US Labor & Economic Impact of Vehicle Supplier Industry – 2019CY

Final Report for Motor & Equipment Manufacturers Association

December 2020 2.0

Contents

Executive Summary

Executive Summary

- US Vehicle Supplier Industry (The Industry) direct employment grew 6.4% to 907,164 in 2019 from 2015 – outperforming US manufacturing employment by 2.8 pts over the same period. The Industry maintained the 2015 position as #1 manufacturing sector.

- In total, direct, indirect and induced US Vehicle Supplier employment accounted for over 4.8 million jobs in 2019 - reflecting a rise of 266,746 jobs since 2015. Additionally, total economic impact of US Vehicle Supplier employment in 2019 reached 2.5% of US GDP - outlining a 0.2 point improvement from 2015.

- Top-ten US states account for two-thirds of total direct Vehicle Supplier employment with the top 20 states accounting for almost 88% of total. This reflects little change from 2015.

- Total direct Vehicle Supplier (Industry) employment growth was relatively stable. Light Vehicle Original Equipment edged both Medium/Heavy-Duty OE and Aftermarket (6.4%) and Light Vehicle Aftermarket (5.3%) from a growth perspective – reaching 6.6% from 2015 to 2019.

- Average 2019 US Vehicle Supplier wage reached $80,300 – exceeding two major categories: (1) Wages of indirect and induced categories supported by those Industry jobs and (2) total manufacturing.

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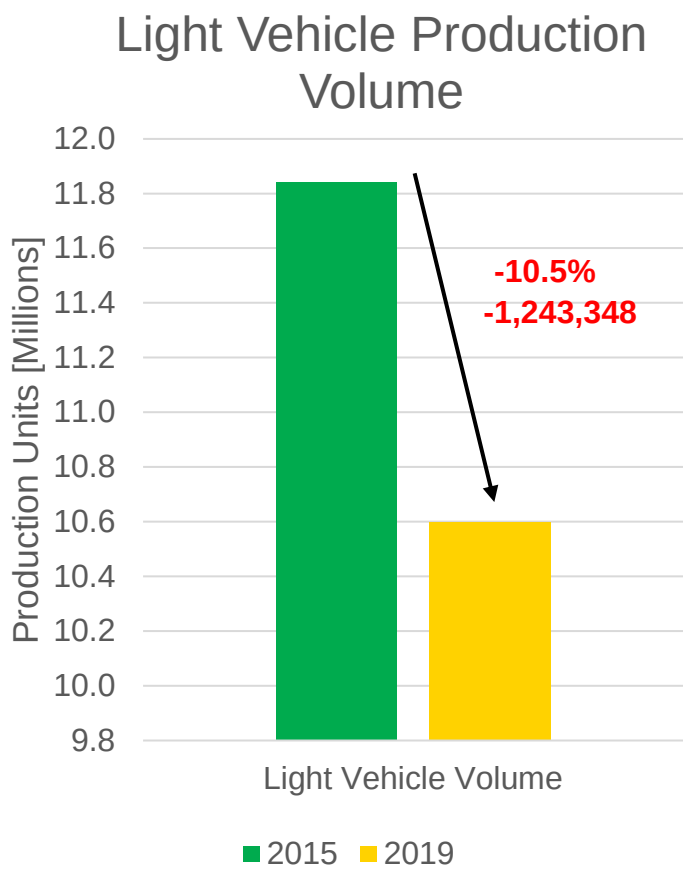
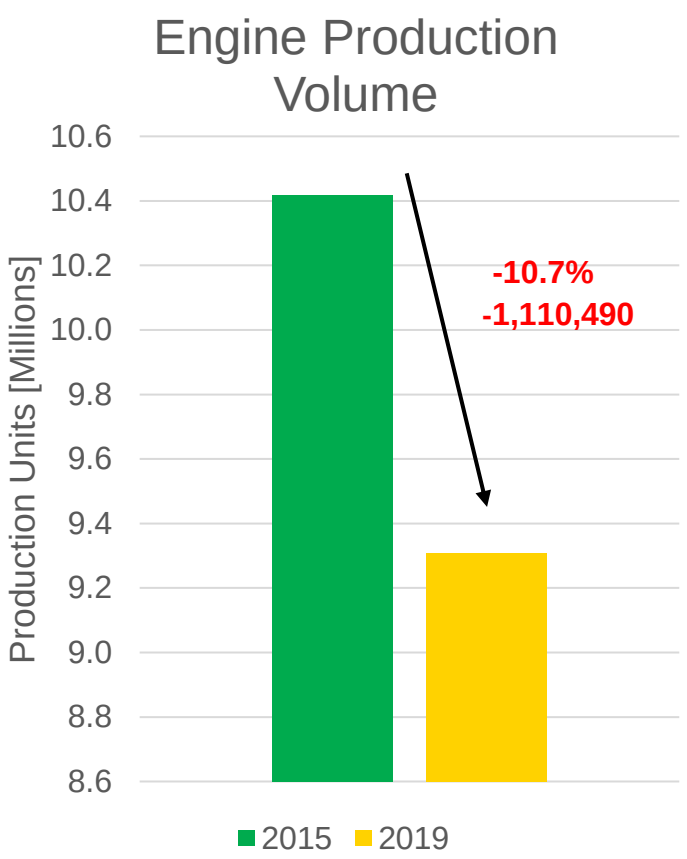
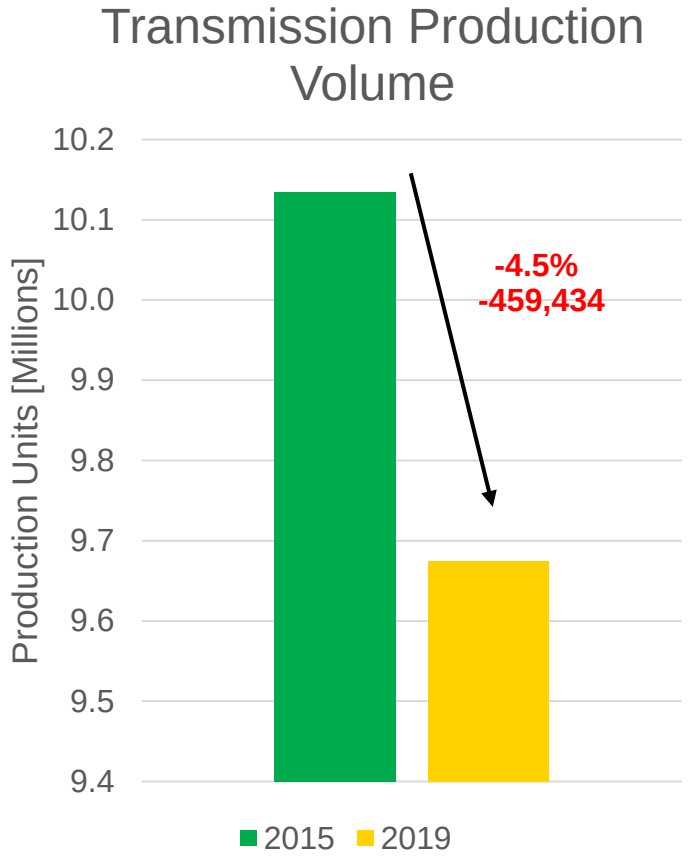
Employment Analysis

US Light Vehicle Production Background

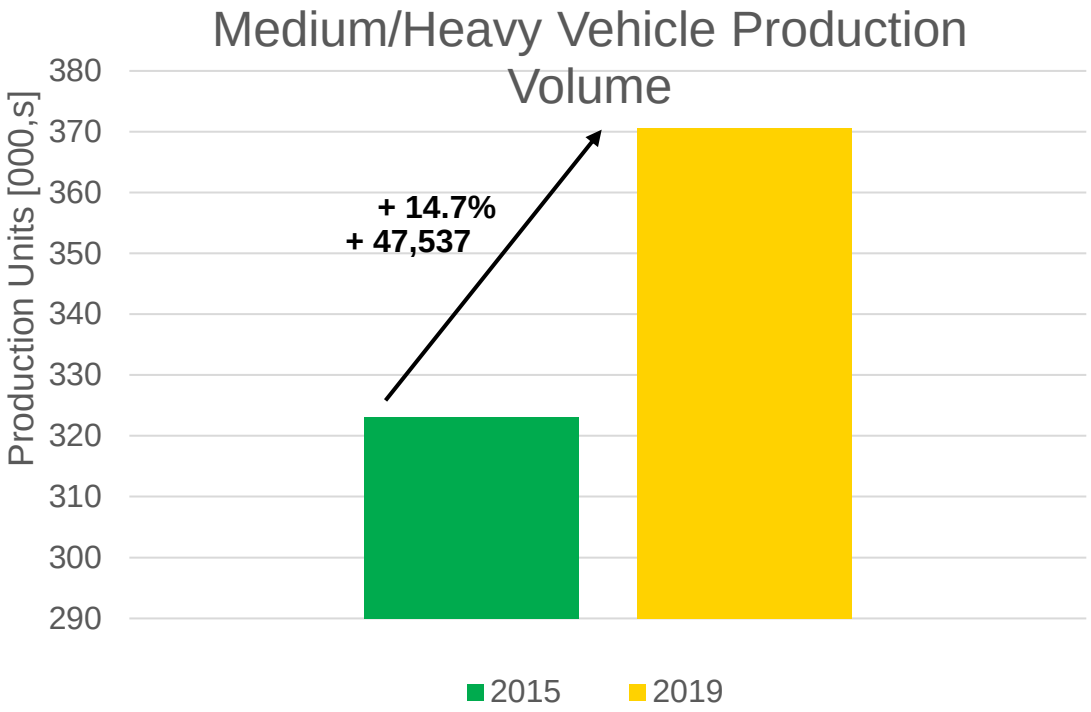


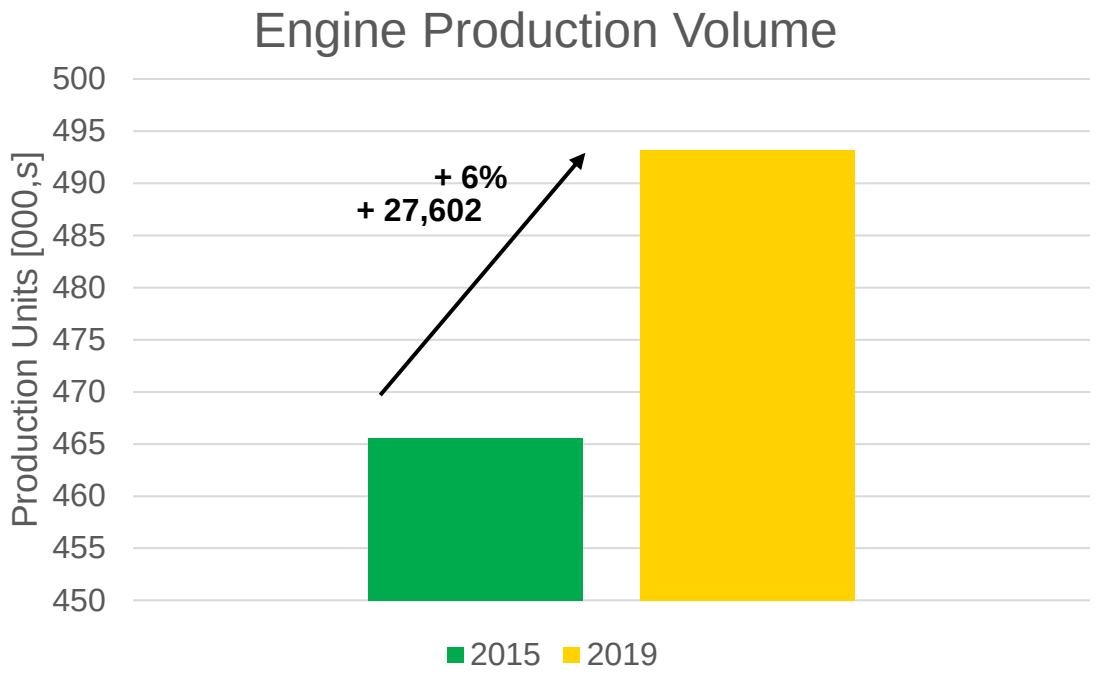




- Cyclical factors and late year labor disruptions drove a 10+% reduction in both US Light Vehicle and associated engine output in 2019 from 2015. Mexico light vehicle volume rose 12% over the same period.
- US transmission volume declined at a more modest rate as OEMs choose to utilize existing footprints to service North American volume versus co-locating output to Mexico.

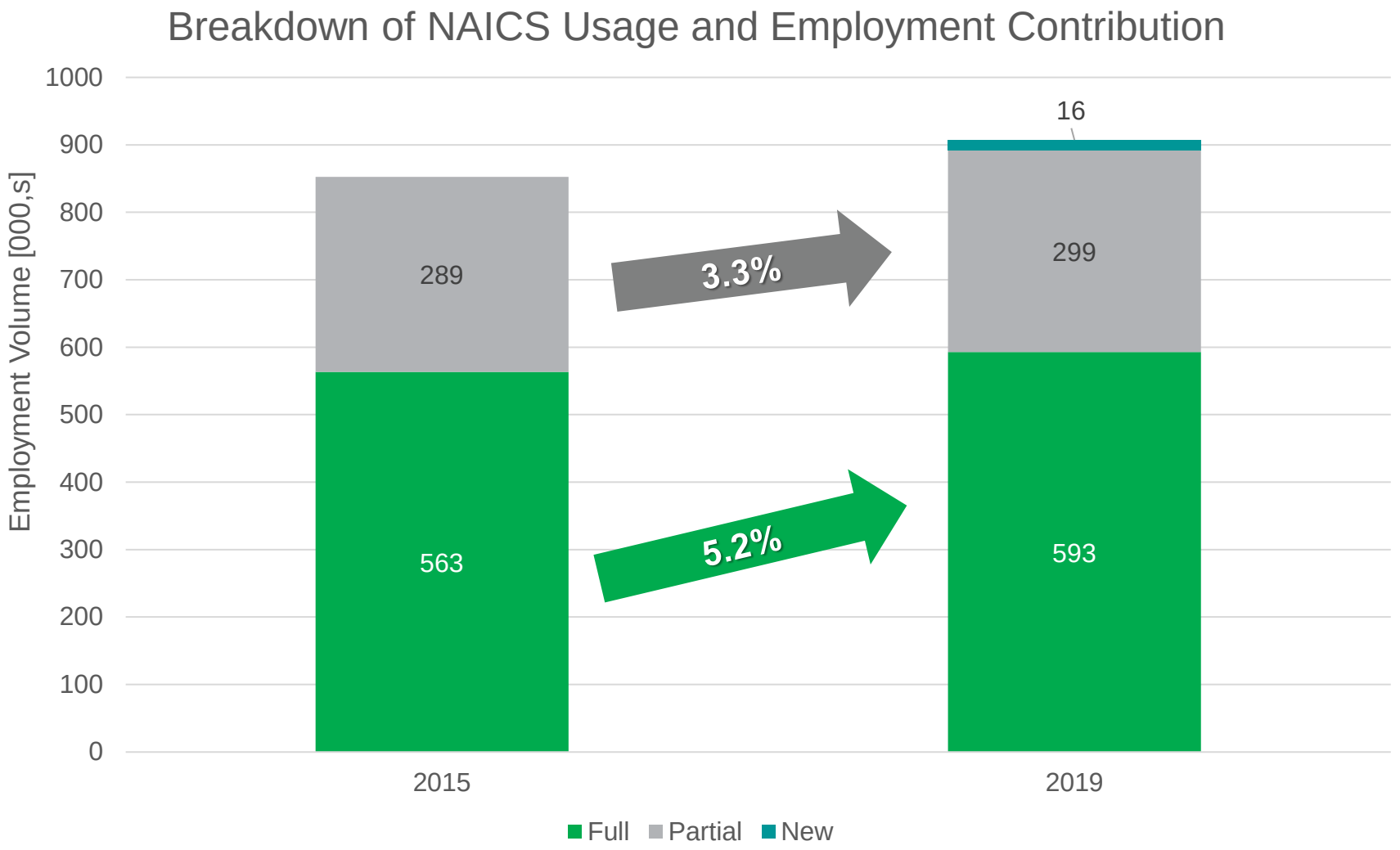
US Medium/Heavy Vehicle Production Background





- In comparison to light vehicle volume, 2019 Medium/Heavy Duty vehicle volume rose significantly versus 2015 – a rise of 14% though engine output rose 6% over the same period.

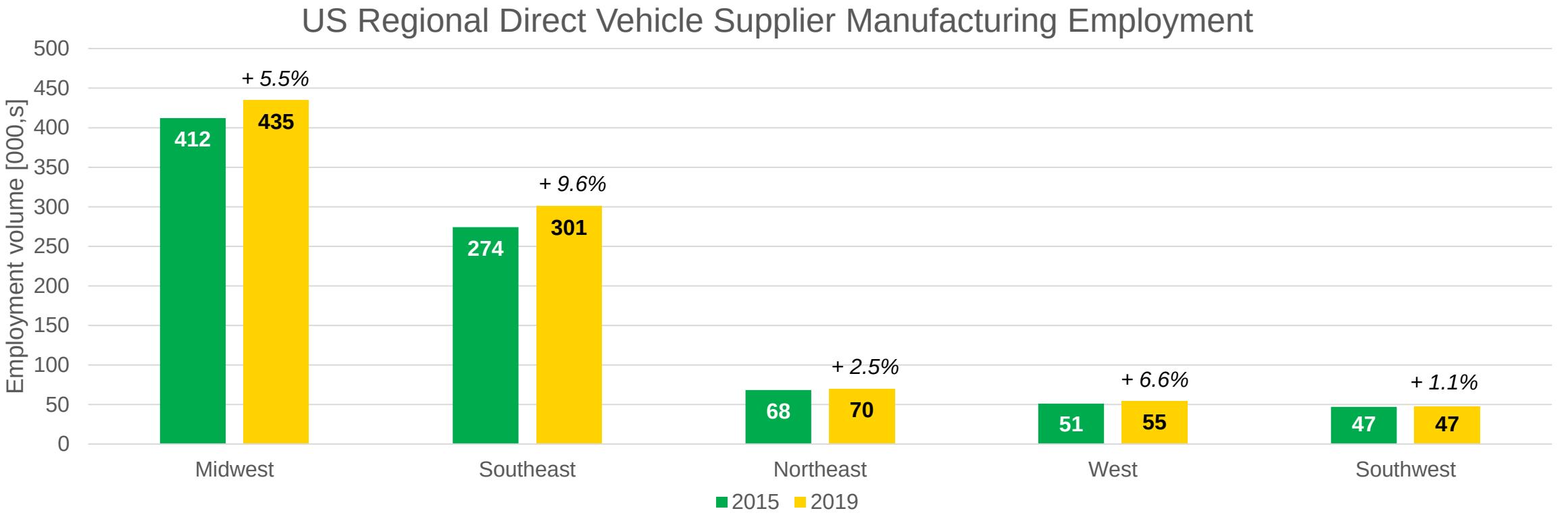
NAICS Additions



- 'Full' NAICS (dubbed '3363 NAICs') grew 5.2% from 2015 to 2019 – adding ~30k jobs
- Partial NAICS (Carryover from the 2015 study) added 10k more jobs over the same period – rising at a more modest 3.3%.
- New NAICS contributed 15k to the 2019 total – incremental inclusions were glass assembly (mirror) and some raw material considerations.

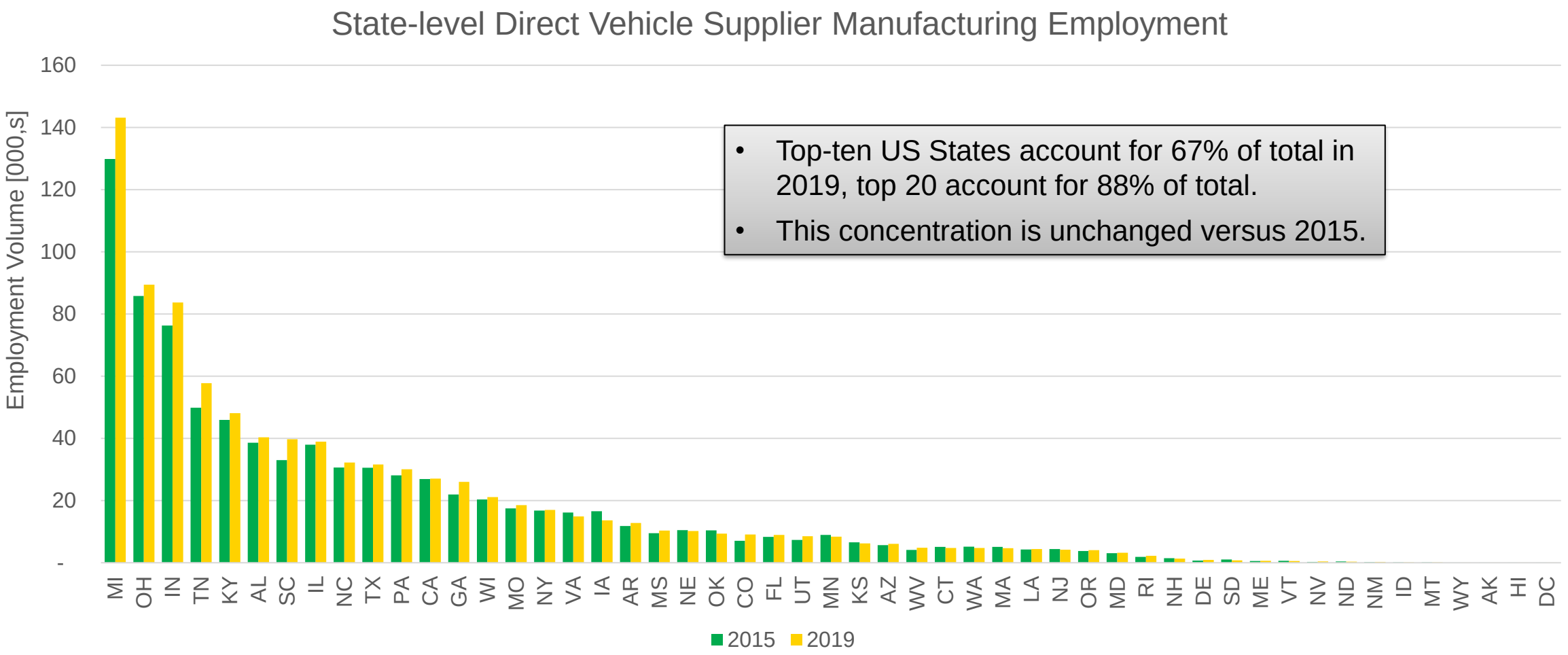
NAICS: North American Industry Classification System

Direct Industry Employment by Region



- LV production growth in the US Southeastern States drove an increase in Tier 1 employment in Tennessee, Georgia, South Carolina and Mississippi. The Southeast added more jobs than the Midwest in 2019.
- Both Michigan and Indiana over-indexed Ohio and Illinois within the US Midwest. Production shifts within each state drove parts employment volume.

Direct Industry Employment by State



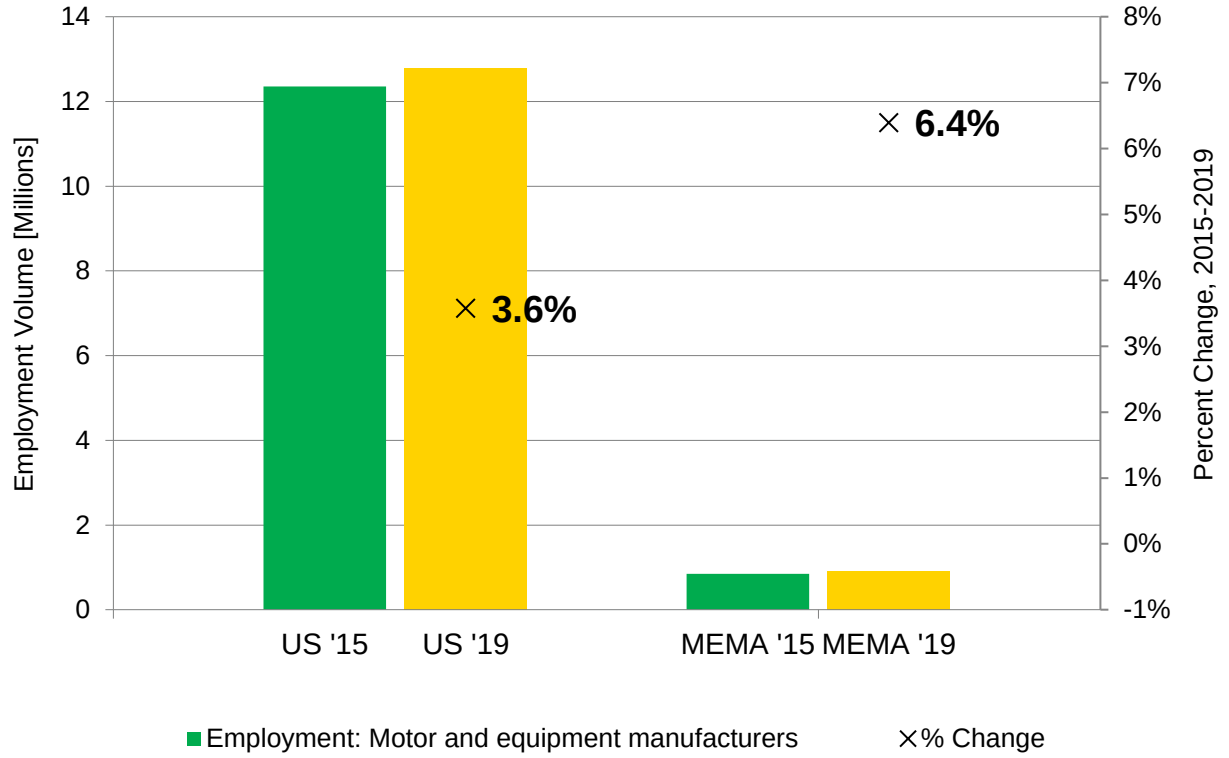
Direct Industry Employment by State

Direct Employment

State	2015	2019	Change	State	2015	2019	Change
MI	129,868	143,166	10.24%	KS	6,588	6,232	-5.40%
OH	85,816	89,416	4.20%	AZ	5,682	6,113	7.59%
IN	76,320	83,708	9.68%	WV	4,141	4,859	17.34%
TN	49,847	57,797	15.95%	CT	5,114	4,780	-6.53%
KY	45,923	48,113	4.77%	WA	5,163	4,776	-7.50%
AL	38,600	40,332	4.49%	MA	5,158	4,734	-8.22%
SC	33,050	39,742	20.25%	LA	4,267	4,444	4.15%
IL	38,005	38,953	2.49%	NJ	4,418	4,186	-5.25%
NC	30,635	32,258	5.30%	OR	3,789	4,084	7.79%
TX	30,586	31,644	3.46%	MD	3,095	3,273	5.75%
PA	28,109	30,077	7.00%	RI	1,945	2,287	17.58%
CA	26,919	27,051	0.49%	NH	1,491	1,328	-10.93%
GA	21,951	26,036	18.61%	DE	744	908	22.04%
WI	20,382	21,171	3.87%	SD	1,088	827	-23.99%
MO	17,520	18,537	5.80%	ME	595	675	13.45%
NY	16,816	17,013	1.17%	VT	681	605	-11.16%
VA	16,188	14,918	-7.85%	NV	308	434	40.91%
IA	16,561	13,667	-17.47%	ND	422	353	-16.35%
AR	11,853	12,814	8.11%	NM	216	282	30.56%
MS	9,530	10,395	9.08%	ID	160	169	5.63%
NE	10,497	10,225	-2.59%	MT	129	145	12.40%
OK	10,429	9,371	-10.14%	WY	121	102	-15.70%
CO	7,095	9,134	28.74%	AK	37	38	2.70%
FL	8,355	8,969	7.35%	HI	34	26	-23.53%
UT	7,390	8,548	15.67%	DC	3	5	66.67%
MN	9,006	8,444	-6.24%				

US Vehicle Supplier Manufacturing vs. Total Manufacturing

Vehicle Supplier Manufacturing Jobs vs US Total, 2015-2019



Source: IHS Markit

US Mfg Employment vs. US Vehicle Supplier Mfg Employment 2015 vs. 2019

	2015	2019	% Change
Total Manufacturing Employment	12,350,179	12,791,635	3.6%
Vehicle Supplier Employment	852,642	907,164	6.4%

- The Industry's job growth outpaced total US manufacturing by nearly double the pace in the period 2015-2019.
- Vehicle Supplier (Industry) manufacturing employment share of total US manufacturing employment rose to a 7.1% share from 6.9% share in 2015.

Vehicle Supplier Manufacturing Employment Growth Top-ten States: 2015-2019

Vehicle Supplier Manufacturing Employment
Top-ten States

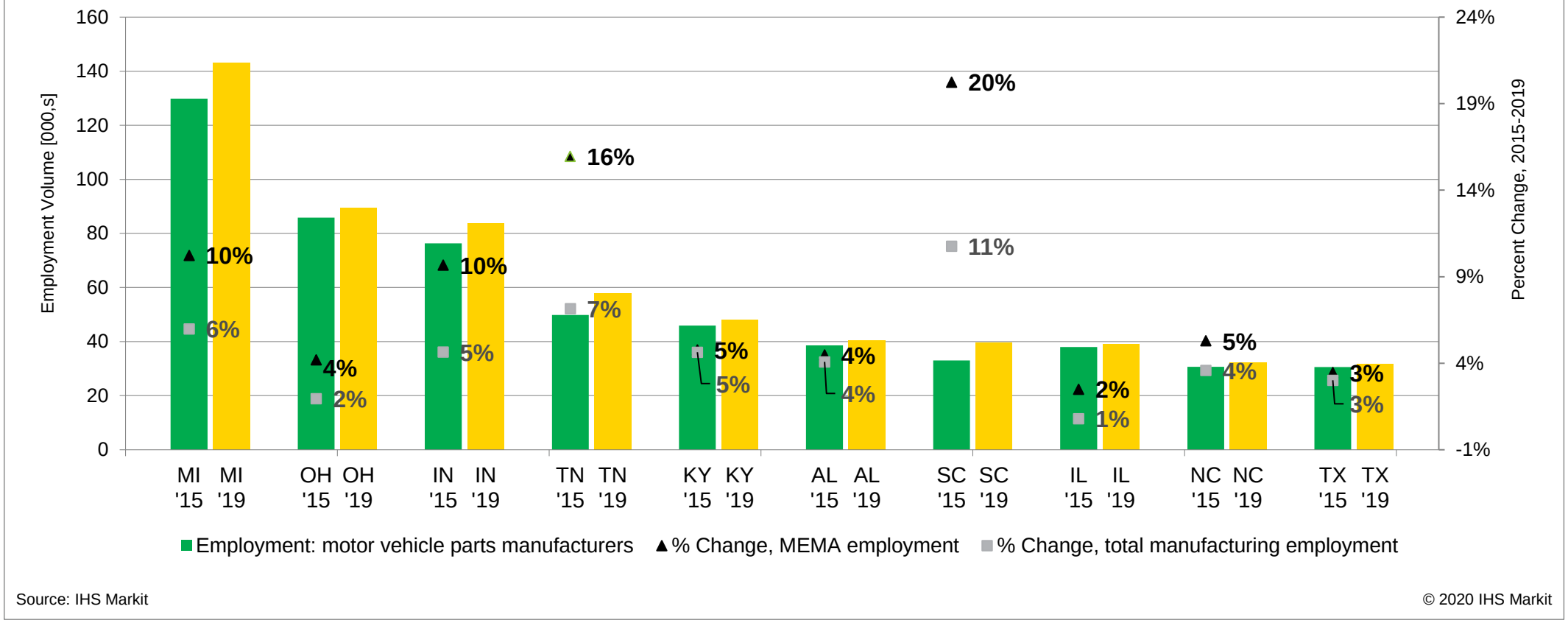
State	2015	2019	% Change
Michigan	129,868	143,166	10.2%
Ohio	85,816	89,416	4.2%
Indiana	76,320	83,708	9.7%
Tennessee	49,847	57,797	15.9%
Kentucky	45,923	48,113	4.8%
Alabama	38,600	40,332	4.5%
South Carolina	33,050	39,742	20.2%
Illinois	38,005	38,953	2.5%
North Carolina	30,635	32,258	5.3%
Texas	30,586	31,644	3.5%

Total Manufacturing Employment
Top-ten Vehicle Manufacturing States

State	2015	2019	% Change
Michigan	589,747	625,051	6.0%
Ohio	720,243	734,285	1.9%
Indiana	505,868	529,387	4.6%
Tennessee	358,005	383,641	7.2%
Kentucky	219,788	229,989	4.6%
Alabama	254,958	265,341	4.1%
South Carolina	210,465	233,118	10.8%
Illinois	558,224	562,626	0.8%
North Carolina	476,124	493,210	3.6%
Texas	883,239	909,840	3.0%

Vehicle Supplier Manufacturing Growth has Outpaced Total Manufacturing in All Top-ten States: 2015-2019

Vehicle Supplier Manufacturing Jobs in Top-ten States, 2015-2019



Source: IHS Markit

Vehicle Supplier Manufacturing Remained the Largest US Manufacturing Sector in 2019

Manufacturing Employment, 2015 & 2019

#	Sector	2015	2019
1	Vehicle Supplier Manufacturing	852,642	907,164
2	Plastics product manufacturing	557,790	597,253
3	Aerospace product and parts manufacturing	554,379	596,422
4	Animal slaughtering and processing	509,513	552,290
5	Electronic instrument manufacturing	415,206	440,216
6	Printing and related support activities	448,690	423,477
7	Architectural and structural metals mfg.	354,280	387,694
8	Semiconductor & electronic component mfg.	379,196	384,263
9	Machine shops and threaded product mfg.	383,342	369,327
10	Bakeries and tortilla manufacturing	299,757	326,916
11	Medical equipment and supplies mfg	305,666	322,938
12	Pharmaceutical and medicine manufacturing	272,727	295,328
13	Other miscellaneous manufacturing	272,687	280,709
14	Other fabricated metal product mfg	268,496	276,729

Share of US Manufacturing Jobs by Subsector

Sector	2015	2019
Vehicle Supplier Manufacturing	6.9%	7.1%
Plastics product manufacturing	4.5%	4.7%
Aerospace product and parts manufacturing	4.5%	4.7%
Animal slaughtering and processing	4.1%	4.3%
Electronic instrument manufacturing	3.4%	3.4%
Printing and related support activities	3.6%	3.3%
Architectural and structural metals mfg.	2.9%	3.0%
Semiconductor and electronic component mfg.	3.1%	3.0%
Machine shops and threaded product mfg.	3.1%	2.9%
Bakeries and tortilla manufacturing	2.4%	2.6%
Medical equipment and supplies manufacturing	2.5%	2.5%
Pharmaceutical and medicine manufacturing	2.2%	2.3%
Other miscellaneous manufacturing	2.2%	2.2%
Other fabricated metal product manufacturing	2.2%	2.2%

Vehicle Supplier Industry is a custom composition of different sectors

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Economic Contribution Assessment

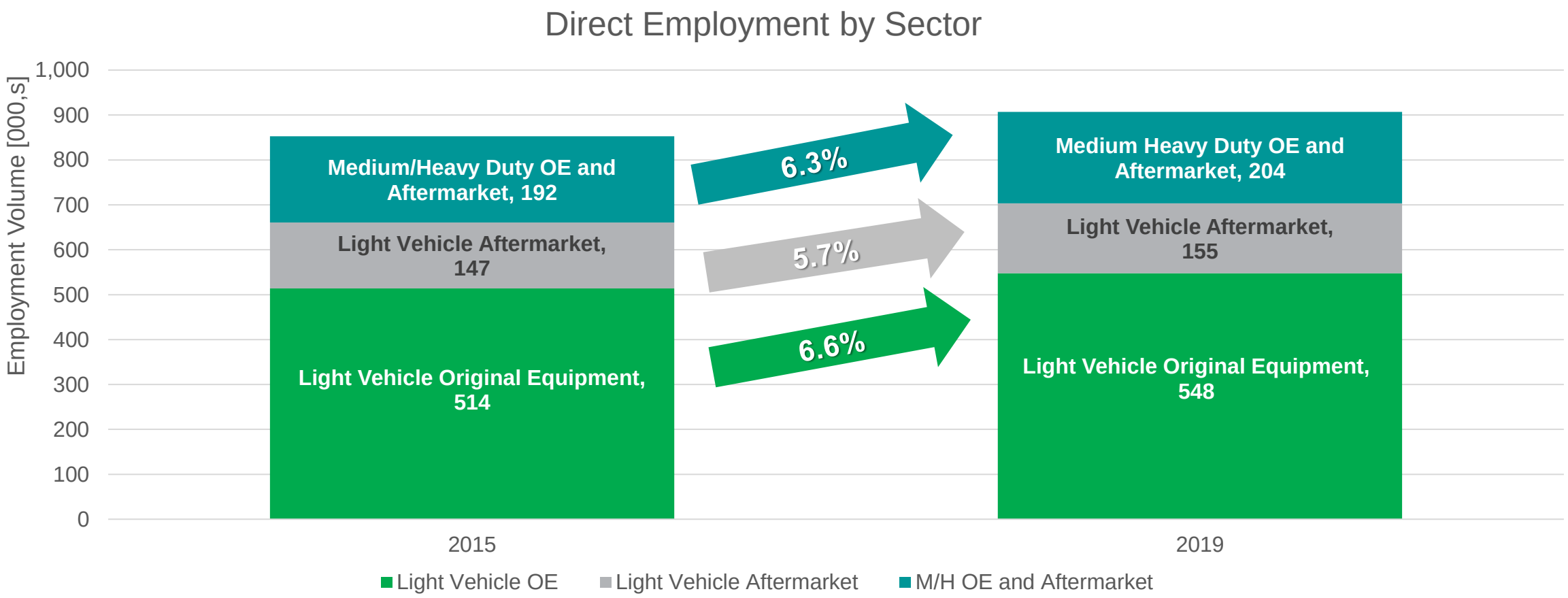
Vehicle Supplier Manufacturing Employment Economic Impact

- The Industry's $548 contribution to GDP represents 2.5% of the 2019 US total. An increase of 0.2 pts. from 2015.
- The Industry's 2019 jobs multiplier was 4.28.
  - For every 100 MEMA employees, 428 **additional** jobs were supported by the companies' supply chain spending.
- The average annual salary at a Vehicle supplier manufacturing-supported job in 2019 was $69,096.
  - This is 17% above the 2019 US average for all workers.
- The average annual salary for a direct vehicle supplier **manufacturing** job was $80,301.
  - This is 15% more than the US average of $69,920.

The Industry's Total Economic Contribution in 2015 and 2019
Millions of 2019 Dollars, unless otherwise noted

	2015 Total	2019 Total	% Change
Employment (workers)	**4,526,213**	**4,792,959**	**5.89%**
Direct	852,642	907,164	
Indirect	1,881,869	1,989,330	
Induced	1,791,702	1,896,466	
Output	**1,288,294**	**1,363,173**	**5.81%**
Direct	435,122	460,816	
Indirect	536,144	566,792	
Induced	317,028	335,565	
Contribution to GDP	**518,168**	**548,467**	**5.85%**
Direct	105,974	112,520	
Indirect	234,194	247,538	
Induced	178,000	188,408	
Labor Income	**312,948**	**331,261**	**5.85%**
Direct	68,798	73,091	
Indirect	143,426	151,557	
Induced	100,724	106,613	

Sector Shares of Vehicle Supplier Manufacturing Direct Employment



- Though all sector definitions rose from 2015 to 2019, Light Vehicle OE rose at a higher pace than both aftermarket and medium/heavy duty sectors – albeit at a narrow margin.

Summary of Economic Impacts of U.S. Vehicle Supplier Manufacturing Industry – Light Vehicle OE

Light Vehicle OE Economic Contribution in 2015 and 2019
Millions of 2019 dollars, unless otherwise noted

	2015 Total	2019 Total	% Change
Employment (workers)	**2,802,599**	**2,971,264**	**6.02%**
Direct	513,870	547,993	
Indirect	1,178,738	1,247,236	
Induced	1,109,991	1,176,035	
Output	**799,446**	**847,028**	**5.95%**
Direct	267,015	283,216	
Indirect	336,022	355,716	
Induced	196,410	208,096	
Contribution to GDP	**318,036**	**337,137**	**6.01%**
Direct	61,221	65,238	
Indirect	146,539	155,061	
Induced	110,277	116,838	
Labor Income	**193,761**	**205,302**	**5.96%**
Direct	41,209	43,851	
Indirect	90,151	95,339	
Induced	62,400	66,113	

Summary of Economic Impacts of U.S. Vehicle Supplier Manufacturing Industry – Light Vehicle Aftermarket

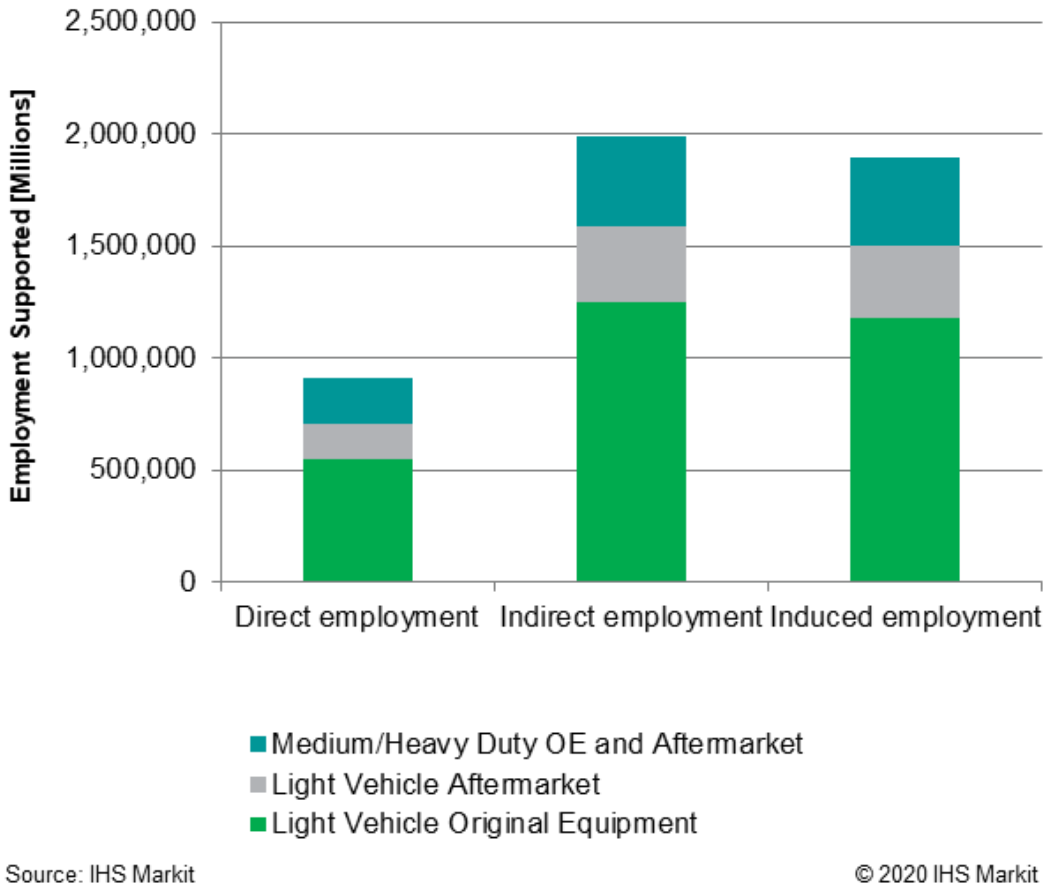
Light Vehicle Aftermarket Economic Contribution in 2015 and 2019 Millions of 2019 dollars, unless otherwise noted	2015 Total	2019 Total	% Change
Employment (workers)	**781,802**	**821,773**	**5.11%**
Direct	147,007	155,338	
Indirect	322,153	337,898	
Induced	312,643	328,538	
Output	**226,719**	**237,897**	**4.93%**
Direct	79,062	83,034	
Indirect	92,343	96,736	
Induced	55,314	58,126	
Contribution to GDP	**94,222**	**98,872**	**4.94%**
Direct	22,502	23,623	
Indirect	40,663	42,612	
Induced	31,057	32,636	
Labor Income	**54,686**	**57,467**	**5.08%**
Direct	12,662	13,371	
Indirect	24,448	25,627	
Induced	17,576	18,469	

Summary of Economic Impacts of U.S. Vehicle Supplier Manufacturing Industry- Medium/Heavy Duty OE and Aftermarket

Medium/Heavy Duty OE and Aftermarket Economic Contribution in 2015 and 2019 Millions of 2019 dollars, unless otherwise noted	2015 Total	2019 Total	% Change
Employment (workers)	**941,812**	**999,921**	**6.17%**
Direct	191,765	203,833	
Indirect	380,978	404,195	
Induced	369,068	391,893	
Output	**262,129**	**278,249**	**6.15%**
Direct	89,045	94,566	
Indirect	107,779	114,340	
Induced	65,304	69,343	
Contribution to GDP	**105,910**	**112,458**	**6.18%**
Direct	22,252	23,660	
Indirect	46,993	49,864	
Induced	36,666	38,933	
Labor Income	**64,501**	**68,493**	**6.19%**
Direct	14,927	15,870	
Indirect	28,826	30,592	
Induced	20,748	22,031	

Industry Economic Impact by Segment

Employment Impacts by Association and Type of Impact



Total Economic Contribution by Segment, 2019
Millions of USD, unless otherwise noted

	LV OE	LV AF	MH OE &AF
Employment (workers)	**2,971,264**	**821,773**	**999,921**
Direct	547,993	155,338	203,833
Indirect	1,247,236	337,898	404,195
Induced	1,176,035	328,538	391,893
Output	**847,028**	**237,897**	**278,249**
Direct	283,216	83,034	94,566
Indirect	355,716	96,736	114,340
Induced	208,096	58,126	69,343
Contribution to GDP	**337,137**	**98,872**	**112,458**
Direct	65,238	23,623	23,660
Indirect	155,061	42,612	49,864
Induced	116,838	32,636	38,933
Labor Income	**205,302**	**57,467**	**68,493**
Direct	43,851	13,371	15,870
Indirect	95,339	25,627	30,592
Induced	66,113	18,469	22,031

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Industry Economic Impact

NAICS Contributions to US Vehicle Supplier Manufacturing Employment

Industry Contributions to U.S. Vehicle Supplier Manufacturing
Top 25 NAICS

NAICS Sector	2019 EMP	2015-2019 % change
All Other Motor Vehicle Parts Manufacturing	151,521	4.4%
Motor Vehicle Metal Stamping	108,413	8.5%
Motor Vehicle Transmission and Power Train Parts Manufacturing	74,738	5.0%
Motor Vehicle Seating and Interior Trim Manufacturing	69,799	8.4%
Motor Vehicle Gasoline Engine and Engine Parts Manufacturing	64,229	6.6%
Vehicular Lighting Equipment Manufacturing & Other Motor Vehicle Electrical Manufacturing	61,622	-1.1%
All Other Plastics Product Manufacturing	53,588	-7.3%
Motor Vehicle Body Manufacturing	48,497	9.0%
Tire Manufacturing (except Retreading)	46,724	4.2%
Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	40,361	6.5%
Truck Trailer Manufacturing	32,282	5.2%
Motor Vehicle Brake System Manufacturing	22,079	-0.8%
Paint and Coating Manufacturing	12,389	5.0%
Iron and Steel Mills and Ferroalloy Manufacturing	12,021	-6.1%
Glass Product Manufacturing Made of Purchased Glass	11,694	6.6%
Storage Battery Manufacturing	10,772	58.0%
Petroleum Lubricating Oil and Grease Manufacturing	10,343	2.6%
Rubber and Plastics Hoses and Belting Manufacturing	7,604	2.7%
Other engine equipment manufacturing	7,282	13.4%
Aluminum Sheet, Plate, and Foil Manufacturing	6,942	21.1%
Spring Manufacturing	6,454	11.3%
Tire Retreading	6,064	-0.7%
Hardware Manufacturing	6,051	2.3%
Totalizing Fluid Meter and Counting Device Manufacturing	5,135	-5.4%
Electric Lamp Bulb and Part Manufacturing	4,133	-14.1%

Note: These NAICS make up 97% of total Industry employment.

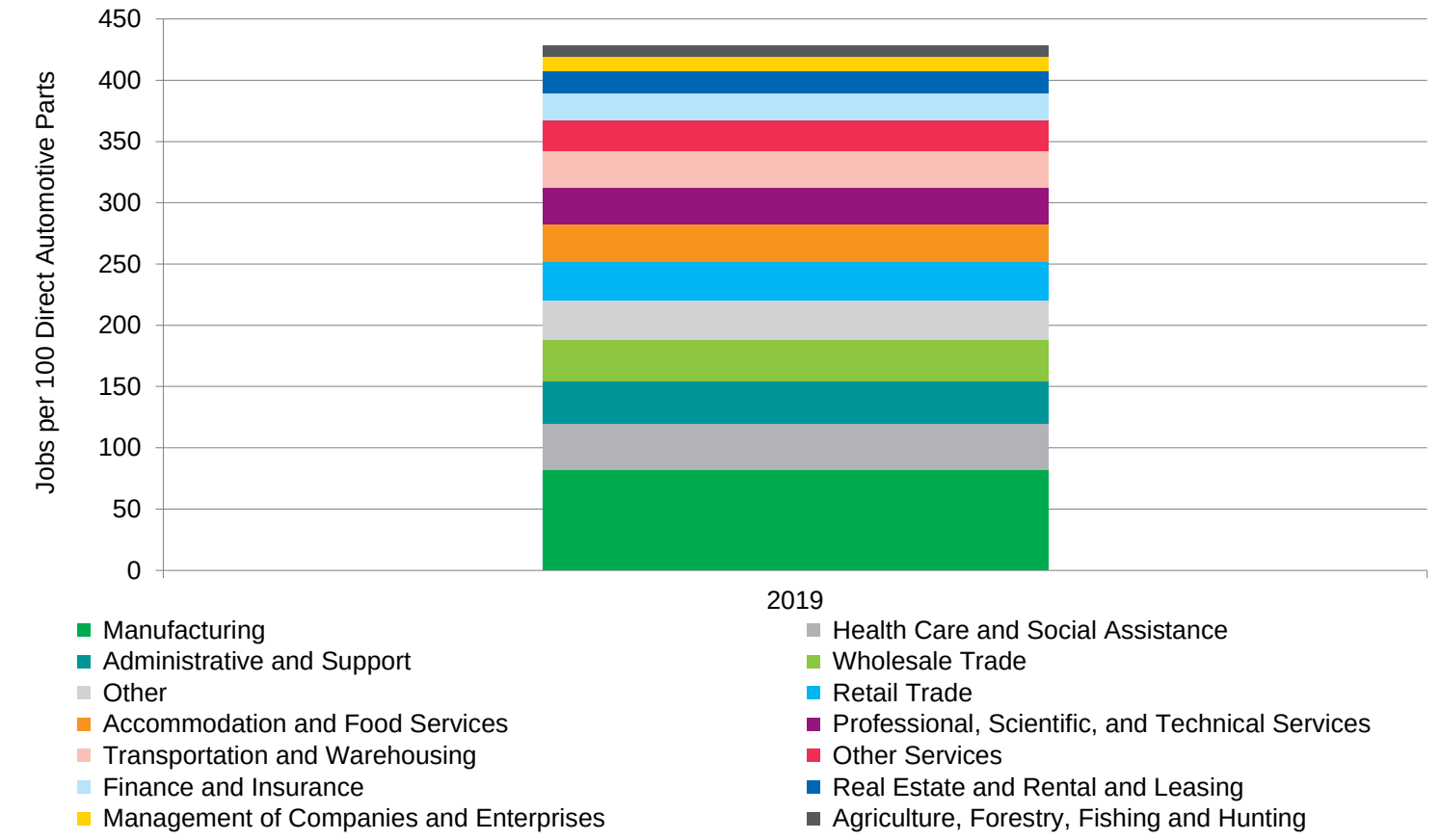
- Strong volume growth in the '3363' classification from 2015 to 2019
- Technology shifts in lighting, battery storage, in-vehicle displays, and material lightweighting shifts towards aluminum underscore sector-level changes.
- New for 2019 included changes to spring and purchased glass/assemblies.

Vehicle Supplier Manufacturing-supported Employment by Sector

Vehicle Supplier Manufacturing Contributes:

- 82 Manufacturing jobs
- 37 Health care and social assistance jobs
- 35 Administrative and support services jobs
- 34 Wholesale trade and 32 retail trade jobs
- 31 Accommodation and food service jobs
- 30 Professional services jobs
- 147 jobs in 13 other sectors

Jobs Supported per 100 Vehicle Supplier Employees in All Sectors



Source: IHS Markit

Average Pay of Vehicle Supplier-supported Workers Exceeded US Average

- Vehicle Supplier Manufacturing -supported workers earned 15% more than the industry average
- Transportation and warehousing workers in Vehicle Supplier Manufacturing's extended supply chain earned 25% more than the industry average
- Overall, Vehicle Supplier Manufacturing-supported employees earned more in 12 of the 20 major industries in the US in 2019

Average Annual Pay of Vehicle Supplier Mfg-supported Workers in Key Sectors: 2019

NAICS Code	Sector	Avg APM-supported salary	Avg US pay	% difference
10	**All sectors**	**69,114**	**59,209**	**17%**
31-33	Manufacturing	80,301	69,920	15%
42	Wholesale Trade	88,252	80,193	10%
54	Professional, Scientific, and Technical Services	89,293	100,699	-11%
62	Health Care and Social Assistance	63,937	51,792	23%
48-49	Transportation and Warehousing	68,118	54,365	25%
52	Finance and Insurance	87,490	112,656	-22%
55	Management of Companies and Enterprises	127,933	126,310	1%
56	Administrative and Support	43,691	43,026	2%
44-45	Retail Trade	37,866	33,611	13%
81	Other Services (except Public Administration)	46,617	39,922	17%
51	Information	146,061	119,605	22%
72	Accommodation and Food Services	29,541	22,491	31%
53	Real Estate and Rental and Leasing	39,101	61,336	-36%
22	Utilities	144,426	113,354	27%
71	Arts, Entertainment, and Recreation	35,688	40,056	-11%
61	Educational Services	44,414	52,658	-16%
11	Agriculture, Forestry, Fishing and Hunting	31,609	37,212	-15%
21	Mining, Quarrying, and Oil and Gas Extraction	80,315	107,986	-26%
23	Construction	64,927	64,826	0%
92	Public Administration	89,681	94,906	-6%

Vehicle Supplier Industry Employment Volume Growth and Salary Comparison

- On average, employees of MEMA members earned $80,571 in 2019. This salary is 15% greater than the 2019 average in Manufacturing and 33% less than in the tech/information sector.
- Vehicle Supplier manufacturers' employment impact, including direct employees and suppliers, grew by 5.9% from 2015-2019; US job growth was 6.1% in that period.
- Vehicle supplier manufacturers' contribution to GDP outpaced overall US growth, growing in share from 2.3% to 2.5%.

2019 Salary Comparison: Auto Parts Manufacturers vs. Other Sectors

NAICS Code	Sector	Average Salary	APM vs. Other Sectors
	Auto Parts Manufacturers Employees	**80,571**	
31-33	Manufacturing	69,920	115%
42	Wholesale Trade	80,193	100%
54	Professional, Scientific, and Technical Services	100,699	80%
62	Health Care and Social Assistance	51,792	156%
48-49	Transportation and Warehousing	54,365	148%
52	Finance and Insurance	112,656	72%
55	Management of Companies and Enterprises	126,310	64%
56	Administrative and Support	43,026	187%
44-45	Retail Trade	33,611	240%
81	Other Services (except Public Administration)	39,922	202%
51	Information	119,605	67%
72	Accommodation and Food Services	22,491	358%
53	Real Estate and Rental and Leasing	61,336	131%
22	Utilities	113,354	71%
71	Arts, Entertainment, and Recreation	40,056	201%
61	Educational Services	52,658	153%
11	Agriculture, Forestry, Fishing and Hunting	37,212	217%
21	Mining, Quarrying, and Oil and Gas Extraction	107,986	75%
23	Construction	64,826	124%
92	Public Administration	94,906	85%

Vehicle Supplier Manufacturing's Impact Spread Beyond Manufacturing: 65% of Jobs Supported were in Non-manufacturing Industries

Manufacturing Jobs Supported by Vehicle Supplier Manufacturing: 2019

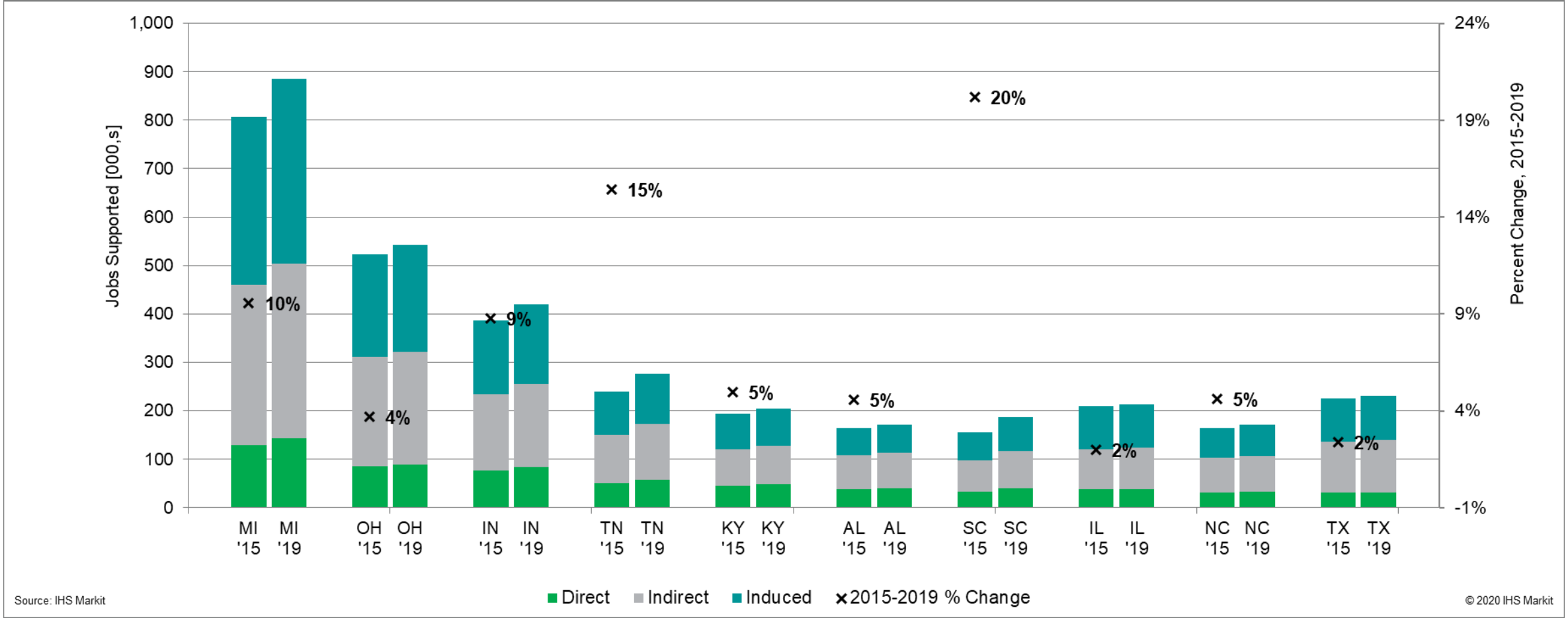
NAICS Code	Sector	Jobs supported
	All Manufacturing	**1,654,086**
336	Transportation Equipment Manufacturing	765,307
332	Fabricated Metal Product Manufacturing	234,467
326	Plastics and Rubber Products Manufacturing	170,106
331	Primary Metal Manufacturing	151,929
325	Chemical Manufacturing	59,869
334	Computer and Electronic Product Manufacturing	45,206
333	Machinery Manufacturing	32,497
327	Nonmetallic Mineral Product Manufacturing	30,097
335	Electrical Equipment, Appliance, and Component Manufacturing	28,179
311	Food Manufacturing	27,698
321	Wood Product Manufacturing	25,678
322	Paper Manufacturing	15,188
324	Petroleum and Coal Products Manufacturing	13,305
323	Printing and Related Support Activities	12,309
313	Textile Mills	10,803
339	Miscellaneous Manufacturing	8,473
314	Textile Product Mills	7,395
337	Furniture and Related Product Manufacturing	5,242
312	Beverage and Tobacco Product Manufacturing	4,214
316	Leather and Allied Product Manufacturing	3,609
315	Apparel Manufacturing	2,514

Non-manufacturing Jobs Supported by Vehicle Suppliers: 2019

NAICS Code	Sector	Jobs supported
	All non-manufacturing	**3,138,873**
62	Health Care and Social Assistance	338,587
56	Administrative and Support	316,087
42	Wholesale Trade	304,339
44-45	Retail Trade	286,363
72	Accommodation and Food Services	277,975
54	Professional, Scientific, and Technical Services	276,207
48-49	Transportation and Warehousing	266,806
81	Other Services	231,655
52	Finance and Insurance	200,797
53	Real Estate and Rental and Leasing	158,360
55	Management, Companies and Enterprises	110,659
11	Agriculture, Forestry, Fishing and Hunting	80,383
71	Arts, Entertainment, and Recreation	75,817
61	Educational Services	57,424
51	Information	57,201
21	Mining, Quarrying, and Oil and Gas Extraction	31,492
23	Construction	27,158
22	Utilities	24,474
92	Public Administration	17,088

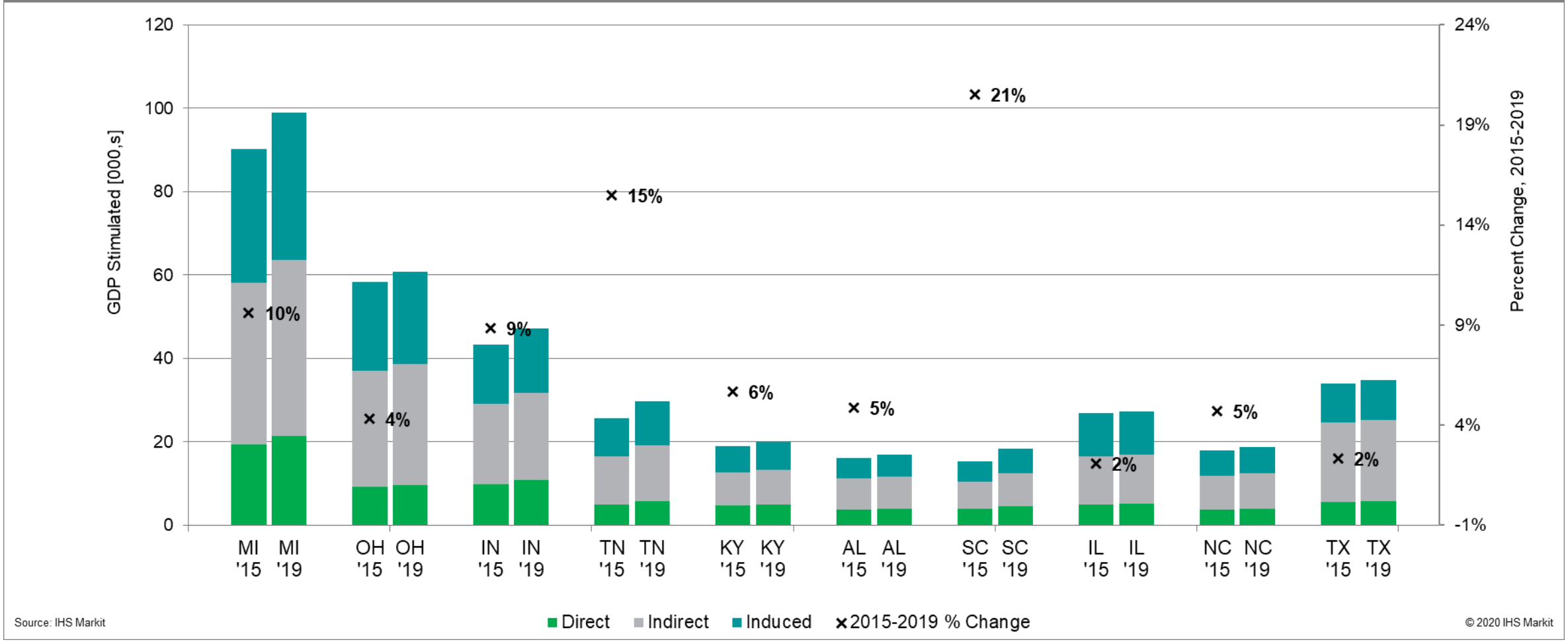
State-level Industry Employment Impacts

Vehicle Supplier Employment Supported in Top-ten States



State-level Industry Employment Impacts

GDP Stimulated by Automotive Parts Manufacturing in Top-ten States, 2015-2019 (Millions USD)



Source: IHS Markit

Contents

Appendix

Economic Contribution Assessment

How to Define the Industry

This research effort continues and builds upon previous work done by the Motor & Equipment Manufacturers Association (MEMA) to quantify the size of the motor vehicle parts manufacturing industry and determine its contributions to the overall U.S. economy. MEMA has periodically commissioned studies to determine these results and then utilized those figures to communicate the importance of the industry to a variety of stakeholders.

For the purpose of this study, the overall industrial sphere that was analyzed was expanded from previous efforts to include a more comprehensive view of all the products that go into not only a light vehicle, but also heavy-duty vehicles and those products destined directly for the aftermarket. The final definition was set to cover all parts and raw materials shipped directly to either light vehicle or heavy-duty OEMs, as well the manufacturers of products made specifically for the aftermarket. This effort resulted in a total direct employment figure for the U.S. motor vehicle parts manufacturing industry. The U.S. total direct employment figure was then split into three distinct categories:

- OE Light Vehicle (LV): Includes all manufacturing of components for the original equipment purposes for light vehicles (typically Class 3 and below in GVWR)
- Heavy Duty: Includes both original equipment and aftermarket components and accessories manufacturing for on-highway medium and heavy trucks in the Class 4 sector and higher in GVWR)
- Aftermarket (AF): Includes all components and accessories focused on the light vehicle (Class 3 and below in GVWR) sector including dealer service parts.

Given the determination of the components, accessories and some light equipment to be included in the analysis, the associated NAICS (North American Industry Classification System) codes were determined for inclusion in the study. These codes are found in various levels of detail – from four-digit codes to the more specific five- and six-digit codes – the appropriate detail was determined and included for consideration in the analysis.

The foundation of the industry analysis, as was the case in previous studies, is the NAICS code 3363 – Motor vehicle parts manufacturing sector. This was the only industry sector, either at the four-digit level or the more specific five- and six-digit levels where all U.S. employment was considered part of the motor vehicle supply industry. This provided a foundation of 2015 employment of over 567,000. Beyond that, each additional relevant NAICS code was examined individually to determine not only the share of their total employment relevant to this study, but also how that share should break out from a segment and from a state-by-state standpoint. For 2015, Carbon Fiber and Graphite Product Manufacturing was added to the relevant NAICS codes to reflect changes in automotive body material usage.

How to Define the Economic Contribution

- The objective of measuring the economic contribution is to fully “size” the industry’s economic influence by capturing all of the supply-chain and income effects associated with the U.S. motor vehicle parts manufacturing industry. The results of the direct employment analysis were integrated into a modeling system to capture the comprehensive contribution of this industry to the U.S. economy.
- The steps used to derive the economic contribution of any industry can be summarized as follows:
  - Any level of industry activity, in this case within those industries that supply the light and heavy-duty OE market as well as the aftermarket, represented by direct employment, results in direct benefits to the economy.
  - This employment also results in indirect effects on final demand. In theory, an increase of output within the motor vehicle supply industry, with all else constant, would lead to more employment and output among supplier industries, such as raw materials, transportation and professional services. This is the type of impact seen within in the supply chain, resulting from the change in the target industries, in this case motor vehicle production or the aftermarket.
- The industries that make up the motor vehicle parts manufacturing industry use many different types of products and services from various industrial sectors of the economy. As a result, a change in parts output would result in both a direct contribution (through production) and an indirect contribution (via supply-chain dynamics) across a broad spectrum of sectors. The contribution of these supplier industries has implications for each supplier industry’s own supply chains, magnifying the indirect contribution.
- As explained below, the net effects on the U.S. economy and its industrial sectors, due to these contributions, are divided into three stages: the direct contribution, the indirect contribution and the induced economic contribution.

How to Define the Economic Contribution

- For each stage in the analysis, the economic contribution is quantified in terms of employment, value added contribution to GDP, and labor income.
- The direct contribution is the effect of the core industry's output, employment, and income. For example, the motor vehicle parts manufacturing industry's direct contributions are generated by the production of its products to downstream elements – either OEMs or the aftermarket. Investments in these activities result in a direct contribution to production output, the number of workers employed by the industry and how much those workers are paid and otherwise compensated.
- Any changes in the purchasing patterns or activities by the motor vehicle parts manufacturing industry initiate the indirect contributions to all of the supplier industries that support the industry. Changes in demand from the direct industries lead to corresponding changes in output, employment, and income throughout their supply chains and inter-industry linkages. The affected supplier activities span the majority of industries in the U.S. economy. These operations extend beyond the acquisition of intermediate goods and includes operational aspects such as accounting and legal spending, real estate management, etc.
- Finally, workers and their families in both the direct and indirect industries spend their income on food, housing, leisure, autos, household appliances, furniture, clothing, and other consumer items. The additional output, employment, and income effects that result from their consumer spending activities are categorized as the induced economic contribution.

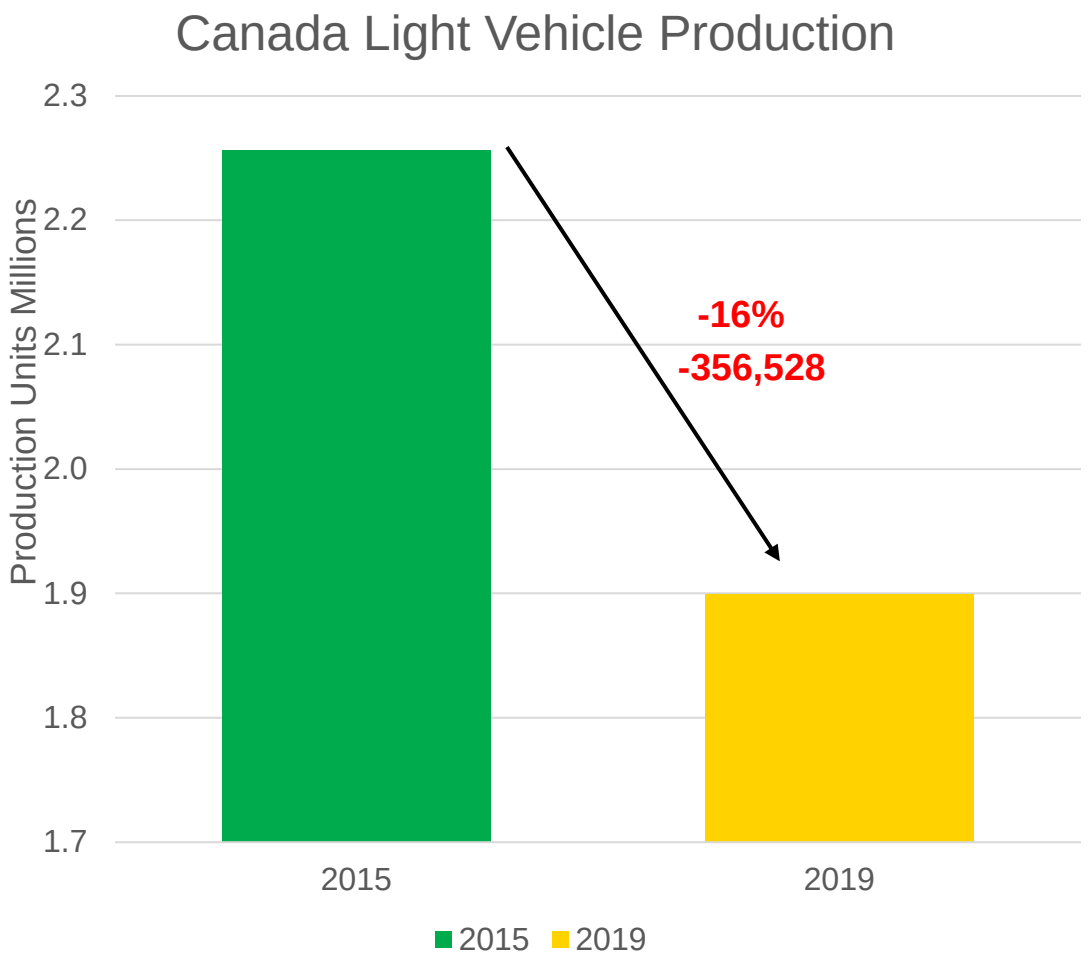
Modeling the Economic Contribution

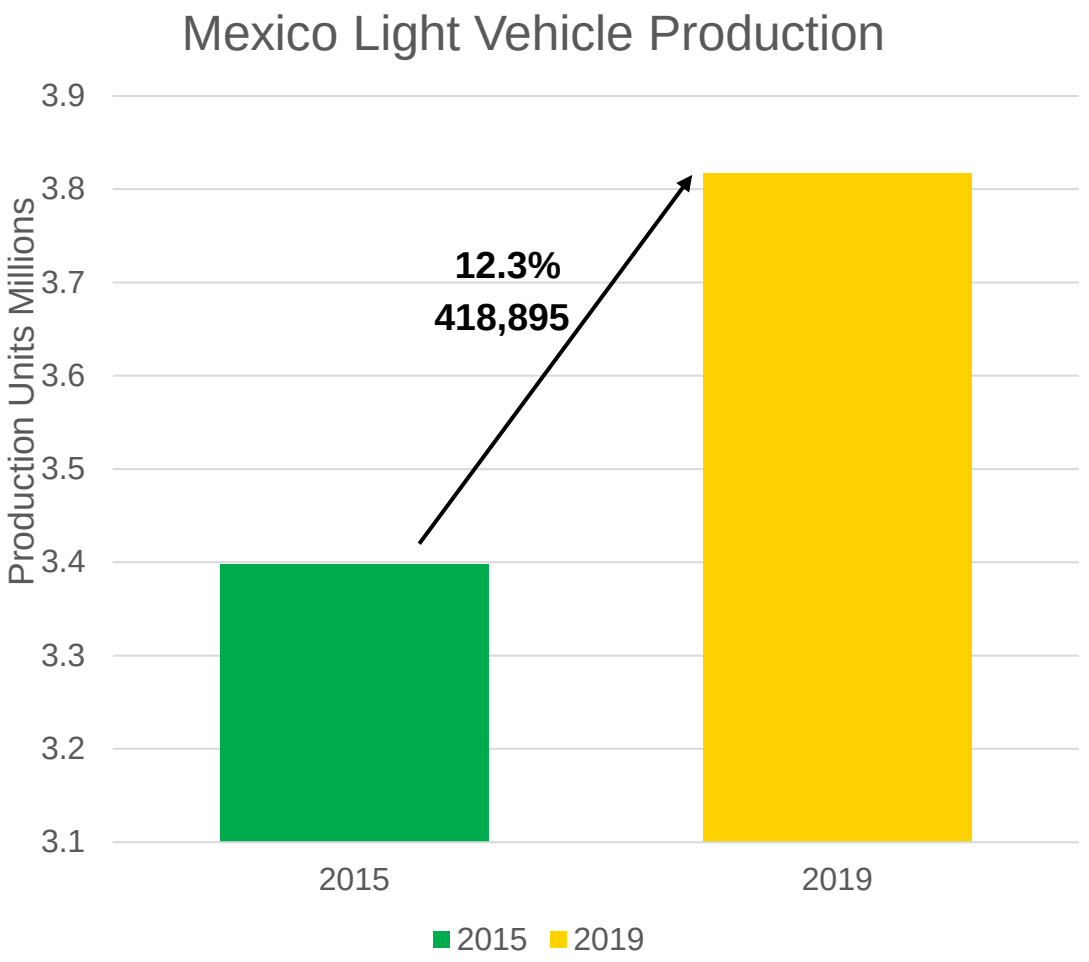
- As discussed previously within this section of this report, a significant effort went into first defining the industry, and then into determining just what the direct employment within those component industries was attributable to the U.S. motor vehicle parts manufacturing sector. The result of that effort was an estimate for 2019 direct employment within the industry that was built up from 61 separate six-digit NAICS industries.
- The IMPLAN model was utilized to evaluate changes, within the context of a comprehensive, linked industrial structure of an economy. The NAICS codes were mapped to their corresponding IMPLAN sector codes and the direct employment level by sector served as inputs to the IMPLAN model.
- The U.S. IMPLAN model was utilized to separately analyze the light vehicle, heavy duty and aftermarket segments of the motor vehicle supply industry. The sum of these impacts was then utilized to quantify the total impact of the entire industry.
- Specific state IMPLAN models were used to separately analyze each state's economic impact from their own direct employment.
- The IMPLAN model was used to quantify the direct and indirect contributions of the motor vehicle parts manufacturing industry. When combined, the direct and indirect contributions represent all of the production, marketing, and sales activities required to bring primary products to the end-users, either the vehicle manufacturers or the aftermarket consumers. IMPLAN's input-output framework allows one to enter direct employment, by industry, in order to analyze and quantify direct and indirect contributions. The sum of all contributions relative to the total size of the economy provides initial benchmark estimates to evaluate the importance of a given industry.
- The induced economic contributions represent the changes in consumer spending when their incomes are altered. The broad range of consumer spending means that induced contributions tend to be dynamic and reactive to shifts in consumer sentiment and employment outlooks. The composition of induced effects therefore tend to mirror the overall makeup of the consumer expenditures for the region.
- See Appendix III for more details on the IMPLAN model

State Regional Mapping

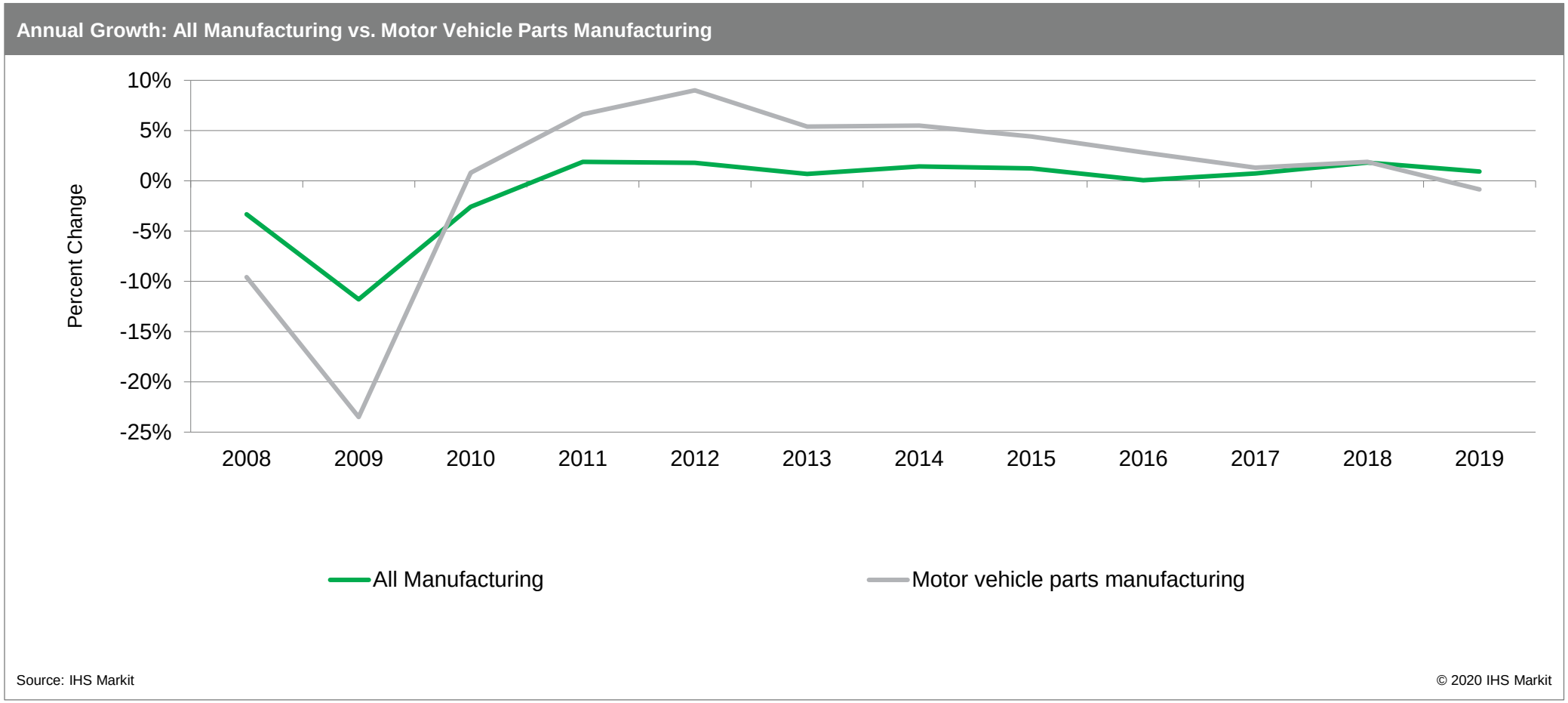
Midwest	Southeast	Northeast	West	Southwest
IA	AL	CT	AK	AZ
IL	AR	DC	CA	NM
IN	FL	DE	CO	OK
KS	GA	MA	HI	TX
MI	KY	MD	ID	
MN	LA	ME	MT	
MO	MS	NH	NV	
ND	NC	NJ	OR	
NE	SC	NY	UT	
OH	TN	PA	WA	
SD	VA	RI	WY	
WI	WV	VT		

Mexico and Canada Light Vehicle Production





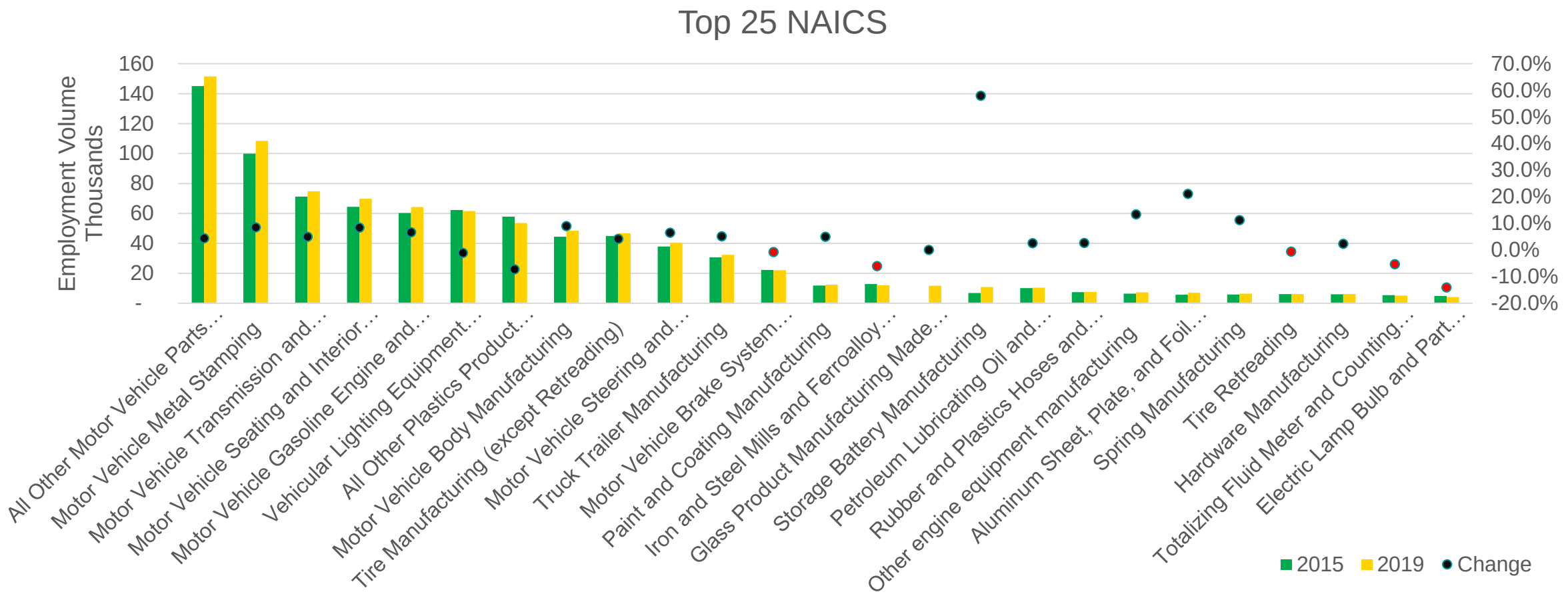
Employment Growth: Vehicle Supplier Manufacturing and All US Manufacturing



*just NAICS code 3363, not inclusive of all MEMA sectors

Industry Contributions to U.S. Vehicle Supplier Manufacturing

These NAICS make up 97% of total Vehicle Supplier employment.



Industry NAICS Inclusion

NAICS - North American Industry Classification System

Fully Included NAICS

6 Digit NAICS Code	NAICS Description
336310	Motor Vehicle Gasoline Engine and Engine Parts Manufacturing
336320	Vehicular Lighting Equipment Manufacturing & Other Motor Vehicle Electrical and Electronic Equipment Manufacturing
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
336340	Motor Vehicle Brake System Manufacturing
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing
336360	Motor Vehicle Seating and Interior Trim Manufacturing
336370	Motor Vehicle Metal Stamping
336390	All Other Motor Vehicle Parts Manufacturing

Partially Included NAICS

6 Digit NAICS Code	NAICS Description
326211	Tire Manufacturing (except Retreading)
326212	Tire Retreading
336211	Motor Vehicle Body Manufacturing
336212	Truck Trailer Manufacturing
324191	Petroleum Lubricating Oil and Grease Manufacturing
335110	Electric Lamp Bulb and Part Manufacturing
326220	Rubber and Plastics Hoses and Belting Manufacturing
331315	Aluminum Sheet, Plate, and Foil Manufacturing
332613	Spring Manufacturing
335911	Storage Battery Manufacturing
334514	Totalizing Fluid Meter and Counting Device Manufacturing
325510	Paint and Coating Manufacturing
332510	Hardware Manufacturing
331314	Secondary Smelting and Alloying of Aluminum
326199	All Other Plastics Product Manufacturing
333618	Other engine equipment manufacturing
325612	Polish and other sanitation goods manufacturing
331110	Iron and Steel Mills and Ferroalloy Manufacturing
316110	Leather and Hide Tanning and Finishing
325998	All other miscellaneous chemical product and preparation manufacturing
325520	Adhesive Manufacturing
333318	Other Commercial and Service Industry Machinery Manufacturing
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing
332216	Wrenches, handtools, nonpowered, manufacturing
336214	Travel Trailer and Camper Manufacturing
323117	Books Printing
335991	Carbon and Graphite Product Manufacturing
332991	Ball and roller bearing manufacturing
332999	All other miscellaneous fabricated metal product manufacturing
333415	Air-conditioning and warm air heating equipment and commercial and industrial refrigeration equipment manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals

New NAICS

Newly Included NAICS	
6 Digit NAICS Code	**NAICS Description**
326150	Urethane and other foam product manufacturing
327215	Glass Product Manufacturing Made of Purchased Glass
331313	Alumina Refining and Primary Aluminum Production
331318	Other Aluminum Rolling, Drawing, and Extruding
334290	Other Communications Equipment Manufacturing
334310	Audio and Video Equipment Manufacturing
325211	Plastics Material and Resin Manufacturing
331221	Rolled Steel Shape Manufacturing

Source: IHS Markit

Detailed State Results

Vehicle Suppliers Economic Contributions by State: 2019																
	Employment (workers)				Output (millions of 2019 dollars)				GDP Contribution (millions of 2019 dollars)				Labor Income (millions of 2019 dollars)			
	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced
MI	**884,873**	143,166	360,584	381,117	**242,704**	76,658	101,521	64,525	**98,986**	21,301	42,223	35,462	**62,770**	13,930	28,216	20,624
OH	**542,780**	89,416	233,287	220,067	**151,228**	44,520	67,318	39,389	**60,738**	9,620	29,090	22,028	**36,617**	7,229	17,429	11,960
IN	**419,667**	83,708	171,204	164,749	**122,908**	44,861	49,893	28,154	**47,221**	10,747	20,895	15,579	**28,498**	6,927	12,602	8,969
TN	**276,332**	57,797	115,489	103,047	**77,301**	28,557	30,383	18,361	**29,637**	5,637	13,474	10,526	**18,739**	4,058	8,440	6,241
KY	**204,525**	48,113	79,204	77,203	**56,929**	23,945	20,659	12,325	**19,930**	4,888	8,440	6,603	**12,616**	3,596	5,225	3,796
AL	**171,084**	40,332	72,365	58,385	**48,019**	19,365	19,107	9,547	**16,810**	3,895	7,821	5,094	**10,262**	2,853	4,645	2,765
SC	**187,341**	39,742	77,014	70,580	**50,051**	20,058	19,040	10,954	**18,361**	4,594	7,848	5,919	**11,440**	3,285	4,888	3,267
IL	**214,148**	38,953	84,482	90,713	**61,932**	19,621	24,679	17,631	**27,339**	5,029	11,778	10,531	**16,506**	3,344	7,291	5,871
NC	**171,027**	32,258	74,916	63,850	**46,033**	15,858	18,741	11,434	**18,700**	3,930	8,417	6,353	**11,015**	2,422	5,137	3,456
TX	**231,117**	31,644	107,618	91,848	**87,364**	19,474	49,818	18,071	**34,788**	5,749	19,461	9,578	**17,620**	2,681	9,530	5,409
PA	**165,719**	30,077	64,889	70,747	**47,449**	15,294	19,338	12,817	**20,750**	4,198	9,002	7,550	**12,612**	2,550	5,566	4,496
CA	**190,828**	27,051	95,943	67,823	**60,171**	13,615	31,249	15,306	**26,701**	3,084	14,556	9,061	**16,322**	1,977	9,290	5,055
GA	**139,116**	26,036	57,060	56,014	**36,711**	12,523	14,277	9,911	**15,233**	2,793	6,787	5,654	**9,034**	1,946	4,031	3,057
WI	**106,507**	21,171	46,094	39,242	**28,708**	10,406	11,564	6,739	**11,583**	2,663	5,209	3,711	**6,766**	1,341	3,303	2,121
MO	**88,970**	18,537	34,638	35,788	**23,632**	8,978	8,618	6,036	**9,268**	1,813	4,134	3,321	**5,684**	1,249	2,522	1,912
NY	**76,759**	17,013	29,964	29,776	**23,784**	8,850	8,882	6,052	**10,874**	2,293	4,549	4,033	**6,834**	1,552	2,954	2,328
VA	**61,078**	14,918	24,166	21,991	**16,262**	6,727	5,649	3,887	**6,849**	1,687	2,860	2,303	**4,039**	1,025	1,782	1,232
IA	**50,874**	13,667	17,740	19,466	**13,467**	5,886	4,402	3,178	**5,088**	1,390	1,980	1,718	**3,167**	1,022	1,207	938
AR	**51,181**	12,814	21,294	17,075	**13,877**	6,177	4,976	2,725	**4,931**	1,230	2,261	1,439	**2,843**	798	1,280	765
MS	**39,616**	10,395	16,537	12,686	**10,376**	5,017	3,385	1,974	**3,450**	1,031	1,397	1,022	**2,027**	692	817	518
NE	**41,481**	10,225	15,580	15,676	**11,122**	4,721	3,700	2,701	**4,347**	1,057	1,784	1,505	**2,647**	733	1,090	825
OK	**38,606**	9,371	15,875	13,364	**9,397**	3,921	3,235	2,241	**3,693**	1,045	1,469	1,179	**2,299**	727	910	662
CO	**47,069**	9,134	19,693	18,246	**12,227**	3,873	4,958	3,396	**4,849**	516	2,417	1,916	**3,289**	600	1,594	1,094
FL	**52,604**	8,969	21,812	21,817	**13,221**	4,369	5,116	3,737	**5,605**	1,036	2,465	2,104	**3,289**	656	1,473	1,159
UT	**49,345**	8,548	22,269	18,531	**14,255**	4,803	6,054	3,398	**5,909**	1,420	2,673	1,816	**3,088**	633	1,495	960

Detailed State Results (continued)

Vehicle Suppliers Economic Contributions by State: 2019																
	Employment (workers)				Output (millions of 2019 dollars)				GDP Contribution (millions of 2019 dollars)				Labor Income (millions of 2019 dollars)			
	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced
MN	**43,324**	8,444	16,442	18,438	**11,327**	3,584	4,334	3,409	**5,043**	1,073	2,079	1,891	**3,130**	650	1,349	1,132
KS	**22,763**	6,232	8,129	8,402	**5,952**	2,539	1,941	1,472	**2,358**	700	879	780	**1,417**	448	532	437
AZ	**33,757**	6,113	13,857	13,792	**9,354**	3,635	3,337	2,382	**4,109**	1,129	1,612	1,368	**2,209**	460	974	775
WV	**18,983**	4,859	6,844	7,287	**5,885**	3,061	1,741	1,083	**2,227**	862	765	600	**1,206**	409	459	339
CT	**23,468**	4,780	7,730	10,962	**7,002**	2,649	2,228	2,125	**3,563**	969	1,211	1,383	**2,230**	656	770	804
WA	**21,190**	4,776	9,510	6,907	**6,467**	2,207	2,794	1,467	**2,692**	481	1,329	882	**1,583**	310	795	479
MA	**21,442**	4,734	7,329	9,384	**6,278**	2,409	2,059	1,810	**3,107**	869	1,089	1,149	**1,856**	435	715	706
LA	**20,968**	4,444	8,666	7,864	**8,157**	3,241	3,623	1,293	**3,108**	968	1,424	716	**1,331**	333	625	372
NJ	**21,472**	4,186	7,321	9,969	**6,393**	2,291	2,131	1,970	**3,122**	831	1,083	1,208	**1,960**	503	740	718
OR	**21,877**	4,084	9,737	8,059	**6,097**	1,970	2,740	1,387	**2,641**	504	1,335	802	**1,566**	284	819	462
MD	**13,772**	3,273	4,807	5,691	**4,102**	1,898	1,167	1,037	**1,860**	568	640	652	**1,073**	303	405	364
RI	**7,421**	2,287	2,637	2,500	**2,021**	997	609	414	**878**	302	324	252	**437**	101	195	140
NH	**5,245**	1,328	1,669	2,250	**1,352**	548	421	384	**687**	218	231	239	**393**	115	139	139
DE	**2,216**	908	574	736	**518**	256	137	125	**227**	74	75	78	**129**	42	44	43
SD	**2,409**	827	720	866	**587**	281	165	142	**240**	81	80	79	**138**	47	48	43
ME	**2,759**	675	1,021	1,064	**665**	295	205	165	**256**	68	95	92	**154**	41	60	53
VT	**2,110**	605	670	839	**517**	248	138	132	**194**	52	67	76	**127**	41	43	43
NV	**1,651**	434	649	576	**429**	178	150	101	**187**	42	83	61	**106**	29	47	30
ND	**1,089**	353	365	372	**300**	144	90	65	**101**	24	43	35	**69**	22	27	20
NM	**948**	282	391	279	**279**	138	97	44	**107**	35	48	24	**48**	13	22	13
ID	**569**	169	213	189	**135**	57	48	30	**47**	11	21	16	**32**	9	14	9
MT	**478**	145	191	144	**116**	52	42	22	**37**	9	17	11	**23**	6	10	7
WY	**219**	102	69	50	**57**	33	15	8	**17**	5	7	4	**11**	4	4	2
AK	**93**	38	38	20	**32**	16	12	4	**11**	1	7	2	**5**	1	3	1
HI	**86**	26	33	27	**22**	11	7	5	**7**	1	3	3	**5**	1	2	1
DC	**3**	5	-	-	**-**	-	-	-	**-**	-	-	-	**-**	-	-	-

Appendix: The IMPLAN Model

- IMPLAN, short for “Impact Analysis for Planning,” is a widely used commercially available model for input/output analysis. Minnesota IMPLAN Group, Inc., is responsible for the production of the IMPLAN data, model, and software. Using classic input/output analysis in combination with region-specific social accounting matrices and multiplier models, IMPLAN provides a highly accurate and adaptable model for its users. The IMPLAN database contains country, state, zip code, and federal economic statistics, which are specialized by region. IMPLAN accounts closely follow the accounting conventions used in the “Input-Output Study of the U.S. Economy” by the BEA and the rectangular format recommended by the United Nations. The IMPLAN system was designed to serve three functions:
    - Data retrieval,
    - Data reduction, model development, and
    - Impact analysis
- Comprehensive and detailed data coverage of the entire United States by geography, and the ability to incorporate user-supplied data at each stage of the model-building process, provides a high degree of flexibility both in terms of geographic coverage and model formulation. There are two components to the IMPLAN system, the software and databases. The databases provide all information to create regional IMPLAN models. The software performs the calculations and provides an interface for the user to make final-demand changes.
- The IMPLAN system consists of two major parts:
    - A national-level technology matrix and
    - Estimates of sectoral activity for final demand, final payments, industry output, and employment for each detailed geography in the United States along with the aggregate region.

Appendix: The IMPLAN Model

- Input-output accounting describes commodity flows from producers to intermediate and final consumers. The total industry purchases of commodities, services, employment compensation, value added, and imports are equal to the value of the commodities produced.
- Purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakages from the region (imports and value added) stop the cycle.
- These indirect and induced effects (the effects of household spending) can be mathematically derived. The derivation is called the Leontief inverse. The resulting sets of multipliers describe the change of output for each and every regional industry caused by a one dollar change in final demand for any given industry.
- Creating regional input-output models requires a tremendous amount of data. The costs of surveying industries within each region to derive a list of commodity purchases production functions) are prohibitive. IMPLAN was developed as a cost-effective means to develop regional input-output models.
- IMPLAN easily allows the user to do the following:
    - Develop his/her own multiplier tables;
    - Develop a complete set of SAM (Social Accounting Matrix) accounts;
    - Change any component of the system, production functions, trade flows, or database;
    - Generate type I, II, or any true SAM multiplier internalizing household, government, and/or investment activities
    - Create custom impact analysis by entering final-demand changes;
    - Obtain any report in the system to examine the model's assumptions and calculations.
- There are two components to the IMPLAN system, the software and databases. The databases provide all information to create regional IMPLAN models. The software performs the calculations and provides an interface for the user to make final-demand changes.

Appendix: The IMPLAN Model

- **IMPLAN Software**
- Minnesota IMPLAN Group developed the current version of IMPLAN Professional® version 3.0 in 2009. It is a Windows-based software package that performs the calculations necessary to create the predictive model. The software reads the database, creates the complete set of social accounting matrices (SAM), the I/O accounts, and integrates all user-defined inputs to produce an alternative scenario.
- The IMPLAN Input/Output System derives the predictive multipliers. The software also enables the user to make changes to the data, the trade flows, or technology. It also enables the user to make final-demand changes, which results in the impact assessment.
- Features of IMPLAN Professional® include: Windows file and printer management, Economic database editor; Complete Social Accounting Matrix structure, A choice of trade-flow assumptions: Supply-Demand Pooling; Regional Purchase Coefficients; Location, quotients, Production function editor, i.e., the tools and opportunity necessary to modify the “absorption”, and “byproducts” matrices, Libraries for production functions and impact analysis expenditures, Flexible model aggregation tools, Report generator; many preset reports for all stages of model building and analysis, Export feature to many of the major PC file formats, Flexible assumptions for induced effects;
- Type SAM – true SAM multipliers which allow internalizing any number of institutions;
  - Type II - Based on PCE and SAM based local income relationship;
  - Type II - Based on user-specified disposable income rate;
  - Type III (CPMM) - Traditional Forest Service employment based multipliers;
- Menu structure for easy impact analysis;
- Event-based impact databases;
- Built-in and editable transaction margins;
- Built-in and editable deflators;
- Technical support by MIG, Inc.;
- Data in Access Database format.

Appendix: The IMPLAN Model

- Database
- Each database has information for these components for all 440 industrial sectors in the IMPLAN model. This 440-sector scheme was revised in 2007 and was originally the basis for the Bureau of Economic Analysis's Benchmark Input-Output Study. This scheme is nearly 6 digit NAICS for manufacturing, and more aggregate for service sectors. By necessity IMPLAN's sectoring is very similar. However, in some cases, 6 digit NAICS code data has been aggregated for certain IMPLAN sectors. A full NAICS to IMPLAN mapping document can be downloaded from www.implan.com.
- Employment is total wage and salary and self-employed jobs in a region. In the 1985 database, employment was measured as full-time equivalent jobs. This meant that total employment in a region would generally be below most published estimates because these are generally full-time and parttime. In the 1990 and subsequent databases, employment includes both full-time and part-time workers. Employment in the 1990 and subsequent databases are measured in total jobs.
- There are four sub-components for value added:

  1) Employee Compensation;
  2) Proprietary Income;
  3) Other Property Type Income;
  4) Indirect Business Taxes;

- Employee compensation is wage and salary payments as well as benefits, including health and life insurance, retirement payments, and any other non-cash compensation. This provides a measure of income to workers who are paid by employers.
- Proprietary income consists of payments received by self-employed individuals as income. This would be recorded on Federal Tax Form 1040C. This includes income received by private business owners, doctors, lawyers, and so forth. Any income a person receives for payment of self-employed work is counted here.
- Other property-type income consists of payments from rents royalties and dividends. This includes payments to individuals in the form of rents received on property, royalties from contract, and dividends paid by corporations. This also includes corporate profits earned by corporations.

Appendix: The IMPLAN Model

- Indirect business taxes consist primarily of excise and sales taxes paid by individuals to businesses. These taxes are collected during the normal operation of these businesses but do not include taxes on profit or income. Goods and services purchased for their ultimate use by an end user are called final demands. For a region, this would include exports as that is a final use for that product. In an input-output framework, final demands are allocated to producing industries with margins allocated to the service sectors (transportation, wholesale and retail trade, insurance) associated with providing that good to the final user.
- Thus, final demands are in producer prices. There are 13 subcomponents for final demands:

1) Personal Consumption Expenditures (PCE)—nine income levels;
2) Federal Government Military Purchases;
3) Federal Government Nonmilitary Purchases;
4) Federal Government Capital Formation Purchases;
5) State and Local Government Non-Education Purchases;
6) State and Local Government Education Purchases;
7) State and Local Government Capital Formation Purchases;
8) Inventory Purchases;
9) Capital Formation;
10) Foreign Exports;
11) State and Local Government Sales;
12) Federal Government Sales;
13) Inventory Sales.

- All final demands in the original data are on a commodity basis. The distinction between industries and commodities is as follows from the 1972 I-O Definitions and Conventions Manual:
  - An input-output industry is a grouping of establishments, as classified by Standard Industrial Classification (SIC) ;
  - An input-output commodity consists of the characteristic products of the corresponding I-O industry wherever made. There are several industries that have no commodities. This is a result of departures from the strict SIC of industries. Also, some commodities have no associated industry. An example of this is noncomparable imports.
- PCE consists of payments by individuals/households to industries for goods and services used for personal consumption. Individuals tend to buy little directly from industries other than retail trade. In an input-output table, though, purchases made by individuals for final consumption are shown as payments made directly to the industry producing the good. PCE is the largest component of final demand.

Appendix: The IMPLAN Model

- Federal government purchases are divided between military and nonmilitary uses and capital formation. Federal military purchases are those made to support the national defense. Goods range from food for troops to missile launchers. Nonmilitary purchases are made to supply all other government functions. Payments made to other governmental units are transfers and are not included in federal government purchases.
- State and local government purchases are divided between public education and non-education and capital formation. Public education purchases are for elementary, high school, and higher education. Non-education purchases are for all other government activities. These include state government operations, operations including police protection and sanitation. Private-sector education purchases are not counted here. Private education purchases show up in IMPLAN sectors 495 and 496.
- Inventory purchases are made when industries do not sell all output created in one year. This is generally the case. Each year, a portion of output goes to inventory. Inventory sales occur when industries sell more than they produce and need to deplete inventory. Inventory purchases and sales generally involve goods-producing industries (e.g., agriculture, mining, and manufacturing).
- Capital formation is private expenditures made to obtain capital equipment. The dollar values in the IMPLAN database are expenditures made to an industrial sector producing the capital equipment. The values are not expenditures by the industrial sector.
- Foreign exports are demands made to industries for goods for export beyond national borders. These represent goods and services demanded by foreign parties. Domestic exports are calculated during the IMPLAN model creation and are not part of the database.
- The national transactions matrix is based on the most current BEA National Benchmark Input-Output Model. It is re-sectored to IMPLAN industrial sectoring. We use our IMPLAN data for the current year to update the most recent National Benchmark study.