The Effects of AB 1493 on U.S. Employment in the Automotive Manufacturing Industry

Prepared by Harbour Consulting

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Qualifications of Harbour Consulting

Harbour Consulting is a manufacturing and management consulting firm focused on improving the overall competitiveness of manufacturing companies. The company has worked closely with many manufacturers to help them compete successfully in the domestic and global marketplace. Harbour Consulting assists in the implementation of quality, productivity and overall cost improvement initiatives while introducing companies to world-class manufacturing techniques. Harbour Consulting continues to study and service manufacturing organizations throughout North America, Europe and Asia.

In addition to its consulting services, Harbour Consulting publishes ***The Harbour Report***, the most comprehensive guide to automotive manufacturing in North America. The only source of its kind, ***The Harbour Report*** provides an insider's look at many of the factors shaping the auto industry today. ***The Harbour Report*** contains performance data for more than 120 Assembly, Stamping and Powertrain plants, including plant-by-plant and company-by-company productivity rankings, as well as detailed tables and trend charts, and a separate section covering the strengths and weaknesses of each company.

Ron Harbour, President of Harbour Consulting, has been a key member of the Harbour team since 1983. As the primary author of the Harbour Report, Ron has an intimate knowledge of automotive manufacturing plant performance and has personally toured most of the OEM factories in North America, Europe, and East Asia. Ron also authored a monthly column in *Automotive Industries* magazine for several years. Over the years, Ron has successfully led a wide variety of assignments in the automotive industry. Ron

has directed projects for nearly every major automotive manufacturer worldwide, including DaimlerChrysler, Ford, General Motors, Honda, Toyota, Nissan, Hyundai, Mitsubishi, KIA, Samsung, Isuzu, BMW, Land Rover and Saab. His work with automotive clients has included factory operation improvements, new product development, investment and product cost reductions, product teardowns, strategic planning, competitive analysis, and plant assessments. He also has provided key input in the development of new vehicle programs, common processes, plant layout, long-term manufacturing and labor strategies, and supplier improvement.

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Overview

The California Air Resources Board (CARB) has approved a regulation (the AB 1493 rule) that regulates the greenhouse gas emissions from vehicles sold in California. Several other states (New York, Massachusetts, Maine, Vermont, Connecticut, New Jersey and Rhode Island) also intend to adopt the regulation.

An analysis by Sierra Research Inc. (Sierra) indicates that the AB 1493 regulation would have a disproportionate impact on the ability of some OEMs to cost-effectively produce vehicles because of the different product mixes that the OEMs sell. This would force specific OEMs to severely limit vehicle sales in states that adopt AB 1493, as it would be cost-prohibitive to equip their vehicles with the technology required to meet the new standards.

Applying these conclusions to 2003 U.S. vehicle sales data for the applicable states, Harbour calculated the vehicle production losses in North American vehicle assembly plants. Production losses also were calculated for OEM-produced engines, transmissions, and body stampings specific to vehicle applications.

Harbour used OEM-provided staffing data to determine the relationship between production loss and plant workforce adjustments. From this relationship, Harbour calculated the loss of OEM plant jobs based on the assumed production losses.

Using U.S. Bureau of Labor Statistics (BLS) data, Harbour calculated the number of indirect jobs (from industries supporting automotive manufacturing: parts suppliers, raw

materials, equipment, etc.) that would be lost based on the assumed production losses. Similarly, Harbour also calculated the number of distribution jobs (freight, dealerships) that would be lost.

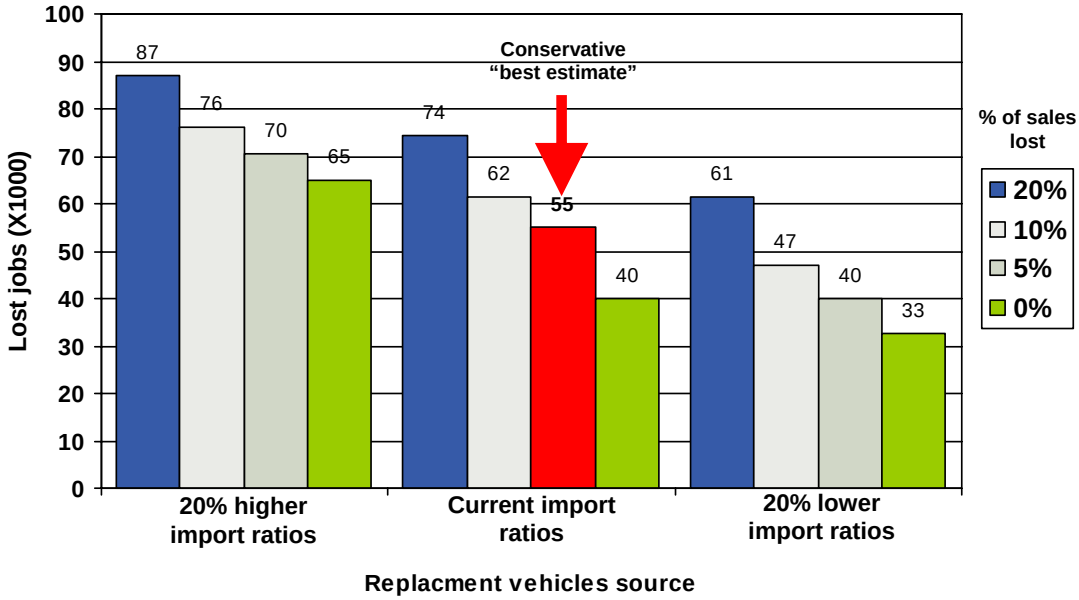
Harbour then adjusted this "gross" loss of jobs for the new jobs that would be created by vehicles produced to displace models no longer on the market. The methodology utilized to calculate the number of jobs created by the replacement vehicles was equivalent to the methodology used to calculate to gross loss of jobs. Several different scenarios were analyzed (based on lost sales and import ratios) to calculate the potential range of net jobs lost. The results are summarized in the following tables.

TABLE 1 – Gross U.S. Workforce Loss by OEM

COMPANY[1]	U.S. Volume Loss	Total Volume Loss	OEM Workforce Loss	Indirect Workforce Loss	Distribution Workforce Loss	Total U.S. Workforce Loss
GM	-230,461	-383,763	-9,740	-36,839	-15,351	-61,929
Ford	-228,825	-338,325	-9,434	-37,869	-13,533	-60,836
DCX	-79,558	-198,577	-1,580	-12,888	-7,943	-22,411
Nissan	-51,445	-112,073	-1,351	-5,599	-4,483	-11,433
Mitsubishi	-44,155	-46,908	-2,551	-5,158	-1,876	-9,586
SIA	-30,279	-63,623	-565	-2,948	-2,545	-6,057
Auto Alliance	-13,548	-13,548	-337	-2,242	-542	-3,121
CAMI	0	-10,702	0	0	-428	-428
Honda	0	0	0	0	0	0
Toyota	0	0	0	0	0	0
Hyundai	0	0	0	0	0	0
	-678,271	**-1,167,519**	**-25,558**	**-103,543**	**-46,701**	**-175,802**

[1] GM includes Buick, Cadillac, Chevrolet, GMC, Oldsmobile, Pontiac, Saturn, Saab, and Suzuki (excluding NUMMI); Subaru is listed separately
Ford includes Ford, Lincoln, Jaguar, Aston Martin, Volvo, and Mazda (excluding Auto-Alliance)
DCX includes Chrysler, Dodge, Jeep, and Mercedes; Mitsubishi is listed separately

TABLE 2 – Net Workforce Loss Scenarios



Assumptions: Sierra Research Conclusions

Sierra Research conducted analysis on the costs that the OEMs would face in order to comply with the AB 1493 standards. The following section summarizes the conclusions of this analysis, as it relates to Harbour's research.

AB 1493 mandates increasing fuel-efficiency standards, to be phased in between 2009 and 2016, by vehicle segment (Passenger Cars / LDT1 and LDT2 / MDPV)[2]. The minimums apply to OEMs' fleet average fuel efficiency in each segment. The AB 1493 fuel economy minimums are very aggressive compared to the existing federal CAFE regulations. Currently, the CAFE minimum for Passenger Cars is fixed at 27.5 mpg, and the minimum for the LDT1/LDT2 segment is 21.0 mpg (MDPVs are not regulated). It should be noted that how the segments are grouped also has a significant impact on OEMs ability to meet the standards (e.g. grouping less fuel-efficient LDT1s with Passenger Cars effectively increases the fuel-economy standards for that group).

TABLE 3 – AB 1493 Fuel Economy Standards

Year	--Passenger Cars/LDT1--	--LDT2/MDPV--
2009	27.6 mpg	20.3 mpg
2010	29.7 mpg	21.2 mpg
2011	33.5 mpg	22.9 mpg
2012	38.4 mpg	24.7 mpg
2013	39.4 mpg	25.1 mpg
2014	40.3 mpg	25.5 mpg
2015	42.0 mpg	26.2 mpg
2016	**43.7 mpg**	**26.8 mpg**

[2] The AB 1493 rule officially regulates greenhouse gas emissions. However, this effectively translates into increasing fuel-economy standards.

The fact that the fuel-efficiency minimums apply to the OEMs' fleet-average (for a specific segment grouping) is significant because of the different product mixes sold by the OEMs. The "affected" OEMs (GM, DCX, Ford and Nissan) sell a greater proportion of larger vehicle models (particularly within the Passenger Car / LDT1 segment) than the "unaffected" OEMs (Honda, Toyota, and Hyundai). Since larger vehicles inherently have lower fuel-efficiency than smaller vehicles, the unaffected OEMs are much closer to compliance with the proposed standards. Thus, product mix alone will cause certain OEMs to be disproportionately impacted by the AB 1493 standards.

OEMs would need to implement new technology in their vehicles, such as strong hybrid-engine systems, to comply with the AB 1493 standards. The cost-per-vehicle of implementing this new technology would be substantially higher for the affected OEMs, as they are currently much further from compliance (due to model mix). The higher cost-per-vehicle for an affected OEM would raise that OEM's vehicle prices to a level that would not be competitive in the marketplace. For purposes of this analysis, it has been assumed that the relevant affected OEMs (and all of their subsidiaries) would be forced to curtail their product offerings in states that adopt AB 1493: each of the relevant affected OEMs would reduce sales approximately 75% in the Passenger Car / LDT1 segment[3], and approximately 15% in the LDT2 segment (these lost sales would be comprised of the OEMs least fuel-efficient vehicle models within the segment). This is more conservative than Sierra's conclusion that OEMs would reduce sales by 75% in Passenger Cars, 100% in LDT1's, and 15% in LDT2's. Based on OEM input, Harbour's

[3] One notable exception is for Nissan, who was assumed to reduce sales 59% (instead of 75%) in the PC/LDT1 segment. This was due to the 2.5 liter Altima, which had such high sales volume in California, it would have represented over 90% if included in the lost sales.

analysis assumed that lost vehicle sales translate into lost production at the OEM plants producing those vehicles.

Assumptions: State of the Industry

The following analysis was conducted by Harbour to estimate the effects that the AB 1493 regulation would have on the workforce in the U.S. automobile manufacturing industries, and its supporting industries. The calculated effects represent a snapshot in time, occurring after the AB 1493 standards have been fully imposed and the industry has rebalanced itself to meet the new demands of the market.

For the purposes of our analysis, it was necessary to make a few assumptions regarding the future state (year 2016) of the industry:

1) Analysis of OEM plant jobs lost assumes that the future state of the industry, with respect to the number of OEM plants[4], and their production volumes across market segments, will be comparable to current state
2) Analysis of indirect jobs lost assumes that the future state of the industry, with respect to the number of employees required to support the production of a given number of vehicles (i.e. U.S. Bureau of Labor Statistics, Employee Requirements data), will be comparable to the current state
3) Analysis of indirect jobs lost assumes that the future state of the industry, with respect to the percentage of domestic content contained in each OEMs U.S.-produced vehicles (NHTSA American Automobile Labeling Act data), will be comparable to the current state

[4] Includes assembly, engine, transmission, and stamping plants

It is Harbour's opinion that these assumptions are reasonable. In general, it is more conservative to assume that a current state will be maintained than to assume that some change will occur. Furthermore, data specifically related to these assumptions were analyzed, and the results substantiate the assumptions. Regarding assumption 1, current data does not suggest any dramatic changes in the next 10 year period. Regarding assumption 2, while the workforce of motor vehicle parts manufacturing (the largest component of the indirect jobs that support the automotive manufacturing industry) has been in decline the past several years, regression analysis of Bureau of Labor statistics employment data shows that these declines have essentially bottomed out, implying that future losses in this industry would be questionable. The remainder of the supporting workforce (other than motor vehicle parts manufacturing) is spread very thin across many industries, so even if trends exist in some of these industries, the effects on the analysis would be negligible. Regarding assumption 3, there were no clear trends (at the OEM level) in the American Automobile Labeling Act data of recent years.

Harbour Analysis – OEM Workforce Losses

Harbour gathered 2003 vehicle sales data for vehicles sold by GM, DCX, Ford and Nissan in states expected to adopt the CARB regulation. Based on the assumption that the affected OEMs would reduce Passenger Car / LDT1 sales by 75%, and LDT2 sales by 15% in states adopting AB 1493, Harbour translated these lost sales into production losses by vehicle model in the appropriate North American assembly plants[5] (these lost sales figures are shown in Table 1, Appendix A)

Harbour calculated lost OEM engine and transmission production based on the lost vehicle volume. Production losses were attributed to the appropriate plants, based on the specific engines and transmissions contained in the lost vehicles. For example, if there were a volume loss of 3,000 Jeep Liberty's, and 50% of those lost vehicles contained 2.4L I4 engines, the production of the 2.4L engine would go down by 1,500. This methodology is comparable for both Engine and Transmission data.

Domestic OEM stamping facilities are often centralized, with various body stampings going to many different vehicle assembly plants. There is no available data to associate stamped parts to specific vehicles. So instead of vehicle applications, we utilize the percentage change in volume at the company level, and apply that to all of the company's stamping facilities. For example, if after all vehicle volume adjustments GM has lost 10% of its Vehicle volume, the model assumes that there will be a 10% loss in volume of stamped parts at all GM stamping facilities.

[5] In cases where vehicle models were produced in more than one plant, Harbour relied on its knowledge of the industry to extrapolate how losses would be allocated to appropriate plants. Vehicles imported from overseas would not be considered in the production losses, as they are not produced in North American plants.

When a manufacturing plant experiences production volume losses, measures are taken to minimize the effect on profitability. When volume loss is considerable or for a sustained duration, a plant will generally take steps to maximize efficiencies for the reduced production requirements. Slowing down an assembly line enables fewer workers to produce a reduced output (e.g. assemble fewer vehicles) over the same time period. This is referred to as "line rebalancing."

Similar concepts can be applied to optimize efficiency throughout other manufacturing processes. For example, stamping facility press operators could be rotated across presses, thus allowing some presses to remain idle for periods of time. Based on concepts such as these, plant managers have staffing plans to determine the manpower required for various output levels at their plant.

Harbour analyzed OEM-provided staffing data to determine the relationship between volume loss and plant workforce adjustments. The percent change in workforce is equal to the "employment ratio" multiplied by the percent volume change. The "employment ratios" are defined by division type (assembly, engine, transmission, stamping) and labor classification (hourly, salary). For example, say the Ford Atlanta plant experiences a 10% loss in volume. The percent change in hourly workforce is calculated by multiplying the change in volume (-10%) by the ratio (80%), equaling -8.0%. Thus, if there were 1000 hourly workers, 80 would be eliminated[6].

[6] The eliminated workers may be laid off, still receiving some portion of their pay, depending on the current labor contract. This would create a considerable cost burden for the affected OEMs, as they are still liable for the cost of the laid off workforce.

Table 4 - Employment Ratios

	Assembly	Engine	Transmission	Stamping
Hourly	0.80	0.90	0.90	0.90
Salary	0.45	0.40	0.40	0.50

Harbour developed a computer model which calculates the OEM plant jobs that would be removed by rebalancing for each plant (based on the defined employment ratios for the assumed production losses). However, rebalancing has associated costs (planning, moving equipment, etc.), so it is not always the appropriate solution.

If a volume loss is small or expected to be short in duration, a plant would simply reduce scheduled overtime (the computer model was designed to adjust for this). The next step would be to shut down production for a short period of time to help the plant avoid unnecessary operating costs and inventory surplus. If a volume loss is large, a plant may remove an entire shift (most plants generally run 2 or 3 shifts per day) instead of rebalancing the line in order to meet the reduced volume requirements. Below certain production levels, plants cannot operate profitably and would be forced to close.

Harbour analyzed the effects of volume loss and line rebalancing on a plant-by-plant basis, and determined where rebalancing would not be an optimal strategy. It was assumed that plants with production losses of less than 5% would temporarily halt production instead of rebalancing, and that plants with substantial volume loss (losses resulting in less than 60% capacity utilization for a 2-shift operation) would drop a shift. In rare cases, plants that could not operate profitably would be closed. In metal stamping, Harbour concluded that Ford and GM each would close one centralized plant rather than rebalancing across all of their plants.

Table 5 – OEM Workforce Loss by Company

COMPANY	U.S. Volume Loss	Total Volume Loss	U.S. Workforce Loss			U.S. Total Workforce Loss
			Line Rebalancing	Plant closings / dropped shifts	Non-Plant jobs	
GM	-230,461	-383,763	-4,668	-2,906	-2,166	-9,740
Ford	-228,825	-338,325	-3,865	-3,418	-2,151	-9,434
DCX	-79,558	-198,577	-1,116	251	-716	-1,580
Nissan	-51,445	-112,073	-368	-731	-252	-1,351
Mitsubishi	-44,155	-46,908	-525	-1,793	-233	-2,551
SIA	-30,279	-63,623	-417	0	-148	-565
Auto Alliance	-13,548	-13,548	-271	0	-66	-337
CAMI	0	-10,702	0	0	0	0
Grand Total	**-678,271**	**-1,167,519**	**-11,230**	**-8,597**	**-5,732**	**-25,558**

OEMs would also be expected to reduce non-plant jobs (engineering, sales / purchasing, administrative, etc.). The following table shows estimated OEM employment reductions in non-plant jobs. Reductions are based on the volume-based multipliers shown in the second column.

Table 6 – OEM U.S. Non-plant Workforce Loss detail

Staff Functions	Jobs per 100 vehicles	Auto Alliance	NUMMI	SIA	Mitsubishi	DCX	Nissan	Ford	GM	**Total**
Total Volume Loss		13,548	0	30,279	47,518	76,195	51,445	228,825	230,461	**678,271**
Product Design*	0.45	0	0	0	0	-343	0	-1,030	-1,037	**-2,410**
Manufacturing Staff	0.12	-16	0	-36	-57	-91	-62	-275	-277	**-814**
Purchasing / Sales	0.22	-30	0	-67	-105	-168	-113	-503	-507	**-1,492**
Other (HR, Finance, etc.)	0.15	-20	0	-45	-71	-114	-77	-343	-346	**-1,017**
Total		**-66**	**0**	**-148**	**-233**	**-716**	**-252**	**-2,151**	**-2,166**	**-5,733**

*U.S. Product Design jobs are assumed to be negligible for the non-Big 3 OEMS, as these jobs are typically located in Japan

Harbour Analysis – Indirect Workforce Losses

U.S. Bureau of Labor 2002 Employment Requirements Tables quantifies the number of employees across all industries that support the motor vehicle manufacturing industry. Table 2, Appendix A shows the number of employees by industry (NAICS code) that support $1 million of sales and converts this into employees per 100 vehicles based on the average number of vehicles per $1 million sales.

Average vehicle (factory) price
*$21,785 = 8% dealer margin * ($24,179 average consumer price[7] - $500 freight charge)*
Vehicles per $1,000,000 sales output
41.36 = $1,000,000 / $21,785 average price

All industries total 15.3 employees per 100 vehicles (less Motor Vehicle Manufacturing, which was measured with the OEM employment analysis). Table 7 shows the sales weighted percentages of domestic content per vehicle for each OEM. Company specific indirect jobs per 100 vehicles can then be calculated.

*Company Indirect Jobs per 100 Vehicles = (15.3 Industry Indirect Jobs per 100 Vehicles / 78.6% Total Industry domestic content) * Company Domestic content*

[7] Source: Edmunds

Table 7 – Sales-weighted domestic content company averages[8]

OEM	Domestic content*	Indirect Jobs per 100 vehicles
Chrysler	83.2%	16.2
Ford	85.0%	16.5
GM	82.1%	16.0
Honda	65.6%	12.8
Mazda	77.3%	15.1
Mitsubishi	60.0%	11.7
Nissan	55.9%	10.9
Subaru	50.0%	9.7
Toyota	59.2%	11.5
Total	**78.6%**	**15.3**

*Domestic content is based on overall company averages for domestically produced vehicles only (imports excluded)

The total loss of U.S. indirect jobs can be found by multiplying the U.S. volume loss by company and the OEM-specific indirect jobs per vehicle ratio. Adjustment is needed for vehicle distribution (freight, dealerships), which is not included in the BLS figures. Calculations using NADA data and NATLD data average 4 employees per 100 vehicles for distribution. (workforce losses are shown in Table 8)

6,100 (2003 Transportation Employees[9])
*677,940 = 1,129,900 * 60% (2003 Auto Dealership Employees[10], assuming 60% of employees support new vehicle sales)*
16,967,442 (2003 U.S. Vehicle Sales[11])

(6,100 + 677,940) / (16,967,442 / 100) = 4 distribution jobs per 100 vehicles

[8] Source: NHTSA American Automobile Labeling Act (AALA) data, Automotive News Market Data Book; provided by Automotive Trade Policy Council (ATPC); It should be noted that the AALA data considers both U.S. and Canadian content as domestic, however, assuming that the ratio of U.S. to Canadian content is consistent across OEMs, this would not have a significant effect on the calculations
[9] Source: National Automobile Transporters Labor Division (NATLD)
[10] Source: National Auto Dealers Association (NADA)
[11] Source: Ward's Automotive

TABLE 8 – Gross U.S. Workforce Loss by OEM

COMPANY[12]	U.S. Volume Loss	Total Volume Loss	OEM Workforce Loss	Indirect Workforce Loss	Distribution Workforce Loss	Total U.S. Workforce Loss
GM	-230,461	-383,763	-9,740	-36,839	-15,351	-61,929
Ford	-228,825	-338,325	-9,434	-37,869	-13,533	-60,836
DCX	-79,558	-198,577	-1,580	-12,888	-7,943	-22,411
Nissan	-51,445	-112,073	-1,351	-5,599	-4,483	-11,433
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SIA	-30,279	-63,623	-565	-2,948	-2,545	-6,057
Auto Alliance	-13,548	-13,548	-337	-2,242	-542	-3,121
CAMI	0	-10,702	0	0	-428	-428
Honda	0	0	0	0	0	0
Toyota	0	0	0	0	0	0
Hyundai	0	0	0	0	0	0
	-678,271	**-1,167,519**	**-25,558**	**-103,543**	**-46,701**	**-175,802**

[12] GM includes Buick, Cadillac, Chevrolet, GMC, Oldsmobile, Pontiac, Saturn, Saab, and Suzuki (excluding NUMMI); Subaru is listed separately
Ford includes Ford, Lincoln, Jaguar, Aston Martin, Volvo, and Mazda (excluding Auto-Alliance)
DCX includes Chrysler, Dodge, Jeep, and Mercedes; Mitsubishi is listed separately

Harbour Analysis – Sources of Replacement Vehicles

If GM, DCX, Ford and Nissan cannot sell vehicles in regulated states at current levels and experience the sales losses noted in the Sierra Research study, this would represent a considerable number of lost sales. However, there is still demand for vehicles, so net losses are calculated after the unaffected OEMs[13] have made up most or all of this volume[14].

The first issue is to determine what volume will be made up by other OEMs. Consumers will be faced with substantially fewer vehicle models to choose from. Also, there will be price increases to cover the cost of redesigning vehicles to comply with the AB 1493 standards, and the reduction in supply of available vehicles. These factors would contribute to a loss of total vehicle sales, as prospective buyers may elect to keep their current vehicles longer or buying a used vehicle as opposed to a new one. Instead of estimating a specific sales loss figure, net losses are analyzed under four different scenarios of sales losses: 0% (all volume made up), 5%, 10%, and 20% sales losses.

Harbour assumes that unaffected OEMs will make up the lost sales volume proportionally to their 2003 market shares. For example, Honda accounted for 35% of the total 2003 U.S. passenger vehicle sales among the unaffected OEMs. Thus, it is assumed Honda will make up 35% of the replacement vehicle production.

[13] "Unaffected OEMs" refers to Honda, Toyota, and Hyundai. It is assumed Volkswagen would not be able to sell replacement vehicles

[14] All volume would not be made up if overall vehicle sales were lost

Harbour research indicates unaffected OEMs do not have available capacity to build all of these vehicles, so some new capacity would need to be built. An emerging market such as China potentially could provide the lowest total cost; however, a substantial amount of planning would be required to develop the requisite manufacturing infrastructure (supplier network, logistics, etc.). Also, there are political considerations, as domestic vehicle production is viewed more favorably by the U.S. public. There are no estimates for the percentage of vehicles that each company would import; instead net losses are analyzed for three different scenarios: using each OEM's current ratio of imports to domestically produced vehicles (see Table 9), and then using the current ratios plus and minus 20%.

TABLE 9 – Import ratios of unaffected OEMs[15]

	U.S. Sales	U.S. Production	Import ratio	Adjusted Import ratio[16]
Honda	1,349,847	845,313	37%	37%
Toyota	1,866,314	727,369	61%	55%
Hyundai	637,692	-	100%	60%

First, we calculated the number of new OEM plant jobs in assembly, engine, transmission and stamping based on the new capacity required to build the replacement vehicles. Plant flexibility is one significant advantage for the unaffected OEMs. Among Japanese OEMs, products and manufacturing processes follow a standard design that enables their plants to produce multiple models on the same production line with minimal investment. Traditional Big 3 plants tend to be platform specific (production is limited to models on the same platform); various vehicle models and their assembly processes vary considerably. Therefore, such plants require a relatively large (sometimes cost-prohibitive) investment for redesign and retooling to produce a different product. This

[15] Source: Automotive News 2004 Market Data book (2003 calendar year data)
[16] Adjusted import ratios account for new facilities currently under construction (Hyundai plant in Alabama, Toyota plant in Texas)

flexibility advantage enables Japanese OEMs to produce more vehicles in fewer plants. For example, a traditional Big 3 OEM may have three plants that each produce one specific model. The Big 3 OEM would need to operate all three plants to produce all three models, even if each plant is running at 33% capacity. A Japanese OEM would generally have the capability to produce all three models at any one of their plants and could shut down the other two plants to save fixed costs and resources associated with the two excess plants. Therefore, the workforce created by replacement vehicles produced at Japanese OEM plants would be substantially less than the workforce lost due to production losses at Big 3 plants.

Second, we estimate the number of non-plant jobs that would be created based on the production of replacement vehicles (using the same methodology shown in Table 6). There is considerable disparity in the proportion of non-plant jobs between traditional Big 3 and Japanese OEMs in the U.S., particularly in product design. The majority of Big 3 non-plant jobs are located in the U.S. Japanese OEMs have some non-plant jobs in the U.S., but many tend to be overseas. Again, the workforce created by the replacement vehicle production would be substantially less than the workforce cut due to the original volume loss.

Finally, we calculate the number of indirect and distribution jobs that would be created based on production of replacement vehicles. The methodology is consistent with the calculation used to determine the loss of indirect and distribution workforce based on volume loss. The number of indirect jobs created is based on the replacement vehicles produced and the average domestic content percentages of the OEMs that produce them. Because domestically produced vehicles of foreign-owned OEMs generally

contain lower amounts of domestic content, the indirect workforce created by replacement vehicle production would be substantially less than the workforce cut due to the original volume loss. Distribution jobs are very straightforward; the jobs per 100 vehicles sold is equal across all companies, whether vehicles are imported or produced domestically. However, a volume loss caused by reduced consumer choice / increased prices reduces the number of distribution jobs accordingly.

The following table summarizes the workforce created by the production of replacement vehicles based on the different scenarios analyzed.

TABLE 10 – Net Workforce Loss scenarios

% of replacement vehicles imported		% of vehicle sales lost			
		20%	**10%**	**5%**	**0%**
20% higher import ratios	New U.S. Production	376,250	423,281	446,797	470,312
	New Plant Jobs	4,987	5,610	5,922	6,234
	New OEM Non-Plant Jobs	1,844	2,074	2,189	2,305
	New Indirect Jobs	44,529	50,095	52,878	55,661
	New Distribtion Jobs	37,361	42,031	44,366	46,701
	Net Change in U.S. Production	-302,021	-254,990	-231,474	-207,959
	Net Change in Jobs	-87,082	-75,992	-70,447	-64,902
current import ratios	New U.S. Production	470,312	529,101	558,496	587,890
	New Plant Jobs	6,234	7,013	7,403	7,792
	New OEM Non-Plant Jobs	2,305	2,593	2,737	2,881
	New Indirect Jobs	55,661	62,618	66,097	69,576
	New Distribtion Jobs	37,361	42,031	44,366	46,701
	Net Change in U.S. Production	-207,959	-149,170	-119,775	-90,381
	Net Change in Jobs	-74,242	-61,547	-55,200	-48,852
20% lower import ratios	New U.S. Production	564,375	634,921	670,195	705,468
	New Plant Jobs	7,481	8,416	8,883	9,351
	New OEM Non-Plant Jobs	2,765	3,111	3,284	3,457
	New Indirect Jobs	66,793	75,142	79,316	83,491
	New Distribtion Jobs	37,361	42,031	44,366	46,701
	Net Change in U.S. Production	-113,896	-43,350	-8,076	27,197
	Net Change in Jobs	-61,402	-47,102	-39,953	-32,803

*Hyundai did not produce vehicles in the U.S. as of 2003, this scenario estimates the domestic content of U.S. produced Hyundai vehicles at 50%

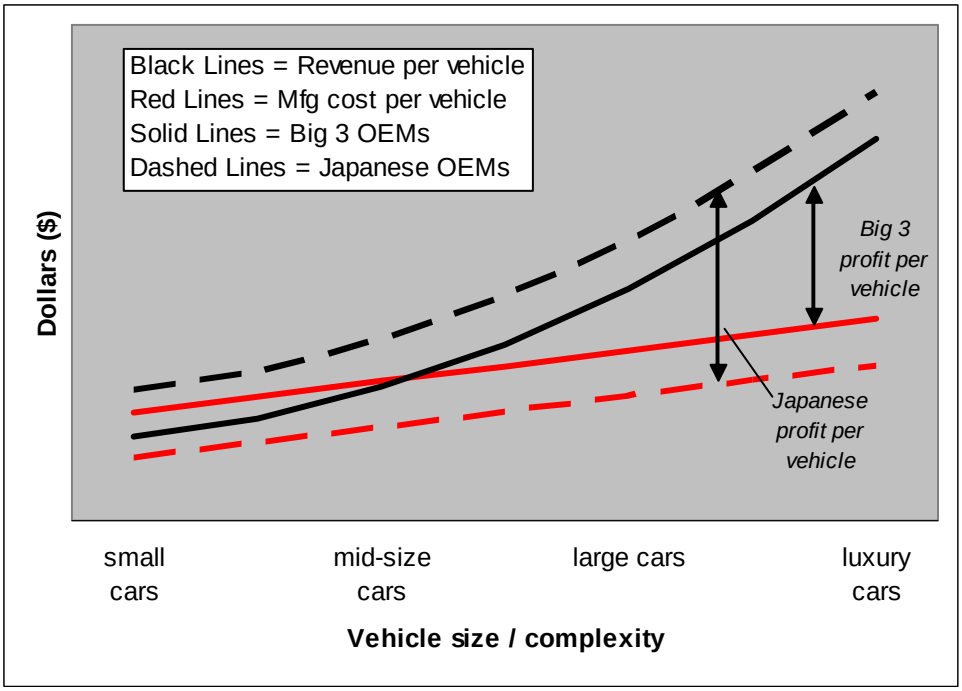
Harbour Analysis – Conclusion

The AB 1493 rule in California and other states will have dramatic effects on the North American automotive market. The regulations affect the manufacturers in disproportionate degrees and have both immediate and far reaching effects on domestic vehicle production and the employment it supports. According to a conservative estimate, there is a net loss of over 55,000 U.S. jobs. This estimate assumes that the OEMs producing the replacement vehicles will produce the majority of the vehicles domestically (proportional to their current domestic production). There are some important factors to consider: the costs of manufacturing vehicles in Canada or Mexico is significantly lower than in the U.S. (in Canada labor wages are somewhat lower than in the U.S. and health care costs are provided by the government, and in Mexico labor wages are much lower than in the U.S.); also, there is the increasing viability of emerging markets – by 2009, added capacity in China could provide more cost-effective imports than either Canada or Mexico. These factors could push the net loss of U.S. jobs closer to 90,000. Also, Toyota and Honda tend to keep their U.S. capacity a step behind the demand. Even if these OEMs build replacement vehicles in the U.S., there would be a period of several years before the new manufacturing jobs would be created. But regardless of these uncertainties, it is clear that the implementation of AB 1493 will lead to a significant loss in U.S. jobs.

Ultimately, reducing production volumes of larger cars and light-duty trucks in the U.S. market will have a dramatic impact on the overall profitability of the companies most in those markets. This has particular impact on the already fragile profit situation of domestic automakers. Domestic manufacturers generally have a higher cost base due

to legacy costs (retiree health and pensions), higher new vehicle capital investment, worker labor productivity, higher warranty cost, and numerous other factors. These issues make profit difficult on smaller or medium size cars (see Figure A). Limiting product mix to these segments of the market, in addition to the costs of new technology and liability costs of laid-off employees, will result in a very significant loss for domestic automakers and severely jeopardize their long-term viability. The previously calculated figures for lost U.S. jobs would pale in comparison to the losses that would occur if one (or more) of the Big 3 OEMs were faced with bankruptcy. And this scenario is not unrealistic; given the tenuous financial state that GM and Ford currently face, imposing AB 1493 could be the breaking point.

FIGURE A – OEM profit per vehicle



The implementation of this regulation poses several controversial questions: Can States indirectly impose fuel economy standards by establishing aggressive emissions regulations? Will aggressive standards accelerate the development of new or partially mature technologies by private industry? If the technology can meet the standard, will customers pay the increased cost or should they be expected to? If the law effectively eliminates the choice of a full range of vehicle sizes (larger cars), should consumers be forced to accept such limitations?

APPENDIX A

TABLE 1 – Lost Passenger Car / LDT1 / LDT2 Sales by Model in affected States (California, New York, Massachusetts, Maine, Vermont, Connecticut, New Jersey, and Rhode Island)[17]

Parent	Make	Model	Volume
DCX	CHRYSLER	300 M	3,123
DCX	CHRYSLER	CONCORDE	2,251
DCX	CHRYSLER	PT CRUISER	27,539
DCX	CHRYSLER	SEBRING	1,878
DCX	CHRYSLER	SEBRING 4-DR	2,116
DCX	CHRYSLER	SEBRING CONVERTIBLE	2,941
DCX	DODGE	DAKOTA PICKUP 4WD	351
DCX	DODGE	DURANGO 4WD	2,431
DCX	DODGE	INTREPID	6,569
DCX	DODGE	RAM 1500 PICKUP 2WD	40,093
DCX	DODGE	RAM 1500 PICKUP 4WD	11,551
DCX	DODGE	RAM VAN 2500 2WD	950
DCX	DODGE	STRATUS 2-DR	1,485
DCX	DODGE	STRATUS 4-DR	1,644
DCX	DODGE	VIPER CONVERTIBLE	360
DCX	JEEP	WRANGLER 4WD	15,068
DCX	MERCEDES	C240	14,343
DCX	MERCEDES	C32 AMG	658
DCX	MERCEDES	C320	5,181
DCX	MERCEDES	C320 WAGON	1,677
DCX	MERCEDES	CL500	1,380
DCX	MERCEDES	CL55 AMG	223
DCX	MERCEDES	CL600	287
DCX	MERCEDES	CLK320	2,034
DCX	MERCEDES	CLK320 (CABRIOLET)	2,481
DCX	MERCEDES	CLK430	2,070
DCX	MERCEDES	CLK430 (CABRIOLET)	1,965
DCX	MERCEDES	E320	16,306
DCX	MERCEDES	E320 (WAGON)	289
DCX	MERCEDES	E320 4MATIC	5,668
DCX	MERCEDES	E320 4MATIC (WAGON)	429
DCX	MERCEDES	E500	9,351
DCX	MERCEDES	S430	6,351
DCX	MERCEDES	S500	4,107

[17] Source: R.L. Polk Automotive Intelligence; provided by Sierra Research

Parent	Make	Model	Volume
DCX	MERCEDES	S55 AMG	590
DCX	MERCEDES	S600	393
DCX	MERCEDES	SL500	9,136
DCX	MERCEDES	SLK230 KOMPRESSOR	1,437
DCX	MERCEDES	SLK32 AMG	1,097
DCX	MERCEDES	SLK320	268
DCX	MERCEDES	G500	1,208
DCX	MITSUBISHI	DIAMANTE SEDAN	2,753
DCX	MITSUBISHI	ECLIPSE	6,406
DCX	MITSUBISHI	ECLIPSE GT	6,485
DCX	MITSUBISHI	ECLIPSE SPYDER	6,060
DCX	MITSUBISHI	GALANT	25,204
FORD	ASTON MARTIN	ASTON MARTIN VANQUISH	131
FORD	ASTON MARTIN	DB-7 VANTAGE COUPE	38
FORD	ASTON MARTIN	DB-7 VANTAGE VOLANTE	88
FORD	FORD	CROWN VICTORIA	25,002
FORD	FORD	E150 ECONOLINE 2WD	8,617
FORD	FORD	E250 ECONOLINE 2WD	1,284
FORD	FORD	EXPEDITION 4WD	19,923
FORD	FORD	F150 PICKUP 2WD 3.55 RAR	13,179
FORD	FORD	FOCUS 5-DR HATCHBACK	693
FORD	FORD	MUSTANG	27,484
FORD	FORD	RANGER PICKUP 2WD	27,871
FORD	FORD	TAURUS LX	52,817
FORD	FORD	TAURUS LX WAGON	3,250
FORD	FORD	TAURUS SE	13,421
FORD	FORD	TAURUS SE WAGON	484
FORD	FORD	THUNDERBIRD	3,483
FORD	JAGUAR	JAGUAR S-TYPE 3.0 LITRE	5,377
FORD	JAGUAR	JAGUAR S-TYPE 4.2 LITRE	2,915
FORD	JAGUAR	JAGUAR SUPER V8	46
FORD	JAGUAR	JAGUAR VANDEN PLAS	370
FORD	JAGUAR	JAGUAR XJ SPORT	226
FORD	JAGUAR	JAGUAR XJ8	1,498
FORD	JAGUAR	JAGUAR XJR	365
FORD	JAGUAR	JAGUAR XK8 CONVERTIBLE	697
FORD	JAGUAR	JAGUAR XKR CONVERTIBLE	265
FORD	JAGUAR	JAGUAR X-TYPE	11,195
FORD	LAND ROVER	DISCOVERY	8,912
FORD	LAND ROVER	RANGE ROVER	6,085
FORD	LINCOLN	GRAND MARQUIS	19,220
FORD	LINCOLN	LS	6,522
FORD	LINCOLN	NAVIGATOR 2WD	6,770
FORD	LINCOLN	NAVIGATOR 4WD	6,811
FORD	LINCOLN	SABLE GS	8,975
FORD	LINCOLN	SABLE GS WAGON	410

Parent	Make	Model	Volume
FORD	LINCOLN	SABLE LS	5,951
FORD	LINCOLN	SABLE LS WAGON	1,030
FORD	LINCOLN	TOWN CAR	17,832
FORD	MAZDA	B2300 2WD	1,855
FORD	MAZDA	B3000 2WD	856
FORD	MAZDA	MAZDA6 I	7,861
FORD	MAZDA	MAZDA6 S	5,687
FORD	MAZDA	MX-5 MIATA	3,016
FORD	MAZDA	SPEED PROTÉGÉ	760
FORD	VOLVO	C70 CONVERTIBLE	257
FORD	VOLVO	S40	3,566
FORD	VOLVO	S60	3,525
FORD	VOLVO	S60 AWD	1,092
FORD	VOLVO	S60 TURBO	3,526
FORD	VOLVO	S80/S80 EXECUTIVE	2,827
FORD	VOLVO	V40	975
FORD	VOLVO	V70	1,933
FORD	VOLVO	V70 TURBO	4,900
GM	BUICK	CENTURY	33,519
GM	BUICK	LESABRE CUSTOM	23,119
GM	BUICK	PARK AVENUE	4,071
GM	BUICK	PARK AVENUE ULTRA	562
GM	BUICK	REGAL GS	1,390
GM	BUICK	REGAL LS	8,206
GM	CADILLAC	CTS	16,824
GM	CADILLAC	DEVILLE	14,917
GM	CADILLAC	ESCALADE AWD	11,130
GM	CADILLAC	ESCALADE EXT AWD	2,926
GM	CADILLAC	SEVILLE	4,653
GM	CHEVROLET	AVALANCHE 1500 2WD	4,792
GM	CHEVROLET	CORVETTE	8,091
GM	CHEVROLET	IMPALA	46,401
GM	CHEVROLET	MALIBU	39,406
GM	CHEVROLET	MONTE CARLO	12,256
GM	CHEVROLET	S10 PICKUP 2WD	19,045
GM	CHEVROLET	TAHOE 1500 4WD LT	20,071
GM	CHEVROLET	TRACKER 4WD CONVERTIBLE	4,098
GM	CHEVROLET	TRACKER 4WD HARDTOP	1,886
GM	CHEVROLET	TRACKER CONVERTIBLE	1,067
GM	CHEVROLET	TRACKER HARDTOP	1,168
GM	GMC	C1500 YUKON XL 2WD	4,431
GM	GMC	K1500 SIERRA DENALI AWD	1,371
GM	GMC	K1500 YUKON DENALI AWD	5,515
GM	GMC	K1500 YUKON DENALI XL AWD	5,458
GM	GMC	SONOMA 2WD	5,190
GM	OLDSMOBILE	ALERO	8,964

Parent	Make	Model	Volume
GM	OLDSMOBILE	AURORA	411
GM	PONTIAC	BONNEVILLE	4,953
GM	PONTIAC	BONNEVILLE SC	705
GM	PONTIAC	GRAND AM	10,290
GM	PONTIAC	GRAND PRIX	11,493
GM	PONTIAC	GRAND PRIX SC	2,269
GM	SAAB	SAAB 9-3 CONVERTIBLE	3,328
GM	SAAB	SAAB 9-3 SPORT SEDAN	10,100
GM	SAAB	SAAB 9-5	4,009
GM	SAAB	SAAB 9-5 WAGON	1,911
GM	SATURN	L200	14,602
GM	SATURN	L300	4,390
GM	SATURN	LW200	1,207
GM	SATURN	LW300	1,085
GM	SUBARU	FORESTER AWD	24,882
GM	SUBARU	IMPREZA AWD	4,259
GM	SUBARU	IMPREZA WAGON AWD	4,203
GM	SUBARU	LEGACY/OUTBACK AWD	5,318
GM	SUBARU	LEGACY/OUTBACK WAGON AWD	24,961
GM	SUZUKI	GRAND VITARA	579
GM	SUZUKI	GRAND VITARA 4WD	1,026
GM	SUZUKI	VITARA 2-DOOR	42
GM	SUZUKI	VITARA 2-DOOR 4WD	46
GM	SUZUKI	VITARA 4-DOOR	483
GM	SUZUKI	VITARA 4-DOOR 4WD	307
NISSAN	INFINITI	FX45 AWD	3,054
NISSAN	INFINITI	G35	31,951
NISSAN	INFINITI	I35	7,184
NISSAN	INFINITI	M45	2,576
NISSAN	INFINITI	Q45	1,292
NISSAN	INFINITI	QX4 4WD	2,279
NISSAN	NISSAN	350Z	12,292
NISSAN	NISSAN	ALTIMA	12,022
NISSAN	NISSAN	FRONTIER 2WD	6,466
NISSAN	NISSAN	FRONTIER V6-2WD	6,990
NISSAN	NISSAN	FRONTIER V6-2WD SC	257
NISSAN	NISSAN	FRONTIER V6-4WD SC	1,525
NISSAN	NISSAN	MAXIMA	20,912
NISSAN	NISSAN	XTERRA V6-2WD SC	789
NISSAN	NISSAN	XTERRA V6-4WD SC	2,484

TABLE 2 – 2002 Employment Requirements data for NAICS code 3361 (motor vehicle manufacturing)[18]

NAICS code	Industry description	Employees per $1M sales output	Indirect Employees per 100 vehicles
111,112	Agricultural products	0.0165	0.04
1131-2, 114	Forestry, fishing, hunting, and trapping	0.0020	0.00
1133	Logging	0.0031	0.01
115	Support activities for agriculture and forestry	0.0018	0.00
211	Oil and gas extraction	0.0044	0.01
2121	Coal mining	0.0051	0.01
2122	Metal ore mining	0.0086	0.02
2123	Nonmetallic mineral mining and quarrying	0.0052	0.01
2131	Support activities for mining	0.0021	0.00
2211	Electric power generation, transmission, and distribution	0.0174	0.04
2212	Natural gas distribution	0.0045	0.01
2213	Water, sewage, and other systems	0.0006	0.00
562	Waste management and remediation services	0.0201	0.04
23	Construction	0.0415	0.09
3111	Animal food manufacturing	0.0007	0.00
3112	Grain and oilseed milling	0.0006	0.00
3113	Sugar and confectionery product manufacturing	0.0002	0.00
3114	Fruit and vegetable preserving and specialty food manufacturing	0.0005	0.00
3115	Dairy product manufacturing	0.0005	0.00
3116	Animal slaughtering and processing	0.0040	0.01
3117	Seafood product preparation and packaging	0.0003	0.00
3118	Bakeries and tortilla manufacturing	0.0020	0.00
3119	Other food manufacturing	0.0004	0.00
3121	Beverage manufacturing	0.0005	0.00
3122	Tobacco manufacturing	0.0000	0.00
3131	Fiber, yarn, and thread mills	0.0066	0.01
3132	Fabric mills	0.0224	0.05
3133	Textile and fabric finishing and fabric coating mills	0.0150	0.03
3141	Textile furnishings mills	0.0103	0.02
3149	Other textile product mills	0.0148	0.03
3151	Apparel knitting mills	0.0002	0.00
3152	Cut and sew apparel manufacturing	0.0017	0.00
3159	Apparel accessories and other apparel manufacturing	0.0006	0.00
3161	Leather and hide tanning and finishing	0.0092	0.02
3162	Footwear manufacturing	0.0001	0.00

[18] Source: U.S. Bureau of Labor Statistics

NAICS code	Industry description	Employees per $1M sales output	Indirect Employees per 100 vehicles
3169	Other leather and allied product manufacturing	0.0004	0.00
3211	Sawmills and wood preservation	0.0037	0.01
3212	Veneer, plywood, and engineered wood product manufacturing	0.0019	0.00
3219	Other wood product manufacturing	0.0097	0.02
3221	Pulp, paper, and paperboard mills	0.0079	0.02
3222	Converted paper product manufacturing	0.0258	0.06
3231	Printing and related support activities	0.0374	0.08
3241	Petroleum and coal products manufacturing	0.0042	0.01
3251	Basic chemical manufacturing	0.0124	0.03
3252	Resin, synthetic rubber, and artificial synthetic fibers andfilaments manufacturing	0.0153	0.03
3253	Pesticide, fertilizer, and other agricultural chemical manufacturing	0.0006	0.00
3254	Pharmaceutical and medicine manufacturing	0.0023	0.01
3255	Paint, coating, and adhesive manufacturing	0.0238	0.05
3256	Soap, cleaning compound, and toilet preparation manufacturing	0.0018	0.00
3259	Other chemical product and preparation manufacturing	0.0076	0.02
3261	Plastics product manufacturing	0.0897	0.20
3262	Rubber product manufacturing	0.0804	0.18
3271	Clay product and refractory manufacturing	0.0079	0.02
3272	Glass and glass product manufacturing	0.0467	0.10
3273	Cement and concrete product manufacturing	0.0035	0.01
3274	Lime and gypsum product manufacturing	0.0011	0.00
3279	Other nonmetallic mineral product manufacturing	0.0072	0.02
3311	Iron and steel mills and ferroalloy manufacturing	0.0499	0.11
3312	Steel product manufacturing from purchased steel	0.0243	0.05
3313	Alumina and aluminum production and processing	0.0241	0.05
3314	Nonferrous metal (except aluminum) production and processing	0.0152	0.03
3315	Foundries	0.1442	0.31
3321	Forging and stamping	0.0379	0.08
3322	Cutlery and handtool manufacturing	0.0022	0.00
3323	Architectural and structural metals manufacturing	0.0483	0.11
3324	Boiler, tank, and shipping container manufacturing	0.0042	0.01
3325	Hardware manufacturing	0.0219	0.05
3326	Spring and wire product manufacturing	0.0316	0.07
3327	Machine shops; turned product; and screw, nut, and bolt manufacturing	0.1576	0.34
3328	Coating, engraving, heat treating, and allied activities	0.0372	0.08
3329	Other fabricated metal product manufacturing	0.0455	0.10
3331	Agriculture, construction, and mining machinery manufacturing	0.0022	0.00

NAICS code	Industry description	Employees per $1M sales output	Indirect Employees per 100 vehicles
3332	Industrial machinery manufacturing	0.0022	0.00
3333	Commercial and service industry machinery manufacturing	0.0017	0.00
3334	Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	0.0172	0.04
3335	Metalworking machinery manufacturing	0.0077	0.02
3336	Engine, turbine, and power transmission equipment manufacturing	0.0800	0.17
3339	Other general purpose machinery manufacturing	0.0213	0.05
3341	Computer and peripheral equipment manufacturing	0.0071	0.02
3342	Communications equipment manufacturing	0.0036	0.01
3343	Audio and video equipment manufacturing	0.0161	0.04
3344	Semiconductor and other electronic component manufacturing	0.0797	0.17
3345	Navigational, measuring, electromedical, and control instruments manufacturing	0.0309	0.07
3346	Manufacturing and reproducing magnetic and optical media	0.0022	0.00
3351	Electric lighting equipment manufacturing	0.0135	0.03
3352	Household appliance manufacturing	0.0005	0.00
3353	Electrical equipment manufacturing	0.0153	0.03
3359	Other electrical equipment and component manufacturing	0.0129	0.03
3361	Motor vehicle manufacturing	1.2134	2.64
3362	Motor vehicle body and trailer manufacturing	0.1233	0.27
3363	Motor vehicle parts manufacturing	1.3401	2.92
3364	Aerospace product and parts manufacturing	0.0049	0.01
3365	Railroad rolling stock manufacturing	0.0007	0.00
3366	Ship and boat building	0.0008	0.00
3369	Other transportation equipment manufacturing	0.0031	0.01
3371	Household and institutional furniture and kitchen cabinet manufacturing	0.0053	0.01
3372	Office furniture (including fixtures) manufacturing	0.0003	0.00
3379	Other furniture related product manufacturing	0.0004	0.00
3391	Medical equipment and supplies manufacturing	0.0023	0.00
3399	Other miscellaneous manufacturing	0.0083	0.02
42	Wholesale trade	0.6327	1.38
44-45	Retail trade	0.4942	1.08
481	Air transportation	0.0386	0.08
482	Rail transportation	0.0236	0.05
483	Water transportation	0.0015	0.00
484, 492	Truck transportation and couriers and messengers	0.2790	0.61
485	Transit and ground passenger transportation	0.0100	0.02
486	Pipeline transportation	0.0015	0.00

NAICS code	Industry description	Employees per $1M sales output	Indirect Employees per 100 vehicles
487,488	Scenic and sightseeing transportation and support activitiesfor transportation	0.0383	0.08
491	Postal Service	0.0333	0.07
493	Warehousing and Storage	0.0856	0.19
5111	Newspaper, periodical, book, and directory publishers	0.0280	0.06
5112	Software publishers	0.0010	0.00
516, 518, 519	Internet services, data processing, and other information services	0.0442	0.10
512	Motion picture and sound recording Industries	0.0088	0.02
5151	Radio and television broadcasting	0.0140	0.03
5152, 5175	Cable and other subscription programming and program distribution	0.0031	0.01
517, except 5175	Telecommunications, except cable and other programming distribution	0.0437	0.10
521, 5221	Monetary authorities and depository credit intermediation	0.0572	0.12
5222, 5223,525, 533	Nondepository credit intermediation and related support activities, funds, trusts, and lessors of nonfinancia	0.0850	0.19
523	Securities, commodity contracts, and other financial investments and related activities	0.0457	0.10
5241	Insurance carriers	0.0170	0.04
5242	Agencies, brokerages, and other insurance related activities	0.0099	0.02
531	Real estate	0.0431	0.09
5321	Automotive equipment rental and leasing	0.0090	0.02
53,225,323	Consumer goods rental and general rental centers	0.0093	0.02
5324	Commercial and industrial machinery and equipment rental andleasing	0.0062	0.01
5411	Legal services	0.0405	0.09
5412	Accounting, tax preparation, bookkeeping, and payroll services	0.0626	0.14
5413	Architectural, engineering, and related services	0.0941	0.21
5414	Specialized design services	0.0847	0.18
5415	Computer systems design and related services	0.0203	0.04
5416	Management, scientific, and technical consulting services	0.0615	0.13
5417, 5419	Scientific research and development and other professional,scientific, and technical services	0.1720	0.37
5418	Advertising and related services	0.0357	0.08
551	Management of companies and enterprises	0.2334	0.51
5611, 2	Office administrative and facilities support services	0.0170	0.04
5613	Employment services	0.1717	0.37
5614, 5616, 5619	Business support and investigation and security services andsupport services, nec	0.1055	0.23

NAICS code	Industry description	Employees per $1M sales output	Indirect Employees per 100 vehicles
5615	Travel arrangement and reservation services	0.0142	0.03
5617	Services to buildings and dwellings	0.0900	0.20
61	Educational services	0.0273	0.06
6211-3	Offices of health practitioners	0.0003	0.00
6214-6,6219	Ambulatory health care services except offices of health practitioners	0.0019	0.00
622	Hospitals	0.0004	0.00
6231-2	Nursing care and residential mental health facilities	0.0001	0.00
6233, 6239	Community care facilities for the elderly and residential care facilities, nec	0.0000	0.00
6241-3	Individual, family, community, and vocational rehabilitationservices	0.0001	0.00
6244	Child day care services	0.0000	0.00
7111, 7113-5	Performing arts companies, promoters, agents, managers and independent artists	0.0126	0.03
7112	Spectator sports	0.0041	0.01
712	Museums, historical sites, and similar institutions	0.0001	0.00
713	Amusement, gambling, and recreation industries	0.0132	0.03
7211	Traveler accommodation	0.0660	0.14
7212-3	RV parks, recreational camps, and rooming and boarding houses	0.0002	0.00
722	Food services and drinking places	0.0532	0.12
8111	Automotive repair and maintenance	0.4033	0.88
8112	Electronic and precision equipment repair and maintenance	0.0087	0.02
8113	Commercial and industrial equipment (except automotive and electronic) repair and maintenance	0.0261	0.06
8114	Personal and household goods repair and maintenance	0.0051	0.01
8121	Personal care services	0.0000	0.00
8122	Death care services	0.0000	0.00
8123	Drycleaning and laundry services	0.0095	0.02
8129	Other Personal Services	0.0027	0.01
8131-3	Religious, grantmaking and giving services, and social advocacy organizations	0.0001	0.00
81,348,139	Civic, social, business, and similar organizations	0.0281	0.06
814	Private households	0.0000	0.00
NA	Federal electric utilities	0.0012	0.00
NA	Federal government enterprises, nec	0.0015	0.00
NA	Federal general government	0.0005	0.00
NA	Federal government capital services	0.0000	0.00
NA	Local government passenger transit	0.0052	0.01
NA	State and local electric utilities	0.0039	0.01
NA	State and local government enterprises	0.0155	0.03

NAICS code	Industry description	Employees per $1M sales output	Indirect Employees per 100 vehicles
NA	State and local government hospitals	0.0001	0.00
NA	State and local government education	0.0011	0.00
NA	State and local general government, nec	0.0008	0.00
NA	State and local government capital services	0.0000	0.00
NA	Royalties	0.0000	0.00
NA	Owner-occupied dwellings	0.0000	0.00
NA	Noncomparable imports	0.0000	0.00
NA	Scrap, used and secondhand goods	0.0000	0.00
NA	Rest of the world industry	0.0000	0.00
NA	Inventory valuation adjustment	0.0000	0.00
NA	Total	8.2356	17.94
NA	Total less Motor Vehicle Manufacturing (NAICS 3361)	7.0223	15.30