Michigan's Automotive Industry:
2019 Economic Contribution

Prepared by
Public Sector Consultants
Lansing, Michigan
www.publicsectorconsultants.com

Prepared for
MICHauto
Detroit, Michigan
www.michauto.org

Table of Contents

EXECUTIVE SUMMARY 4
AUTOMOTIVE INDUSTRY EMPLOYMENT IN MICHIGAN 5
ECONOMIC CONTRIBUTION 6
Statewide Economic Activity 7
ECONOMIC CONTRIBUTION IN MICHIGAN—AUTOMOTIVE SECTORS 8
Automotive Manufacturing 9
Automotive Vehicle and Parts Dealers and Wholesalers 10
Automotive Repair and Maintenance 10
CONCLUSION 11
APPENDIX A: DATA SOURCES AND METHODOLOGY 12
Employment by Sector and County 12
IMPLAN Model 12
APPENDIX B: ADDITIONAL ANALYSIS 14
REFERENCES 16

Executive Summary

As the birthplace of the automobile, Michigan has a long history in the automotive industry. Despite economic volatility, especially during the Great Recession in 2008, the state has continued to maintain its industry dominance. In 2017, Michigan produced more than two million cars and trucks, making it the largest producer in the U.S. Beyond this, the state is also home to multiple original equipment manufacturer headquarters and is one of the country's leaders in self-driving automobile testing (Detroit Regional Chamber 2019). Michigan's automotive industry directly employs thousands of individuals statewide and indirectly supports employment through the purchase of goods and services. Spending by industry employees supports employment and generates economic activity in the communities where these individuals live, learn, work, and recreate. This is evidenced by the automotive industry's total annual payroll of $16.7 billion, making the industry one of the largest in the state (U.S. Census Bureau 2018).[1] Below is a summary of Michigan's automotive industry and its largest subsector—manufacturing.[2]

In 2017, Michigan's automotive industry:

- Directly employed nearly 291,000 workers statewide, which supported an additional 422,000 indirect jobs, a total of more than 712,000 jobs.[3]
- Directly contributed $157 billion to the state's economy, which supported an additional $69 billion in indirect contributions, a total of $225 billion in total state economic contribution.
- Paid a total of $48 billion in earnings and compensation.
- Directly generated approximately $4 billion in state and local taxes and helped drive a total of $7.4 billion in tax payments statewide.

In 2017, Michigan's automotive manufacturing sector:

- Directly contributed $134 billion to Michigan's economy, which supported an additional $53 billion in indirect contributions, a total of $188 billion in total state economic contribution.
- Directly employed more than 158,000 workers, which supported an additional 314,000 indirect jobs, a total of nearly 473,000 jobs supported by this sector.
- Paid a total of $33 billion in earnings and compensation.
- Directly generated approximately $1.1 billion in state and local taxes, which helped drive a total of $3.7 billion in tax payments statewide.

This report estimates the automotive industry's economic contributions to Michigan and primarily focuses on its economic contribution as a whole.[4] U.S. Census CBP data were used to identify the number of people employed in each sector and was supplemented with nonemployer statistics data to account for those self-employed in the industry (U.S. Census Bureau 2016). These employment data were then used as the basis for the economic analysis. The analysis investigates the automotive industry's positive

[1] Annual payroll data was calculated using 2016 U.S. Census County Business Patterns (CBP) data.
[2] The most recently available employment data that provided detailed industry numbers was from 2016. The model was run in IMPLAN (IMpact Analysis for PLANning) using 2017 modeling, and figures are reported in 2017 dollar values.

[3] For simplicity, this report refers to the combination of indirect and induced economic contributions (jobs, output, labor income, value added) as indirect economic contributions.

[4] Economic contribution findings from this report cannot be compared to the *Contribution of the Automotive Industry to the Economies of All Fifty States and the United States* report from 2015 due to methodological differences, including a different definition of the overall automotive industry.

economic contributions; it does not attempt to estimate if some portion of these jobs would exist, even if the automotive industry were not present. (See Appendix A for information about this approach.) A narrow definition of the automotive industry was used in this analysis, focusing on the automotive-related employment of the sectors listed below. For the purposes of this project, each sector is an aggregate of smaller subsectors in the industry.[5] (See Appendix B for a breakdown of the North American Industry Classification System, or NAICS, codes used to represent these sectors.)

Motor Vehicle Manufacturing

- Motor vehicle body manufacturing
- Motor vehicle manufacturing
- Motor vehicle parts manufacturing

Automotive Vehicle and Parts Dealers and Wholesalers

- Automotive parts, accessories, and tire stores
- Motorcycle, ATV, and all other motor vehicle dealers
- Motor vehicle and motor vehicle parts and supplies merchant wholesalers
- Recreational vehicle dealers

Automotive Repair and Maintenance

- Automotive body, paint, interior, and glass repair
- Automotive mechanical and electrical repair and maintenance
- Automotive oil change and lubrication shops
- All other automotive repair and maintenance

Automotive Industry Employment in Michigan

The automotive industry employs hundreds of thousands of employees throughout the state and provides millions of dollars in both direct and indirect contributions to the economy. According to CBP data, in 2016, the average wage for an employee in this industry was approximately $60,300, with both manufacturing and automotive vehicle and parts dealers and wholesalers close to this figure at $64,700 and $59,200, respectively.[6] The automotive repair and maintenance sector had the lowest annual average salary by far at $37,100 and was also low compared to Michigan's 2017 median household income of nearly $53,000 (U.S. Census Bureau 2016).

From 2004 to 2016, employment in the automotive industry has ranged from approximately 6 to 8% of total employment in Michigan (see Exhibit 1).[7] In this 12-year period, employment in the industry was at a

[5] This analysis is a contribution analysis, not a net economic impact analysis. Even with the hypothetical removal of the automotive industry from Michigan's economy, some of those employed by the industry would remain in the state and take jobs in other fields. This analysis does not estimate how many jobs would be lost to the state without the automotive industry.

[6] Average salaries were computed using 2016 CBP data and do not include sole proprietors.

[7] Total employment figures and percentages were calculated using CBP data for Michigan and do not include sole proprietors.

high in 2004 at 311,805 employees.[8] In the years following, total industry employment decreased by 38.8% from 2004 until its most recent historical low of 190,745 employees in 2010.[9] One of the primary reasons for the drastic reduction was the Great Recession, which ended in June 2009 (The National Bureau of Economic Research 2010). After the industry's 2010 low, employment began to increase annually every year after, until 2016, where total employee numbers are comparable to their 2006 levels. The automotive industry's change in employment mirrors the states. Michigan's economy and the automotive manufacturing sector have both made a substantial comeback following the recession and have continued to grow.

EXHIBIT 1. Michigan Automotive Employment Comparison

Year	Total Michigan Employment	Total Automotive Industry Employment	Industry Employment as a Percentage of Total Michigan Employment
2004	3,895,914	311,805	8.00%
2005	3,796,876	291,968	7.69%
2006	3,819,537	276,141	7.23%
2007	3,687,441	255,382	6.93%
2008	3,636,241	239,167	6.58%
2009	3,383,615	200,639	5.93%
2010	3,288,456	190,745	5.80%
2011	3,379,035	205,647	6.09%
2012	3,468,089	214,642	6.19%
2013	3,535,685	234,963	6.65%
2014	3,610,530	244,582	6.77%
2015	3,725,280	265,888	7.14%
2016	3,805,578	277,731	7.30%

Source: U.S. Census County Business Patterns; analysis by PSC.

In terms of total employment, the automotive industry is similar in size to the professional, scientific, and technical services industry, as well as the restaurant and other eating places industry in Michigan. When comparing contributions to gross state product (GSP), it is also similar to the professional, scientific, and technical services industry as well as the health care and social assistance industry.[10, 11]

Economic Contribution

Beyond being a substantial employer, Michigan's automotive industry also contributes to the broader economy in various ways. This economic contribution analysis reflects the value of automotive industry–related economic activity through direct and indirect effects. As discussed in the previous section, the

[8] Total employment numbers were calculated using NAICS codes and CBP data. NAICS code 441228—motorcycle, ATV, and all other motor vehicle dealers—was used for employment calculations from 2012 to 2016. For 2004 through 2011, a combination of 441221—motorcycle, ATV, and personal watercraft dealers—and 441229—all other motor vehicle dealers—was used for employment calculations. Codes 441221 and 441229 were combined during the 2012 NAICS code revisions to become 441228, which continued into the 2017 NAICS code revisions.

[9] CBP data were used to generate employment figures for both the state and the automotive industry. Sector Consultants (PSC) performed the analysis.

[10] This comparison was completed using 2017 GSP data sets, by state, from the U.S. Bureau of Economic Analysis.

[11] GSP is not the same as the total economic activity that is associated with the automotive industry or its total contributions.

automotive industry directly employs people throughout the state, which contributes to the creation of jobs indirectly through the purchases of goods and services. In addition to this, the automotive industry also benefits the state by providing employees wages to spend in the local economy. This secondary spending, both directly and indirectly supported by the automotive industry, affects other industries in the state and creates induced economic activity. This process of indirect and induced economic activity gradually declines as spending occurs outside of the region, is placed in savings, or is paid in taxes; however, the general additional economic activity, resulting from employee spending and industry spending at vendors, is known as the multiplier effect. These activities, discussed in the next section, are also included in the IMPLAN economic model. A further description of the economic model and how indirect contributions are calculated can be found in Appendix A.

Statewide Economic Activity

In 2017, employment in the automotive industry helped generate a total direct and indirect employment of more than 700,000 people in the state. The industry directly produced $156.6 billion in economic output, resulting in a total of $225.4 billion in direct and indirect economic activity (see Exhibit 2).

EXHIBIT 2. Statewide Economic Contribution of the Automotive Industry

Effect	Employment (thousands)	Labor Income (millions)	Economic Contribution (millions)
Direct	290.7	$23,623.0	$156,615.1
Indirect	421.6	$23,964.0	$68,775.1
Total	712.4	$47,587.0	$225,390.2

Source: Analysis by PSC using IMPLAN economic modeling 2017.
Note: Totals may not sum due to rounding.

The average total compensation (wages plus benefits) for the automotive industry averages more than $81,000 per employee. This is nearly $21,000 more than the average pay estimated by available CBP data, or an estimated benefits rate of 35%.

Industries Affected

Michigan's automotive industry helps drive employment and economic output in other industries. For example, automotive manufacturers purchase raw materials for parts, factories purchase parts for vehicle assembly, and dealerships purchase wholesale vehicles to sell to customers. Additionally, industry employees buy goods and services in their local economies, such as groceries or entertainment services. Furthermore, this sector helps drive nearly $69 billion in indirect activity in areas such as:

- Wholesale trade ($9.9 billion in economic activity)
- Management of companies and enterprises ($4.9 billion in economic activity)
- Real estate ($3.9 billion in economic activity)

Appendix B provides a summary of the top ten industries affected by the automotive industry.

Tax Contributions

The automotive industry also contributes to state and municipal governments through various tax structures, including business income, property, and employee personal income taxes. Employees pay state and federal income taxes as well as property taxes through their local governments. In addition to this direct impact, businesses that are indirectly supported by the industry also contribute to public funds through similar tax structures. In 2017, the automotive industry directly paid approximately $3.5 billion in state and local taxes, which helped generate a total tax benefit of nearly $6.3 billion. Moreover, automotive employees contributed nearly $568 million in state and local taxes, yielding over $1.1 billion in total tax benefits (see Exhibit 3.)

EXHIBIT 3. State and Local Tax Contribution of the Automotive Industry

Type of Tax	State and Local—Direct Taxes (millions)	State and Local—Total Taxes (millions)
Household Taxes	$567.6	$1,145.9
Tax on Production, Imports, and Corporations	$3,454.1	$6,269.0
Total Taxes	$4,021.7	$7,414.9

Source: Analysis by PSC using IMPLAN economic modeling 2017.
Note: Totals may not sum due to rounding.

Economic Contribution in Michigan—Automotive Sectors

The automotive industry is made up of several sectors—including manufacturing, vehicle parts dealers and wholesalers, and repair and maintenance—all of which have been analyzed separately for this report. Exhibit 4 shows the breakdown of total automotive industry jobs by sector. Automotive manufacturing supports the highest number of these jobs in Michigan at over 158,000 of the total 290,000 in direct employment, or 54%.

EXHIBIT 4. Employment Breakdown of the Automotive Industry

Employment	Manufacturing (thousands)	Vehicle and Parts Dealers and Wholesalers (thousands)	Repair and Maintenance (thousands)	Automotive Sector (thousands)
Direct	158.2	99.5	32.9	290.7
Indirect	314.5	90.6	16.5	421.6
Total	**472.7**	**190.2**	**49.5**	**712.4**

Source: Analysis by PSC using IMPLAN economic modeling 2017.
Note: Totals may not sum due to rounding.

These three sectors often interact during the normal course of business. Activity in one sector may result in indirect economic activity in the others. To perform a statewide analysis, this indirect contribution was accounted for by removing feedback loops so that the economic activity was not overstated in the automotive industry as a whole. This allowed for a joint analysis of the entire industry, where the industry's economic contribution will equal the sum of the individual sector contributions in IMPLAN

(see Appendix A). The direct, indirect, and total contributions outlined previously can be combined and will equal the total figures in the narrative above. A description of each sector, followed by a table representing their economic contributions to the industry as a whole, is shown in this section.

Automotive Manufacturing

The automotive manufacturing sector consists of the industrial production of automobile or automobile parts and includes the manufacturing of automobiles, light trucks and utility vehicles, heavy-duty trucks, motor vehicle bodies, and individual parts. This is the largest sector of the automotive industry and contributes the largest portion of employees as well as direct and indirect economic contributions. In 2017, this sector directly employed more than 158,000 people statewide, which helped drive total direct and indirect employment of almost 473,000 people in Michigan. It also generated more than $134.4 billion in direct economic output, resulting in nearly $187.9 billion in total economic activity (see Exhibit 5).

EXHIBIT 5. Statewide Economic Contribution of the Automotive Manufacturing Sector

Effect	Employment (thousands)	Labor Income (millions)	Economic Contribution (millions)
Direct	158.2	$14,739.5	$134,426.5
Indirect	314.5	$18,752.9	$53,441.0
Total	472.7	$33,492.4	$187,867.5

Source: Analysis by PSC using IMPLAN economic modeling 2017.
Note: Totals may not sum due to rounding.

The tax benefit of the automotive manufacturing sector was also estimated. In 2017, this sector contributed 21[12]% of direct state and local taxes and helped drive almost 47% of the total state and local tax generation. It also played a much larger role in household taxes and generated 62% of total direct household taxes. This helped produce 70% of the total household tax generation in the overall automotive sector (see Exhibit 6).

EXHIBIT 6. State and Local Tax Contribution of the Automotive Manufacturing Sector

Type of Tax	State and Local—Direct Taxes (millions)	State and Local—Total Taxes (millions)
Household Taxes	$352.8	$805.1
Tax on Production, Imports, and Corporations	$731.2	$2,916.1
Total Taxes	$1,084.0	$3,721.2

Source: Analysis by PSC using IMPLAN economic modeling 2017.
Note: Totals may not sum due to rounding.

[12] These proportions were calculated as a percent of the total automotive industry.

Automotive Vehicle and Parts Dealers and Wholesalers

The automotive vehicle and parts dealers and wholesalers sector includes the merchant wholesalers of motor vehicles, motor vehicles parts supplies (including new and used parts), tire and tube merchant wholesalers, conventional automobile dealers (including new and used cars), recreational vehicle dealers, all other motor vehicle dealers, and automotive parts stores (including part, accessory, and tire stores). This is the second largest sector in terms of total employees, directly employing more than 99,000 people statewide, which helped drive total direct and indirect employment to approximately 190,000 people in Michigan. Vehicle and parts dealers and wholesalers generated roughly $18.5 billion in direct economic output, which resulted in more than $31.5 billion in total economic activity (see Exhibit 7).

EXHIBIT 7. Statewide Economic Contribution of the Automotive Vehicle and Parts Dealers and Wholesalers Sector

Effect	Employment (thousands)	Labor Income (millions)	Economic Contribution (millions)
Direct	99.5	$7,013.6	$18,531.9
Indirect	90.6	$4,457.5	$12,976.8
Total	190.2	$11,471.1	$31,508.7

Source: Analysis by PSC using IMPLAN economic modeling 2017.
Note: Totals may not sum due to rounding.

Automotive Repair and Maintenance

The automotive repair and maintenance sector includes the repair and maintenance of mechanical components, electrical systems, exhaust systems, transmissions, body and paint components, automobile interiors, glass, and fluid changes. It is the smallest sector of the overall automotive industry and contributes the lowest portion of employees as well as direct and indirect economic contributions. In 2017, this sector directly employed almost 33,000 people statewide, which helped drive a total direct and indirect employment of almost 50,000 people in Michigan. Repair and maintenance generated more than $3.7 billion in direct economic output, resulting in approximately $6 billion in total economic activity (see Exhibit 8).

EXHIBIT 8. Statewide Economic Contribution of the Automotive Repair and Maintenance Sector

Effect	Employment (thousands)	Labor Income (millions)	Economic Contribution (millions)
Direct	32.9	$1,869.9	$3,656.7
Indirect	16.5	$753.5	$2,357.3
Total	49.5	$2,623.4	$6,014.1

Source: Analysis by PSC using IMPLAN economic modeling 2017.
Note: Totals may not sum due to rounding.

Conclusion

As a leading industry in Michigan, understanding the scope of the automotive industry's economic footprint is important to the state's economic development targets and efforts. This report narrowly defines the automotive industry and only includes those sectors that are directly related, while other studies take a broader view by including sectors such as gas stations or metal manufacturing as directly related to the automotive industry. This analysis includes these additional sectors in the indirect economic contribution, supporting the automotive industry.

The automotive industry is steadily growing and changing to meet the needs of the global economy, adapting and driving technological changes to meet tomorrow's transportation needs and the needs of the ever-expanding mobility market, of which the automotive industry is a large part. Michigan's unrivaled automotive research, development, and advanced manufacturing assets position the state as the global center for smart mobility, which includes connected and automated vehicle technologies, vehicle-to-infrastructure connectivity, urban mobility solutions, cybersecurity, and more, though these sectors were not specifically analyzed due to this report's targeted focus. As smart mobility solutions continue to emerge, methods for evaluating their economic contributions must be generated to holistically address the industry's overall impact.

Appendix A: Data Sources and Methodology

Employment by Sector and County

This analysis uses 2016 CBP data (the most recently available), as it allows for detailed industry breakdown to six-digit NAICS codes for the automotive industry. A list of NAICS codes used for this analysis is included in Appendix B. This data was supplemented with nonemployer statistics to account for the self-employed in the automotive industry.

IMPLAN Model

There is a waterfall effect of economic activity that occurs around initial spending by a business or industry. Direct spending by an industry to purchase goods and services or pay employees contributes to other economic sectors. The businesses and employees supported by the direct spending then purchase goods and services in the state. This generates additional business spending and employment, and those additionally generated employees and supported businesses also spend money—stimulating even more employment and economic activity. These follow-on spending activities gradually decline as spending occurs out of the region, is placed in savings, or is paid in taxes. This additional economic activity, resulting from the spending of employees and spending at vendors, is known as the multiplier effect. This analysis estimates the automotive industry's full economic contribution to the state, including the multiplier effect.

An input-output (I-O) model uses a series of multipliers to estimate the total value of these follow-on spending activities. It tracks how spending flows through interdependent industries to meet demand. This analysis uses the IMPLAN I-O modeling system to estimate the employment and economic activity the automotive industry generates in Michigan. The economic contribution is split into the following categories:

- **Direct effect**—The direct employment and spending of the automotive industry in Michigan.
- **Indirect effect**—The employment and spending generated in Michigan by the automotive industry's purchases of goods and services.
- **Induced effect**—The effect on the local economy from the household spending of those directly or indirectly employed by the automotive industry. As these employees spend money in Michigan on local goods and services, the resulting employment and spending generated is the induced effect. For the purposes of this report, the induced effect and indirect effect have been combined for simplicity.

Model Modifications

When estimating the economic contribution of entire industries, model modification is required in order to remove double counting of industry impacts. The following IMPLAN model modifications were made:

1. Commodity production and trade flows were altered for the majority of IMPLAN sectors whose total available employment was included as a direct effect in the model. These adjustments ensured that the full employment was accounted for within the identified sectors and not duplicated through indirect or induced impacts.

a. Commodity production was customized to change its underlying multipliers by fixing the coefficient for the majority of automotive sectors to 1.000000 so that 100% of the commodities from a given sector were contained within itself.
b. Trade flows were customized by zeroing out the local use ratio, meaning that no other sectors were able to make purchases from this sector within the state.

The model adjustments were necessary for the overall automotive industry estimation at the statewide level because the analyses already fully accounted for the sectors' employment and output; including additional sectors' purchases from these industries would double count the amounts already included.

Appendix B: Additional Analysis

EXHIBIT 1B. 2012 NAICS Codes

Automotive Subsectors	Detailed Industries	NAICS Code
Manufacturing	Motor vehicle manufacturing	3361
Manufacturing	Motor vehicle body manufacturing	336211
Manufacturing	Motor vehicle parts manufacturing	3363
Vehicle and Parts Dealers and Wholesalers	Motor vehicle and motor vehicle parts and supplies merchant wholesalers	4231
Vehicle and Parts Dealers and Wholesalers	Automobile dealers	4411
Vehicle and Parts Dealers and Wholesalers	Recreational vehicle dealers	44121
Vehicle and Parts Dealers and Wholesalers	Motorcycle, ATV, and all other motor vehicle dealers	441228
Vehicle and Parts Dealers and Wholesalers	Automotive parts, accessories, and tire stores	4413
Automotive Repair and Maintenance	Automotive mechanical and electrical repair and maintenance	81111
Automotive Repair and Maintenance	Automotive body, paint, interior, and glass repair	81112
Automotive Repair and Maintenance	Automotive oil change and lubrication shops	811191
Automotive Repair and Maintenance	All other automotive repair and maintenance	811198

Source: U.S. Census Bureau 2016. Analysis by PSC.

EXHIBIT 2B. Top Ten Industries Affected by the Automotive Industry, by Output

Sector	Employment (thousands)	Output (millions)
Indirect/Induced Contribution		
Wholesale trade	41.5	$9,912.3
Management of companies and enterprises	18.8	$4,900.1
Real estate	21.1	$3,883.4
Owner-occupied dwellings	0.0	$3,750.5
Hospitals	14.0	$2,194.2
Truck transportation	12.7	$1,964.6
Insurance carriers	2.9	$1,615.9
Electric power transmission and distribution	1.0	$1,318.5
Monetary authorities and depository credit intermediation	5.1	$1,116.8
Limited-service restaurants	13.6	$1,116.4
Total—Top Ten Industries by Output	130.7	$31,772.9
Total—All Sectors	421.6	$68,775.1

Source: Analysis by PSC using IMPLAN Economic Modeling 2017.
Note: Totals may not sum due to rounding.

EXHIBIT 3B. Top Ten Industries Affected by the Automotive Industry, by Employment

Sector	Employment (thousands)	Output (millions)
Indirect/Induced Contribution		
Wholesale trade	41.5	$9,912.3
Real estate	21.1	$3,883.4
Management of companies and enterprises	18.8	$4,900.1
Full-service restaurants	14.2	$664.3
Hospitals	14.0	$2,194.2
Limited-service restaurants	13.6	$1,116.4
Truck transportation	12.7	$1,964.6
Employment services	12.3	$914.7
Services to buildings	8.4	$368.8
Retail—general merchandise stores	8.2	$626.2
Total—Top Ten Industries by Employment	164.9	$26,545.2
Total—All Sectors	421.6	$68,775.1

Source: Analysis by PSC using IMPLAN Economic Modeling 2017.
Note: Totals may not sum due to rounding.

References

Detroit Regional Chamber. 2019. “The Auto Industry in Michigan.” *Detroit Regional Chamber*. Accessed May 15, 2019. http://www.detroitchamber.com/econdev/chamber-initiatives/michauto-universal-name/the-auto-industry-in-michigan/

The National Bureau of Economic Research. September 20, 2010. “U.S. Business Cycle Expansions and Contractions.” *The National Bureau of Economic Research*. Accessed May 16, 2019. https://www.nber.org/cycles.html

U.S. Census Bureau. 2016. “Nonemployer Statistics for the U.S., States, Metropolitan Areas, and Counties: 2016. Table NS1600A2.” *U.S. Census Bureau: American FactFinder*. Accessed May 13, 2019. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=NES_2016_00A2&prodType=table

U.S. Census Bureau. April 19, 2018. “County Business Patterns: 2016.” *U.S. Census Bureau*. Accessed May 16, 2019