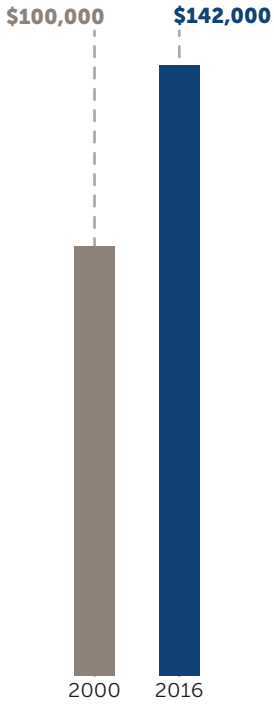
KANSAS

Number of manufacturing workers

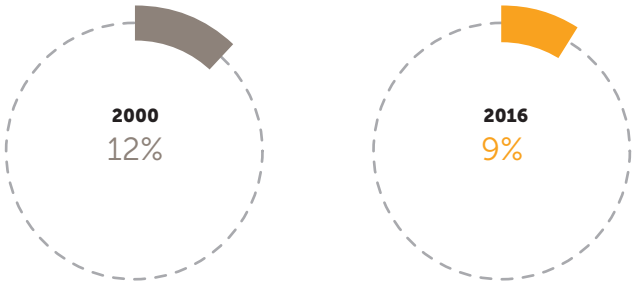


Value of manufacturing output (2016$)

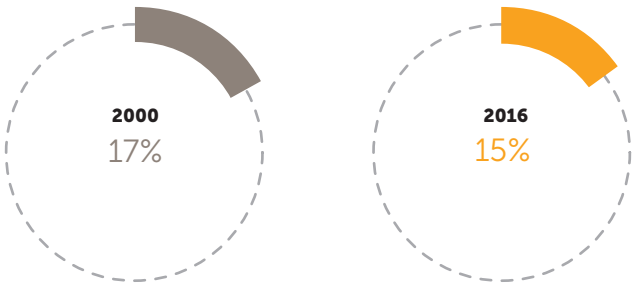
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



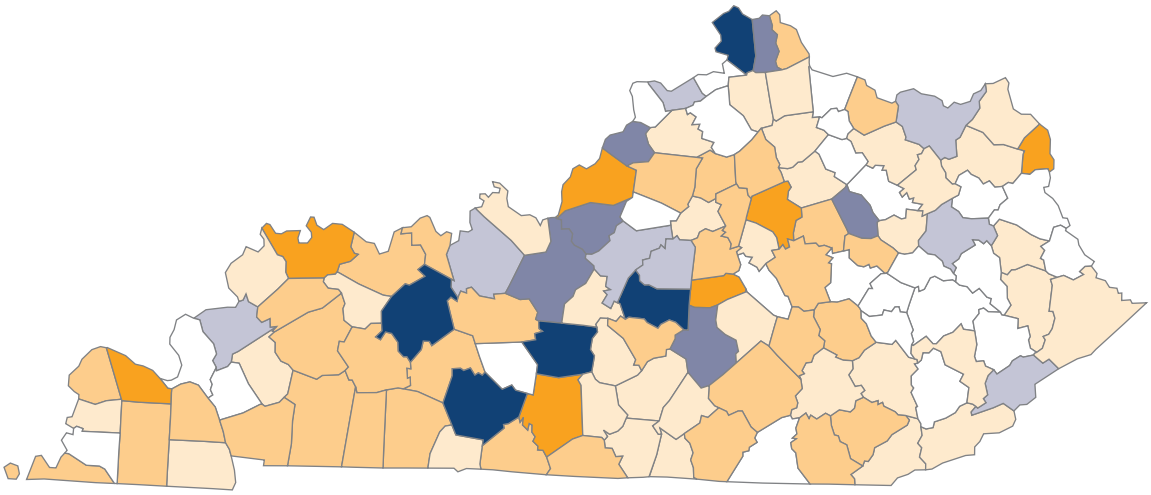
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

KENTUCKY

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 901
- 201–900
- 0–200

DECREASED

- (499)–(1)
- (1,999)–(500)
- (7,600)–(2,000)

No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

Top five manufacturing industries by 2016 output

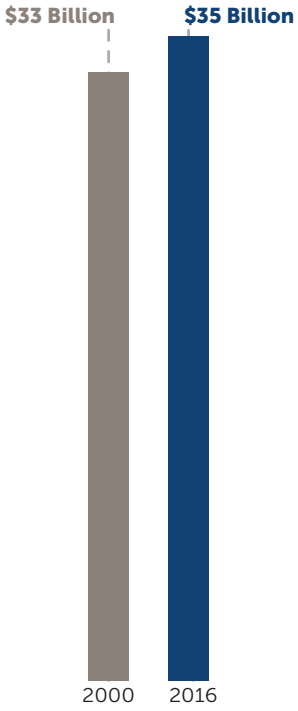
	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Motor vehicles, bodies and trailers, and parts	$8.0	$8.8	**$0.9**
Food and beverage and tobacco products	$5.2	$7.1	**$1.9**
Primary metal	$1.7	$2.5	**$0.8**
Chemical	$2.7	$2.2	**($0.6)**
Fabricated metal products	$2.4	$2.0	**($0.4)**

Note: Numbers are rounded.

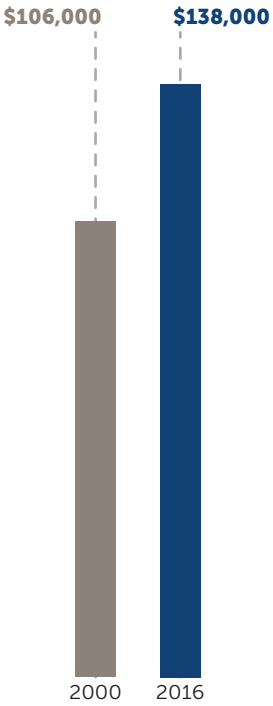
KENTUCKY

Number of manufacturing workers

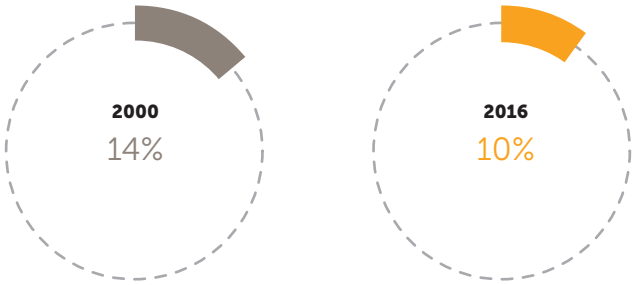
Value of manufacturing output (2016$)



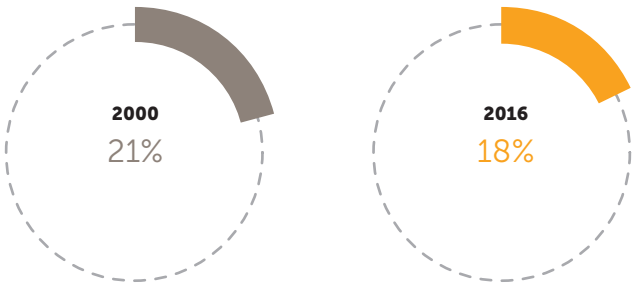
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



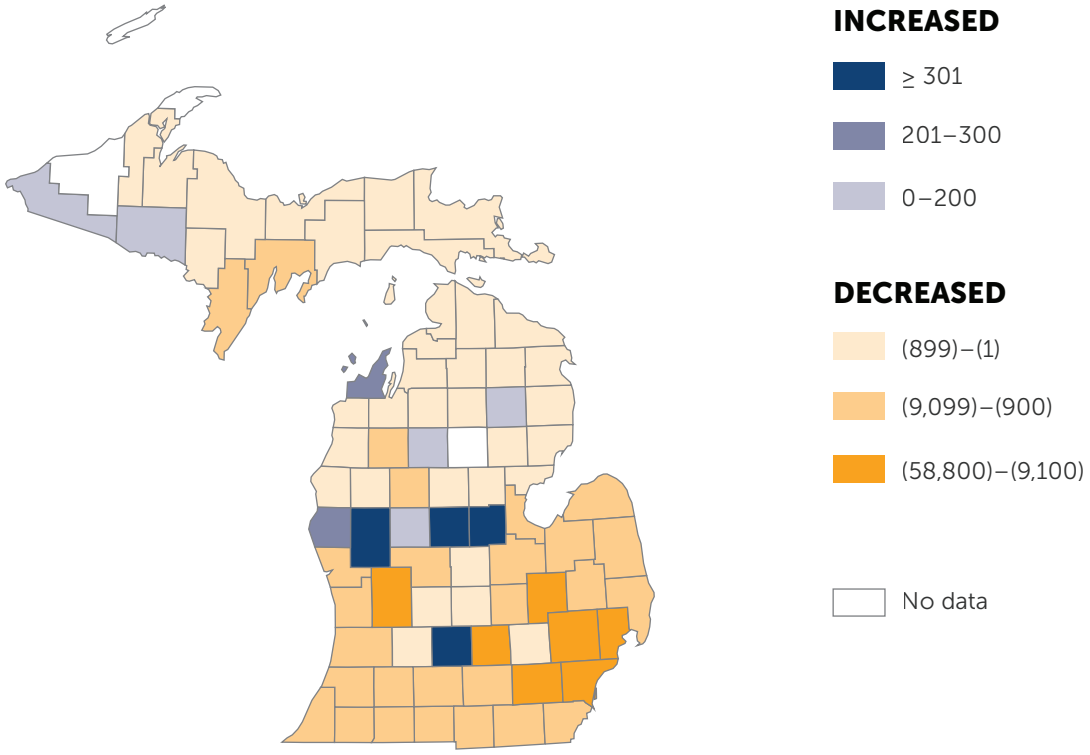
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

MICHIGAN

Change in manufacturing employment by county, 2000–2016



Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

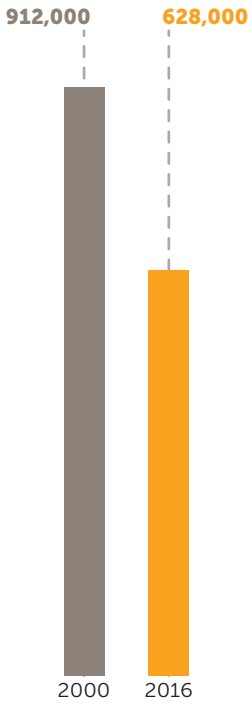
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Motor vehicles, bodies and trailers, and parts	$60.9	$39.7	**($21.2)**
Machinery	$9.0	$8.1	**($0.9)**
Fabricated metal products	$9.4	$7.6	**($1.7)**
Chemical	$6.1	$6.5	**$0.3**
Food and beverage and tobacco products	$4.6	$5.6	**$1.0**

Note: Numbers are rounded.

MICHIGAN

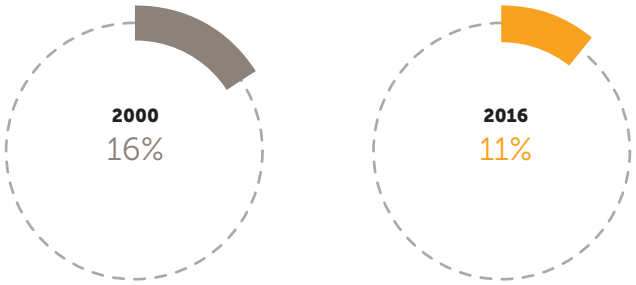
Number of manufacturing workers



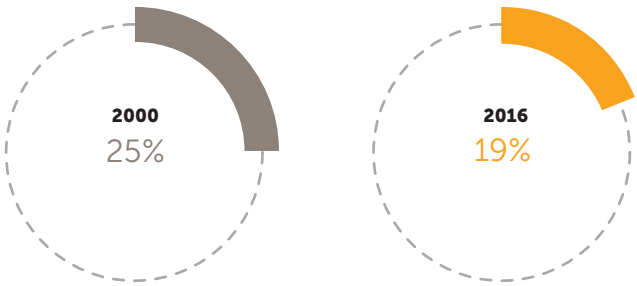
Value of manufacturing output (2016$)

Manufacturing output per worker (2016$)

Share of state's workers in manufacturing



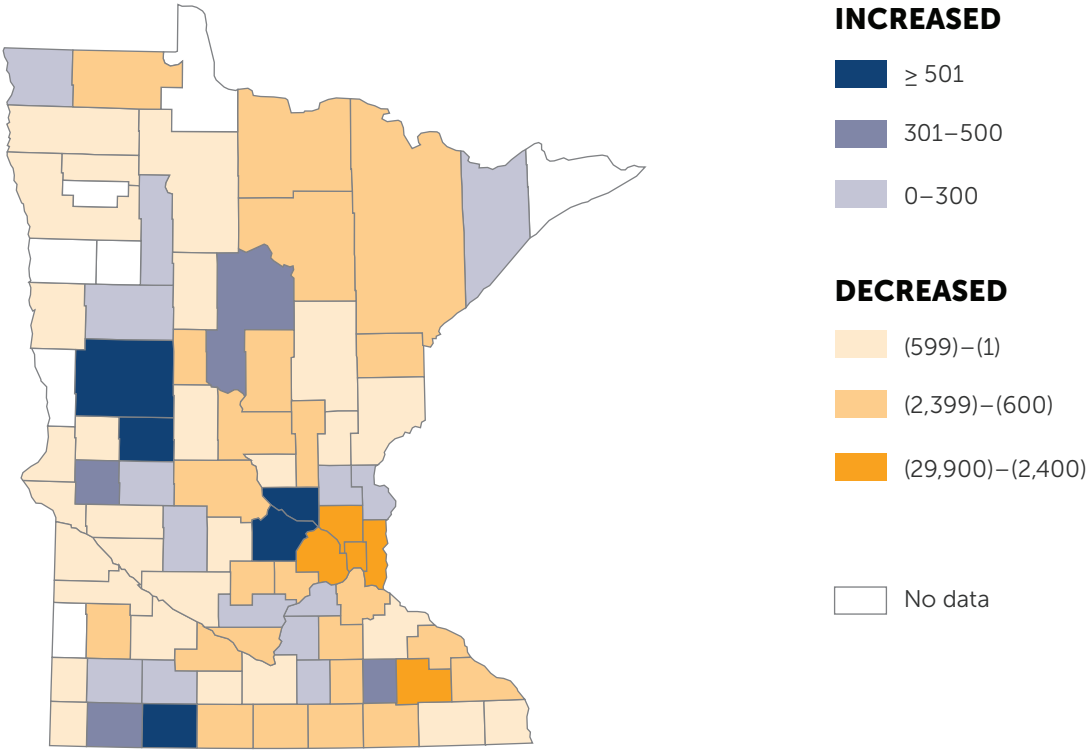
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

MINNESOTA

Change in manufacturing employment by county, 2000–2016



Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

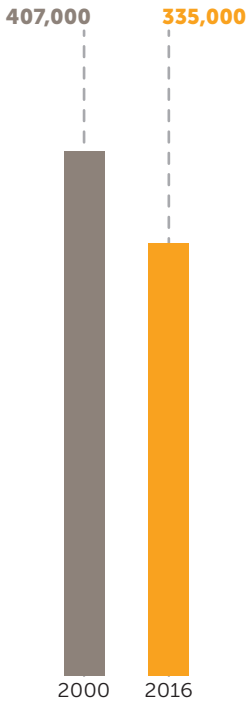
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Computer and electronic products	$6.4	$9.3	**$2.9**
Food and beverage and tobacco products	$5.1	$6.0	**$0.8**
Miscellaneous	$2.6	$5.1	**$2.4**
Machinery	$4.0	$4.3	**$0.3**
Fabricated metal products	$5.5	$4.2	**($1.4)**

Note: Numbers are rounded.

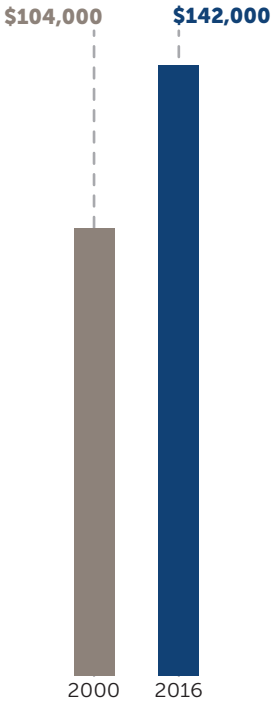
MINNESOTA

Number of manufacturing workers

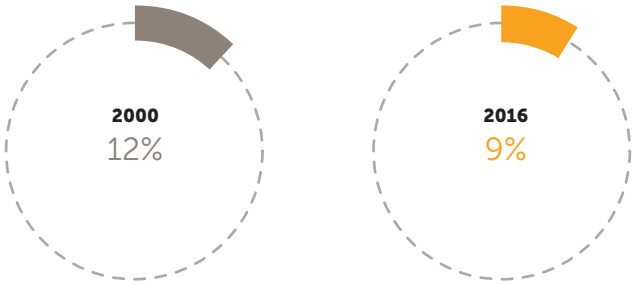


Value of manufacturing output (2016$)

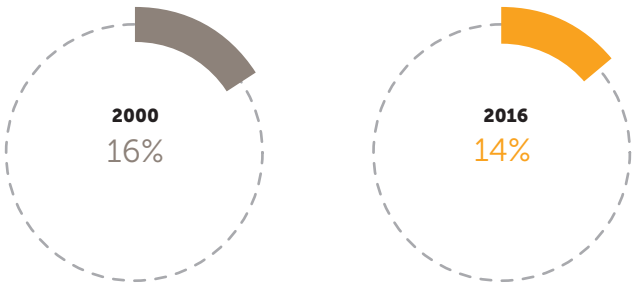
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



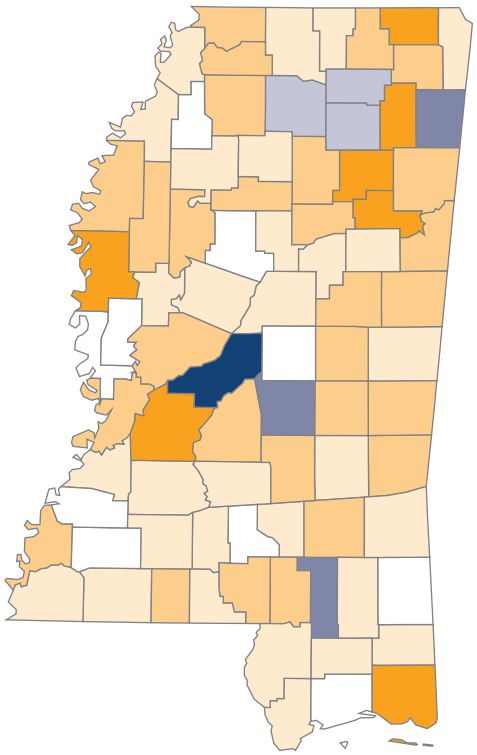
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

MISSISSIPPI

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 701
- 401–700
- 0–400

DECREASED

- (799)–(1)
- (2,499)–(800)
- (7,700)–(2,500)

- No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

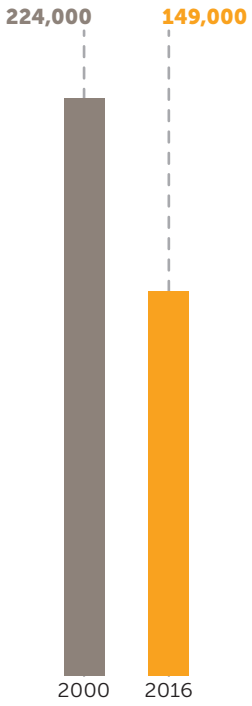
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Motor vehicles, bodies and trailers, and parts	$0.7	$2.2	**$1.5**
Food and beverage and tobacco products	$1.4	$1.6	**$0.2**
Petroleum and coal products	$0.2	$1.5	**$1.3**
Other transportation equipment	$0.9	$1.4	**$0.5**
Machinery	$1.0	$1.3	**$0.3**

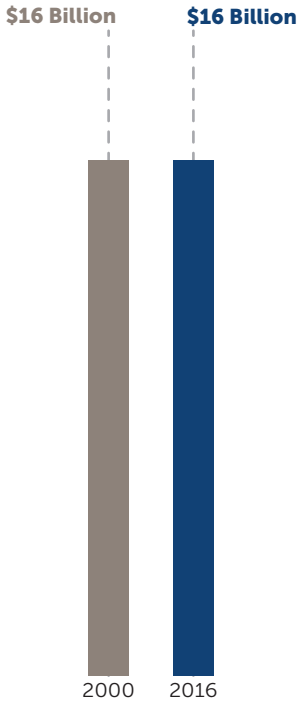
Note: Numbers are rounded.

MISSISSIPPI

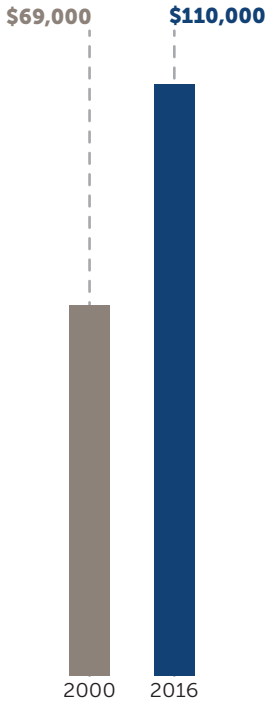
Number of manufacturing workers



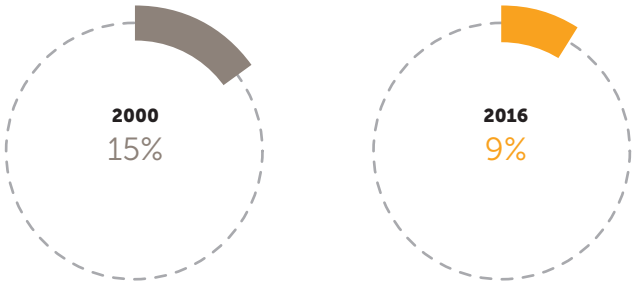
Value of manufacturing output (2016$)



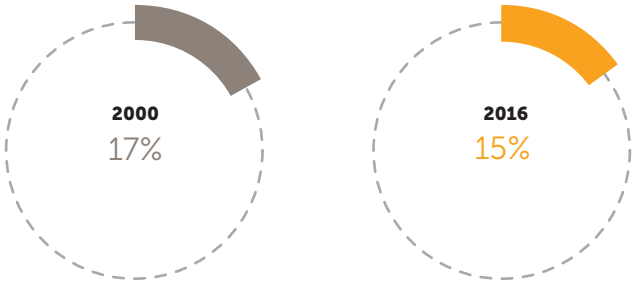
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



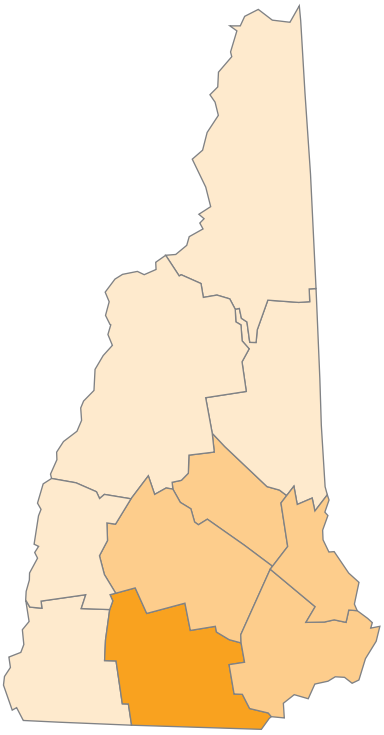
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

NEW HAMPSHIRE

Change in manufacturing employment by county, 2000–2016



DECREASED

(2,199)–(1)

(9,699)–(2,200)

(16,500)–(9,700)

No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

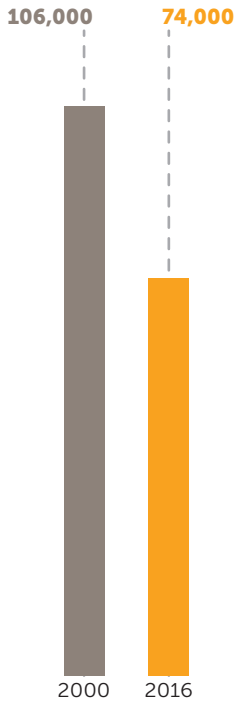
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Computer and electronic products	$3.0	$2.2	**($0.8)**
Fabricated metal products	$1.4	$1.4	**$0**
Machinery	$0.8	$0.8	**$0**
Electrical equipment, appliances, and components	$0.9	$0.8	**($0.1)**
Food and beverage and tobacco products	$0.5	$0.6	**$0.1**

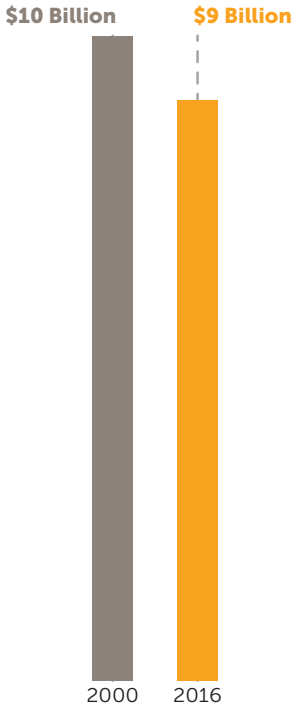
Note: Numbers are rounded.

NEW HAMPSHIRE

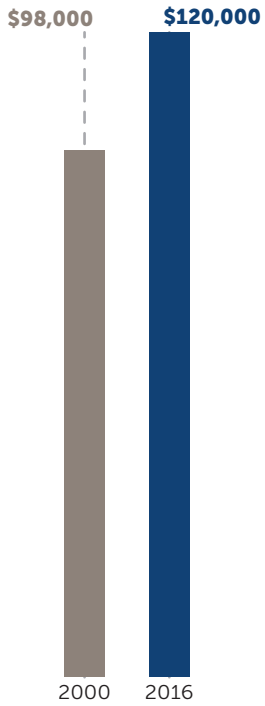
Number of manufacturing workers



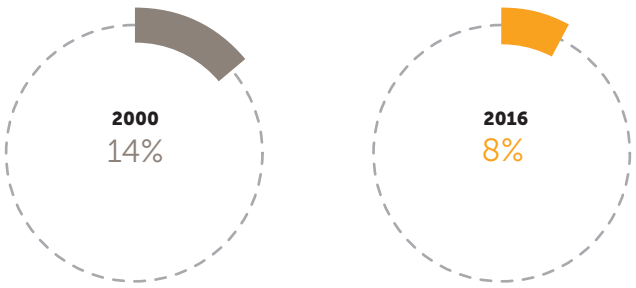
Value of manufacturing output (2016$)



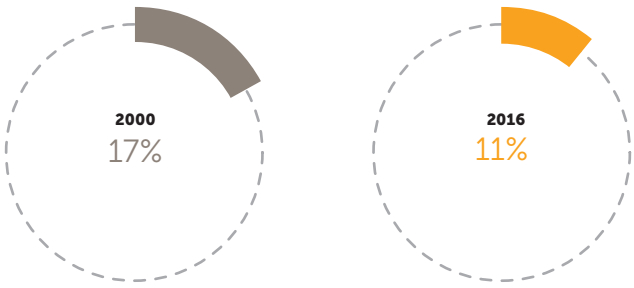
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



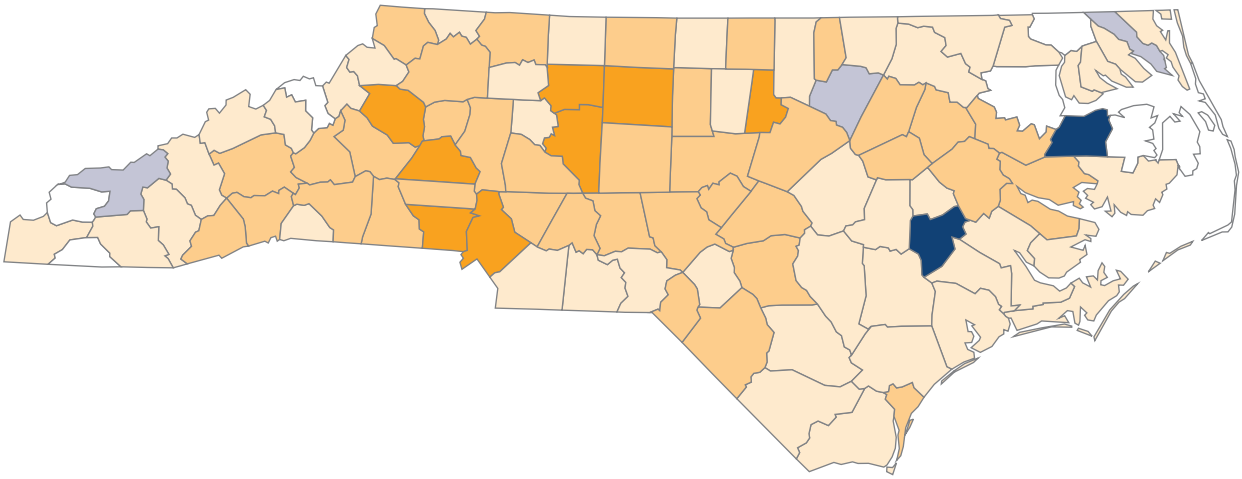
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

NORTH CAROLINA

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 501
- 201–500
- 0–200

DECREASED

- (1,899)–(1)
- (9,499)–(1,900)
- (20,100)–(9,500)

No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

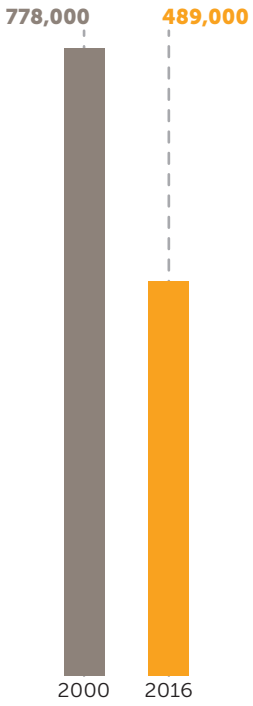
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Chemical	$16.4	$25.1	**$8.8**
Food and beverage and tobacco products	$25.3	$19.7	**($5.6)**
Computer and electronic products	$8.0	$10.3	**$2.3**
Other transportation equipment	$0.7	$6.0	**$5.4**
Machinery	$4.1	$4.8	**$0.7**

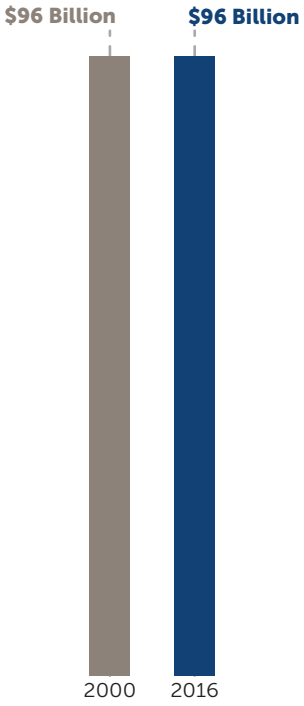
Note: Numbers are rounded.

NORTH CAROLINA

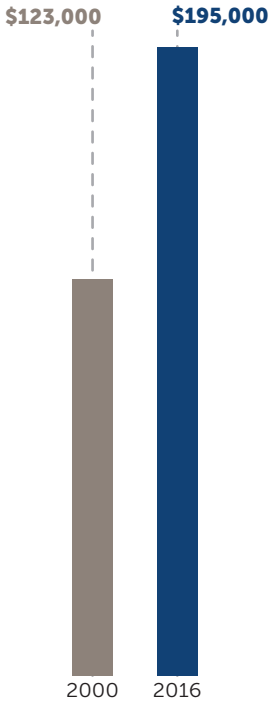
Number of manufacturing workers



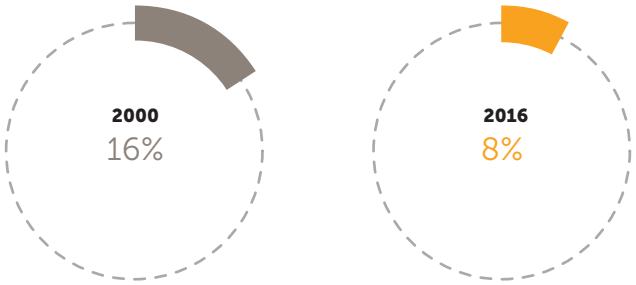
Value of manufacturing output (2016$)



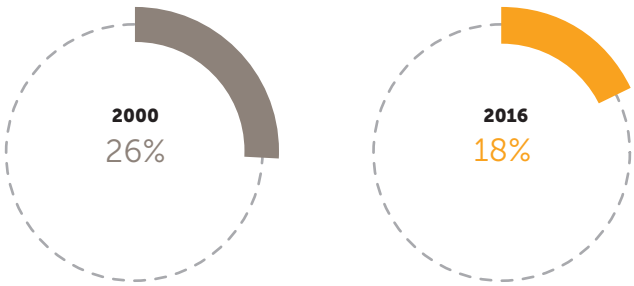
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



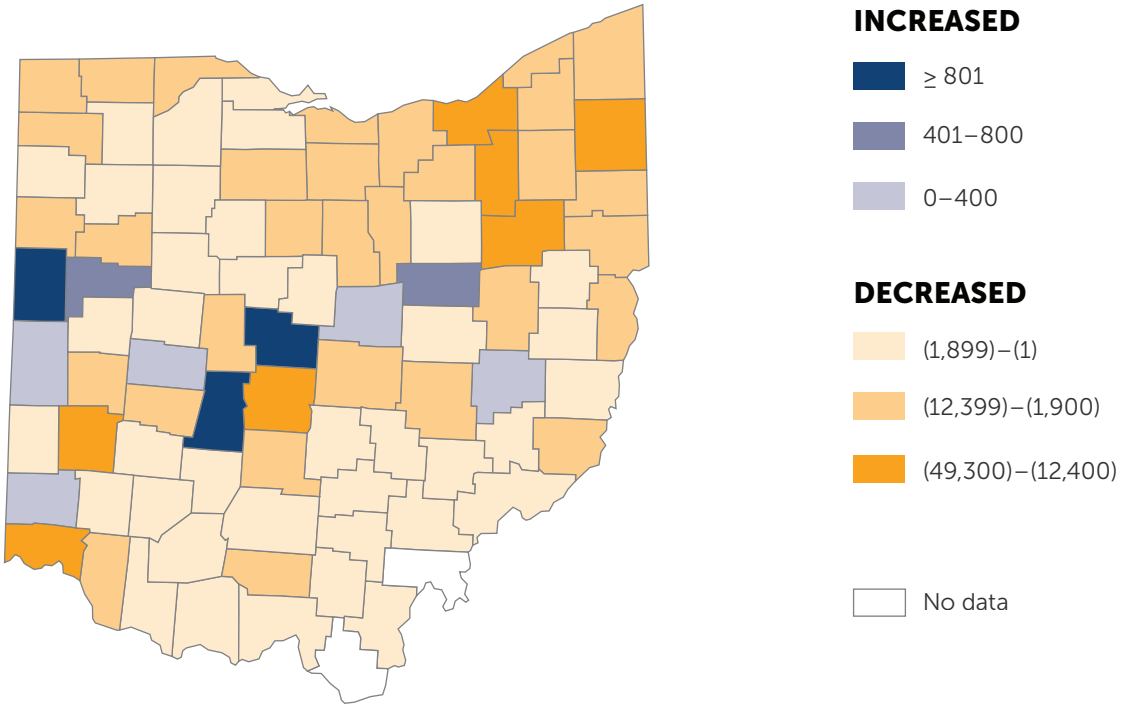
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

OHIO

Change in manufacturing employment by county, 2000–2016



Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

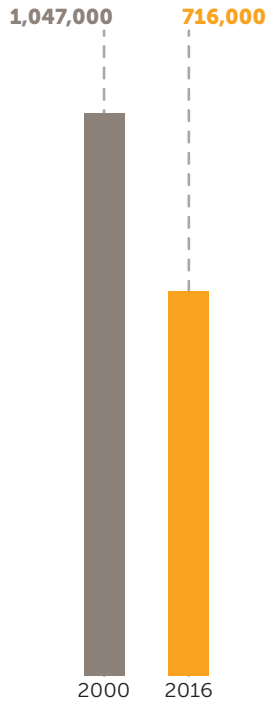
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Chemical	$10.1	$16.2	**$6.1**
Motor vehicles, bodies and trailers, and parts	$24.4	$12.1	**($12.2)**
Food and beverage and tobacco products	$8.8	$11.6	**$2.8**
Fabricated metal products	$14.2	$10.6	**($3.5)**
Machinery	$9.2	$8.6	**($0.6)**

Note: Numbers are rounded.

OHIO

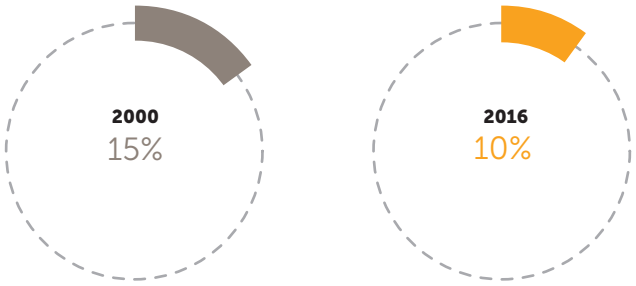
Number of manufacturing workers



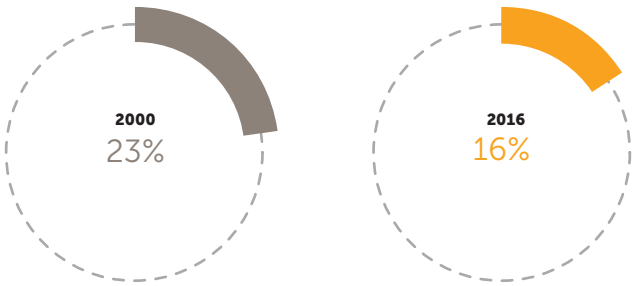
Value of manufacturing output (2016$)

Manufacturing output per worker (2016$)

Share of state's workers in manufacturing



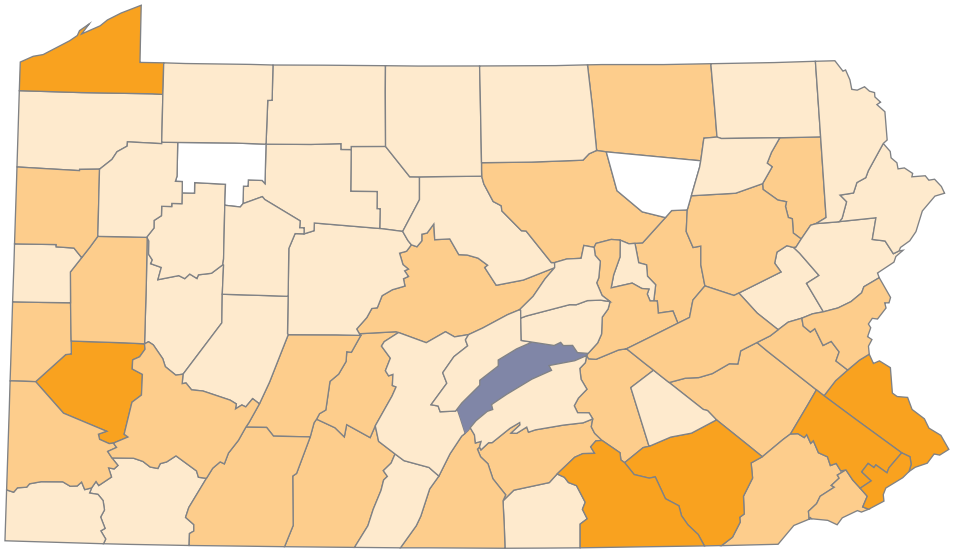
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

PENNSYLVANIA

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 101
- 0–100

DECREASED

- (2,499)–(1)
- (13,399)–(2,500)
- (30,800)–(13,400)
- No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

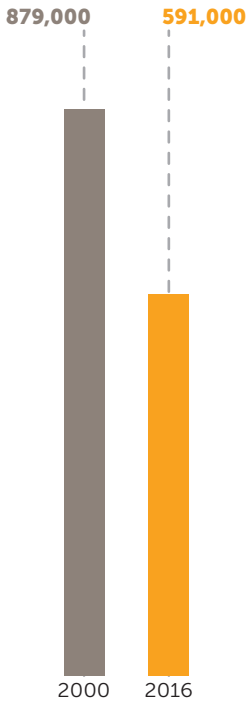
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Chemical	$22.2	$17.6	**($4.6)**
Food and beverage and tobacco products	$9.1	$10.3	**$1.2**
Fabricated metal products	$10.0	$7.3	**($2.8)**
Computer and electronic products	$7.6	$5.2	**($2.4)**
Machinery	$6.6	$5.1	**($1.5)**

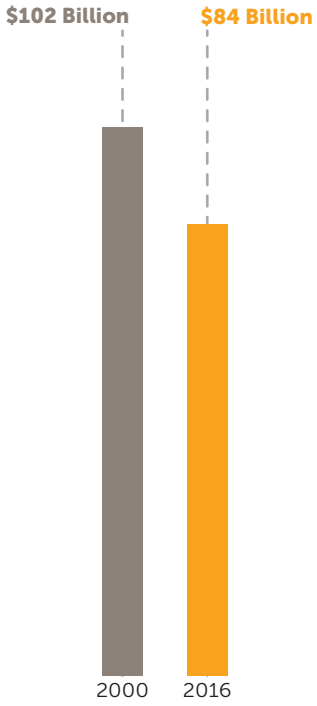
Note: Numbers are rounded.

PENNSYLVANIA

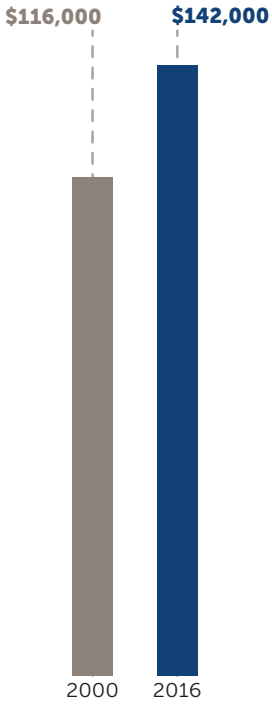
Number of manufacturing workers



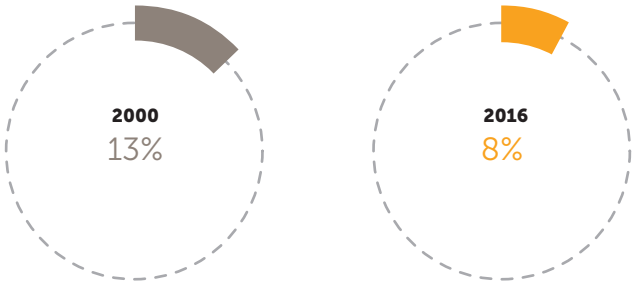
Value of manufacturing output (2016$)



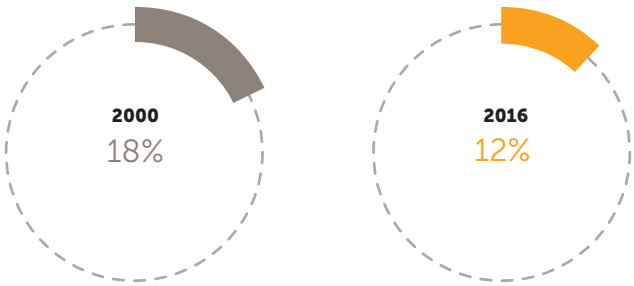
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



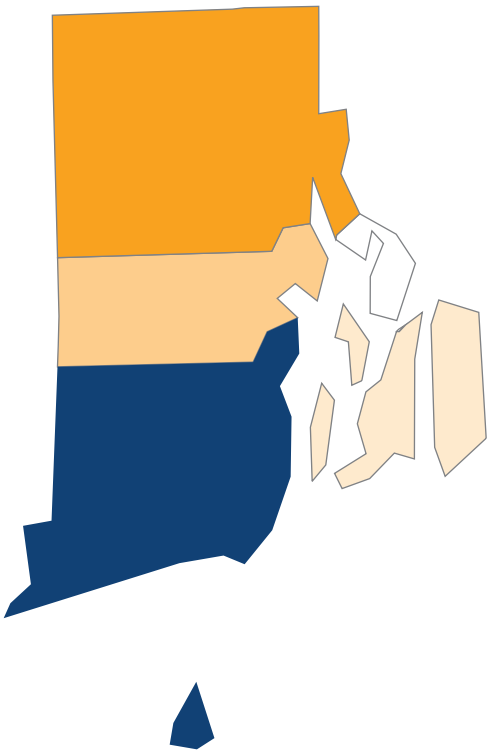
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

RHODE ISLAND

Change in manufacturing employment by county, 2000–2016



INCREASED

≥ 1,000

DECREASED

(2,000)–(1,000)

(8,000)–(6,000)

(22,800)–(20,000)

No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

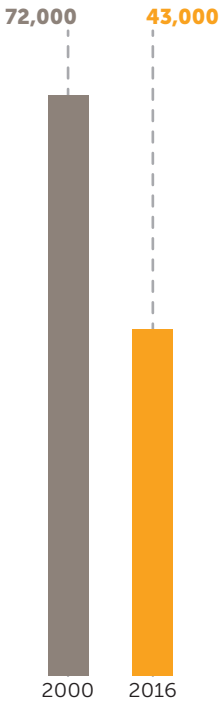
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Miscellaneous	$1.2	$0.9	**($0.3)**
Chemical	$0.4	$0.7	**$0.3**
Other transportation equipment	$0.2	$0.7	**$0.5**
Computer and electronic products	$0.6	$0.5	**($0.1)**
Fabricated metal products	$0.8	$0.3	**($0.4)**

Note: Numbers are rounded.

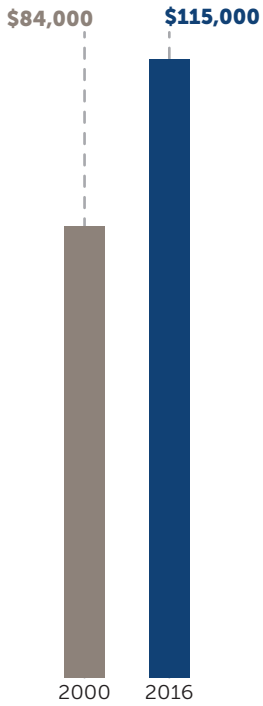
RHODE ISLAND

Number of manufacturing workers

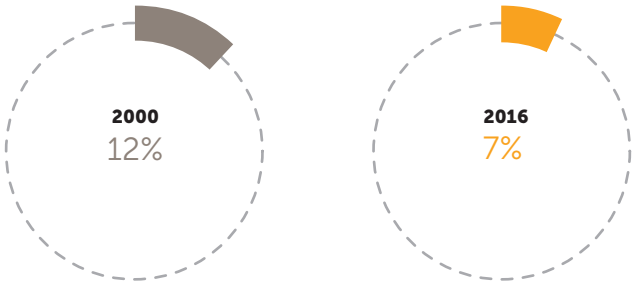


Value of manufacturing output (2016$)

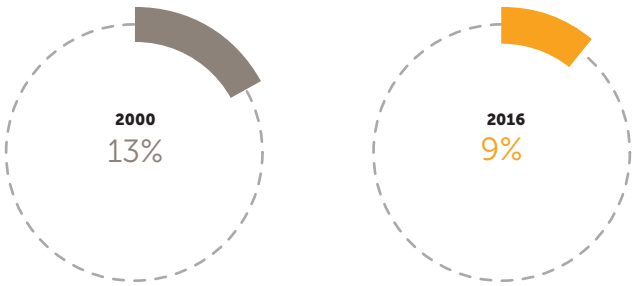
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



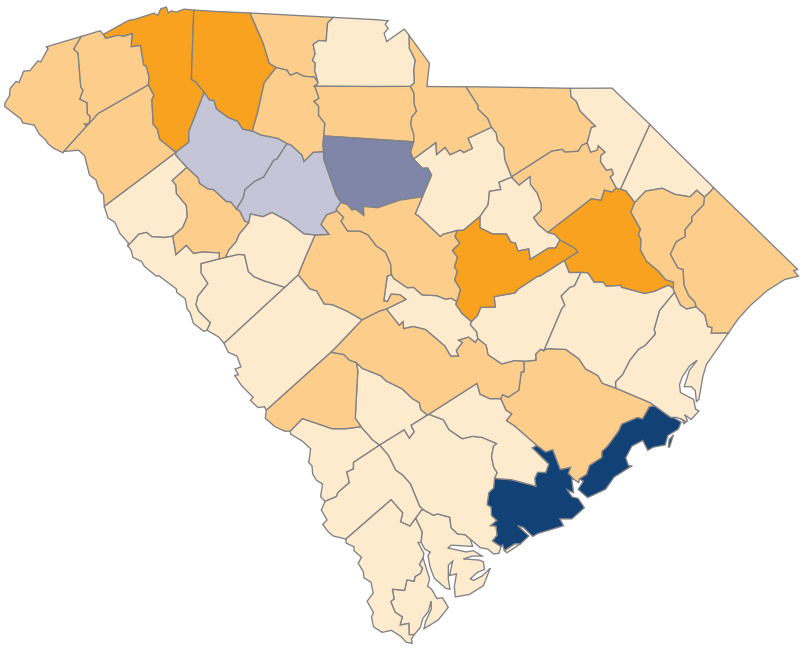
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

SOUTH CAROLINA

Change in manufacturing employment by county, 2000–2016



Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

Top five manufacturing industries by 2016 output

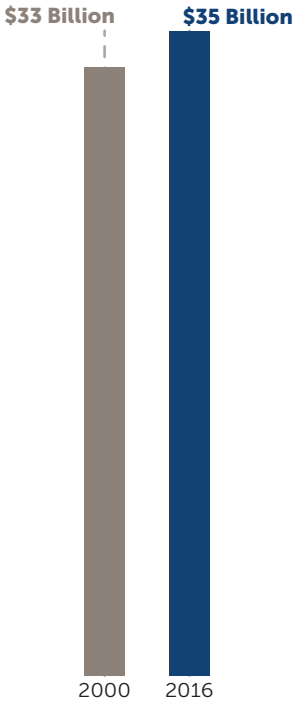
	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Motor vehicles, bodies and trailers, and parts	$2.6	$4.6	**$2.0**
Chemical	$2.9	$4.2	**$1.3**
Fabricated metal products	$2.9	$3.4	**$0.5**
Machinery	$3.5	$3.2	**($0.3)**
Electrical equipment, appliances, and components	$1.6	$2.7	**$1.1**

Note: Numbers are rounded.

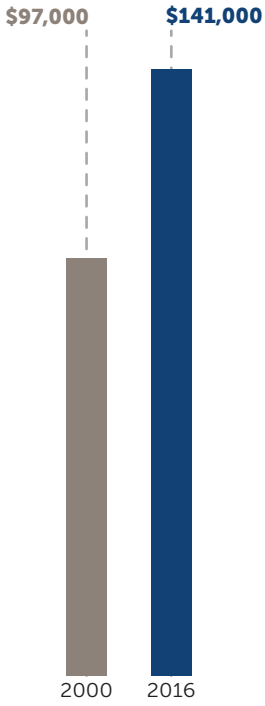
SOUTH CAROLINA

Number of manufacturing workers

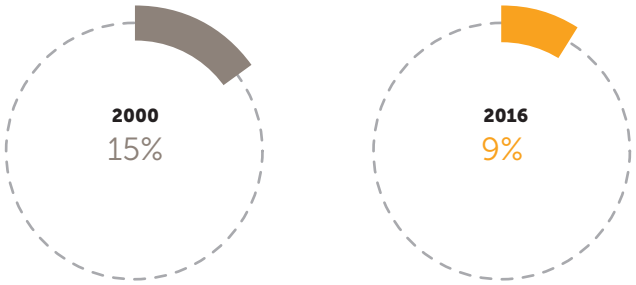
Value of manufacturing output (2016$)



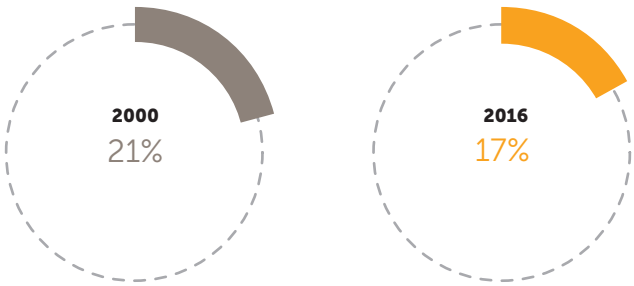
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



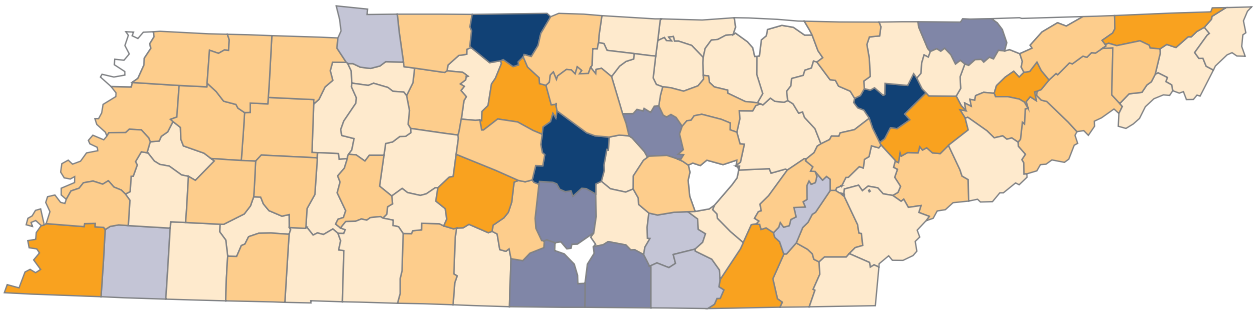
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

TENNESSEE

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 801
- 401–800
- 0–400

DECREASED

- (899)–(1)
- (5,699)–(900)
- (15,100)–(5,700)

No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

Top five manufacturing industries by 2016 output

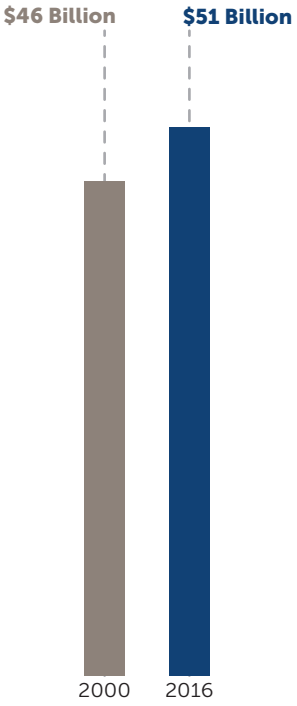
	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Motor vehicles, bodies and trailers, and parts	$6.0	$10.2	**$4.2**
Food and beverage and tobacco products	$5.5	$8.2	**$2.7**
Chemical	$4.6	$5.6	**$1.0**
Electrical equipment, appliances, and components	$2.3	$3.9	**$1.6**
Fabricated metal products	$4.0	$3.9	**($0.1)**

Note: Numbers are rounded.

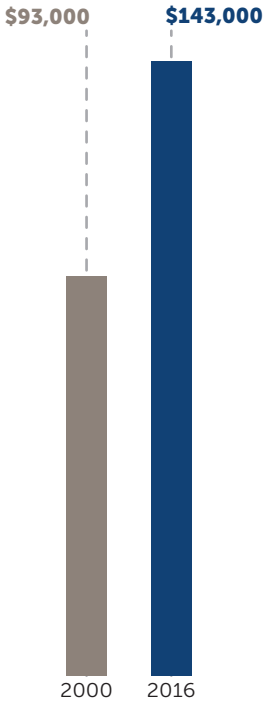
TENNESSEE

Number of manufacturing workers

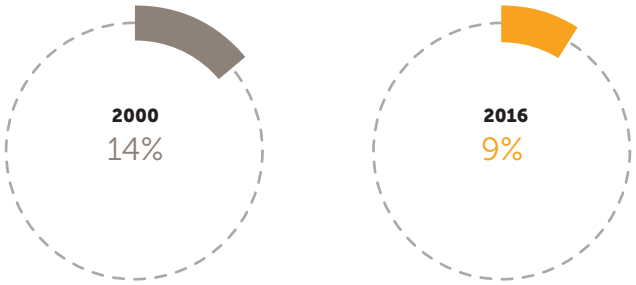
Value of manufacturing output (2016$)



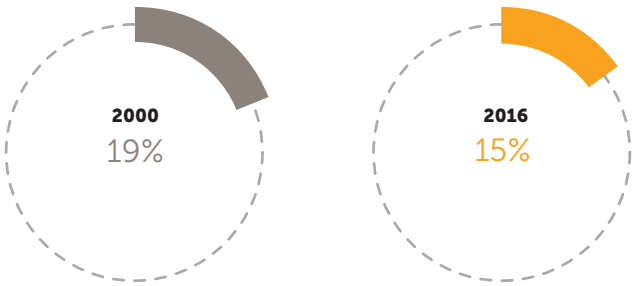
Manufacturing output per worker (2016$)



Share of state's workers in manufacturing



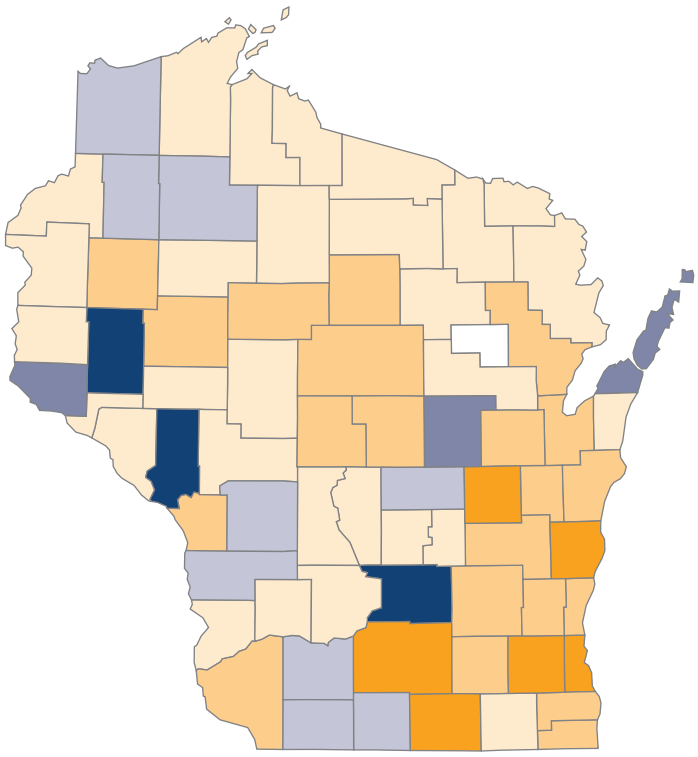
Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

WISCONSIN

Change in manufacturing employment by county, 2000–2016



INCREASED

- ≥ 501
- 401–500
- 0–400

DECREASED

- (899)–(1)
- (6,299)–(900)
- (29,500)–(6,300)

- No data

Source: Georgetown University Center on Education and the Workforce analysis of Bureau of Labor Statistics, Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016).

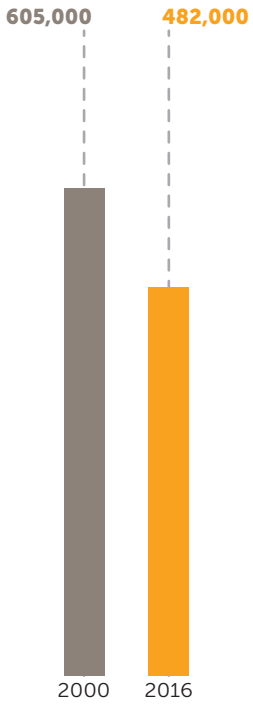
Top five manufacturing industries by 2016 output

	GDP (billions of 2016$)		
Detailed industry	**2000**	**2016**	**Change**
Food and beverage and tobacco products	$5.8	$8.7	**$2.9**
Machinery	$8.3	$7.8	**($0.5)**
Fabricated metal products	$7.3	$6.5	**($0.8)**
Paper	$8.0	$4.5	**($3.5)**
Chemical	$4.0	$4.1	**$0.2**

Note: Numbers are rounded.

WISCONSIN

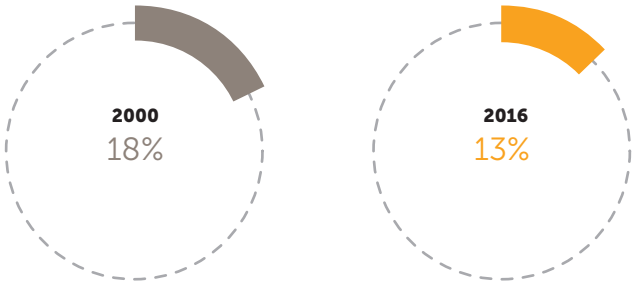
Number of manufacturing workers



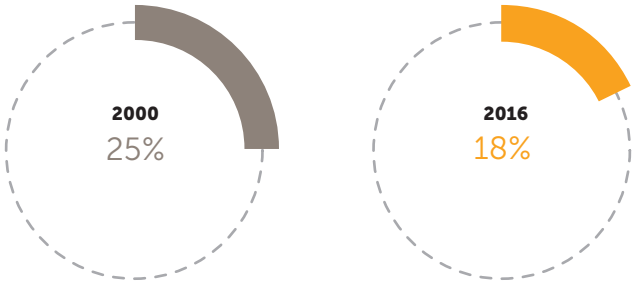
Value of manufacturing output (2016$)

Manufacturing output per worker (2016$)

Share of state's workers in manufacturing



Share of state's total output from manufacturing



Source: Georgetown University Center on Education and the Workforce analysis of US Bureau of Economic Analysis, Annual Gross Domestic Product (GDP) by State, and US Bureau of Economic Analysis, Total Full-Time and Part-Time Employment by Industry.
Note: Numbers are rounded.

REFERENCES

Autor, David H., David Dorn, and Gordon H. Hanson. "The China Shock: Learning from Labor Market Adjustment to Large Changes in Trade." *Annual Review of Economics* 8 (October 2016): 205–40.

Cappelli, Peter, Laurie Bassi, Harry Katz, David Knoke, Paul Osterman, and Michael Useem. "The Pressures to Restructure Employment." In *Change at Work*, 15–65. New York: Oxford University Press, 1997.

Carnevale, Anthony P., Neil Ridley, Ban Cheah, Jeff Strohl, and Kathryn Peltier Campbell. *Upskilling and Downsizing in American Manufacturing*. Washington, DC: Georgetown University Center on Education and the Workforce, 2019.

Carter, Susan B., Scott Sigmund Gartner, Michael R. Haines, Alan L. Olmstead, Richard Sutch, and Gavin Wright, eds. *The Historical Statistics of the United States: Millennial Edition.* Cambridge University Press, 2006.

Eisenstein, Paul A. "Flint Deals with General Motors Layoffs: 'Roger and Me'." *Christian Science Monitor,* January 10, 1990. https://www.csmonitor.com/1990/0110/frog.html.

Gallman, Robert. "Commodity Output, 1839–1899." In *Trends in the American Economy in the Nineteenth Century*, 13–72. Princeton, NJ: Princeton University Press, 1960.

Isenberg, Emily, Liana Christin Landivar, and Esther Mezey. "A Comparison of Person-Reported Industry to Employer-Reported Industry in Survey and Administrative Data." Social, Economic, and Housing Statistics Division Working Paper Number 2013-24, Washington, DC, October 2013.

Kochan, Thomas. "Wages and the Social Contract." *American Prospect*, April 22, 2007.

Kuznets, Simon, Lillian Epstein, and Elizabeth Jenks. *National Income and Its Composition, 1919–1938, Volume I*. Boston, MA: National Bureau of Economic Research, 1941.

Ruggles, Steven, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas, and Matthew Sobek. IPUMS USA: Version 8.0 [dataset]. Minneapolis, MN: IPUMS, 2018. https://doi.org/10.18128/D010.V8.0.

Russo, John, and Sherry Lee Linkon. "The Social Costs of Deindustrialization." In *Manufacturing a Better Future for America*, edited by Richard McCormack, 149–74. Washington, DC: Alliance for American Manufacturing, 2009.

Thompson, Peter. "How Much Did the Liberty Shipbuilders Learn? New Evidence for an Old Case Study." *Journal of Political Economy* 109, no. 1 (February 2001): 103–37.

Uchitelle, Louis. *Making It: Why Manufacturing Still Matters*. New York: The New Press, 2017.

US Bureau of Economic Analysis. Annual Gross Domestic Product (GDP) by State (accessed February 5, 2019). https://apps.bea.gov/regional/downloadzip.cfm.

US Bureau of Economic Analysis. Interactive Access to Industry Economic Accounts Data: GDP by Industry (Historical), November 1, 2018. https://apps.bea.gov/iTable/iTable.cfm?reqid=147&step=2&isuri=1.

US Bureau of Economic Analysis. Interactive Access to Industry Economic Accounts Data: GDP by Industry, November 1, 2018. https://apps.bea.gov/iTable/iTable.cfm?ReqID=51&step=1.

US Bureau of Economic Analysis. Implicit Price Deflators for Gross Domestic Product, Table 1.1.9 (accessed February 5, 2019). https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey.

US Bureau of Economic Analysis. Total Full-Time and Part-Time Employment by NAICS Industry, Table CAEMP25N (accessed February 5, 2019). https://apps.bea.gov/regional/downloadzip.cfm.

US Bureau of Economic Analysis. Total Full-Time and Part-Time Employment by SIC Industry, Table CAEMP25S (accessed February 5, 2019). https://apps.bea.gov/regional/downloadzip.cfm.

US Bureau of Labor Statistics. Quarterly Census of Employment and Wages (annual files for manufacturing, 2000–2016). Washington, DC: US Department of Labor.

US Census Bureau. *Bicentennial Edition: Historical Statistics of the United States, Colonial Times to 1970*. Washington, DC: US Census Bureau, 1975. https://www.census.gov/library/publications/1975/compendia/hist_stats_colonial-1970.html.

US Census Bureau. *Urban and Rural Population and Housing Unit Counts 1790 to 1990*, Table 4, 1993. https://www.census.gov/population/www/censusdata/files/table-4.pdf.

Wilkerson, Isabel. *The Warmth of Other Suns: The Epic Story of America's Great Migration*. New York: Random House, 2010.

Data Visualizations

Explore upskilling and downsizing in Manufacturing across the United States from 1940 to 2016 through five interactive visualizations.

Visit cew.georgetown.edu/manufacturingstates to learn more.

The Way We Were: The Changing Geography of US Manufacturing From 1940 to 2016 can be accessed online at cew.georgetown.edu/manufacturingstates.

Georgetown University
Center on Education and the Workforce
3300 Whitehaven Street, NW
Suite 3200
Washington, DC 20007

GEORGETOWN UNIVERSITY

Center *on* Education *and the* Workforce

McCourt School of Public Policy

JPMORGAN CHASE & CO.

facebook.com/GeorgetownCEW

twitter.com/GeorgetownCEW

linkedin.com/company/GeorgetownCEW