Economic Contribution of the Automotive Industry to the U.S. Economy – An Update

A Study Prepared for the Alliance of Automobile Manufacturers

Fall 2003

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A REPORT FOR THE

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Fall 2003

STUDY INTRODUCTION

The motor vehicle is the second most important possession of the great majority of Americans after housing. In no other society does the motor vehicle play such a large role in the lives of citizens and the economy in general. Our study describes the economic contributions of the motor vehicle to the U.S. economy, to a multitude of U.S. industries in the retail, manufacturing and service sectors, and to individual Americans.

This study is divided into three parts. In the first part of the study, we will review and partially update a portion of our previous 2001 study, *The Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and its Fifty States*.[1] In our previous study, the Center for Automotive Research (CAR) estimated the direct, indirect and spin-off contributions of employment and income generated by the sale and manufacture of light vehicles. CAR's sources of information are data provided by various departments of the U.S. government, industry data from public sources, and data assembled from a national survey of twenty-one motor vehicle firms that currently sell light vehicles in the U.S. market.

The second part of this study highlights "upstream" economic contributions of motor vehicle manufacturing to specific U.S. industries. Our sources of information for this section include market information provided by other industry associations, major corporations and new sources of government information on the role of automotive manufacturing in the U.S. economy.

The third part details the economic role of the use of the motor vehicle in the U.S. economy. A number of downstream or aftermarket contributions are described in such sectors as finance, energy, repair services, car rental and parking services, used vehicle sales and public highway construction. Employment and value located in other industries that rely heavily on the motor vehicle industries include long and short haul freight services; various taxi services are also listed. This section of the study allows CAR to sum the total number of jobs in the U.S. economy that are related to the manufacture, sale, and use of the motor vehicle in the United States. Finally, this section of the study provides some quantitative facts that underlie the importance of the motor vehicle to Americans in terms of personal mobility.

[1] Fulton, George A., Sean P. McAlinden, Donald R. Grimes, Lucie G. Schmidt, and Barbara C. Richardson. *Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States*. Ann Arbor, MI: The University of Michigan Institute for Labor and Industrial Relations, The University of Michigan Transportation Research Institute, Office for the Study of Automotive Transportation, and the Center for Automotive Research, Winter 2001.

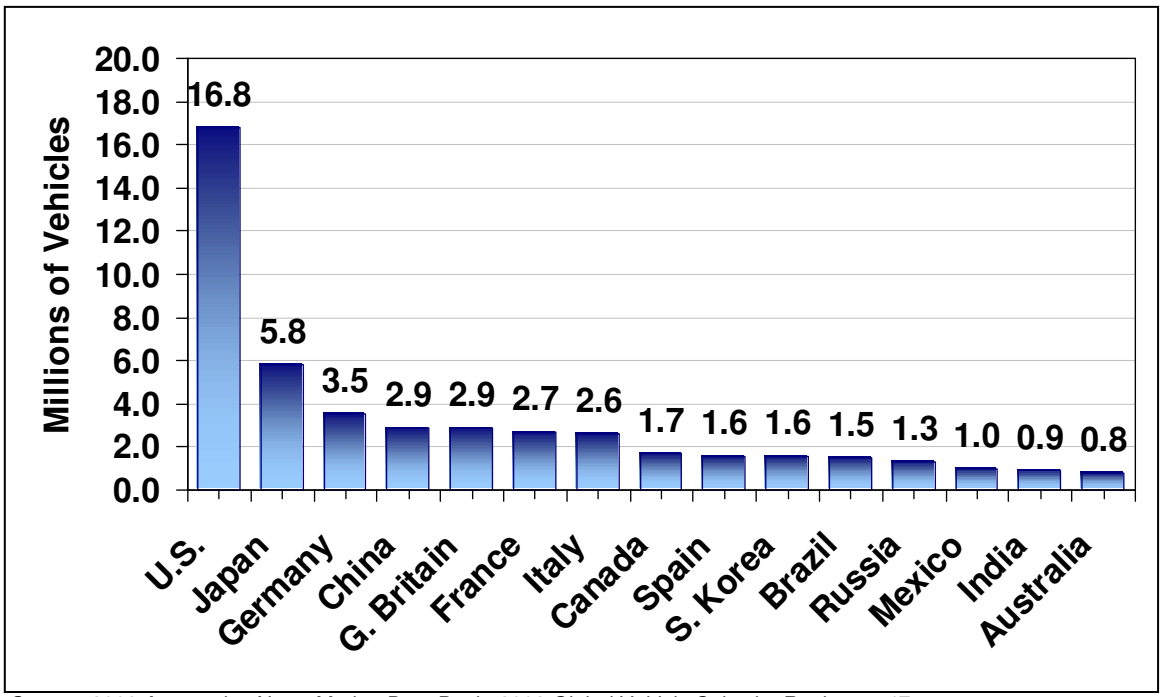
PART I: OVERVIEW OF OUR PREVIOUS STUDY

The U.S. automotive industry is still the largest automotive industry in the world. No other single industry is linked to as much of U.S. manufacturing or generates as much retail business and employment. The industry owes its relative size and importance, of course, to the popular use of its product, the motor vehicle. This fact has remained constant despite the overall downturn in U.S. economic activity in 2001. Figure 1.1 ranks the largest national markets in 2002 in terms of total vehicle sales. The U.S. market, at 16.8 million vehicle sales, was almost three times larger than the next largest market in Japan. Figure 1.2 ranks the largest vehicle-producing nations in 2002 in terms of vehicle production. The U.S. industry produced 21 percent more vehicles than the next largest vehicle industry in Japan.

Recent growth in the production of light vehicles in the United States has been impressive. As shown in figure 1.3, vehicle production increased by 40 percent between the recession years of 1991 and 2002. The 12.3 million vehicles produced in 2002 are clearly a post-war record high for the U.S. industry in the midst of a U.S. recession. The resilience of the U.S. motor vehicle manufacturing industry in a period of relative stagnation in the first part of the decade can be attributed to three major factors.

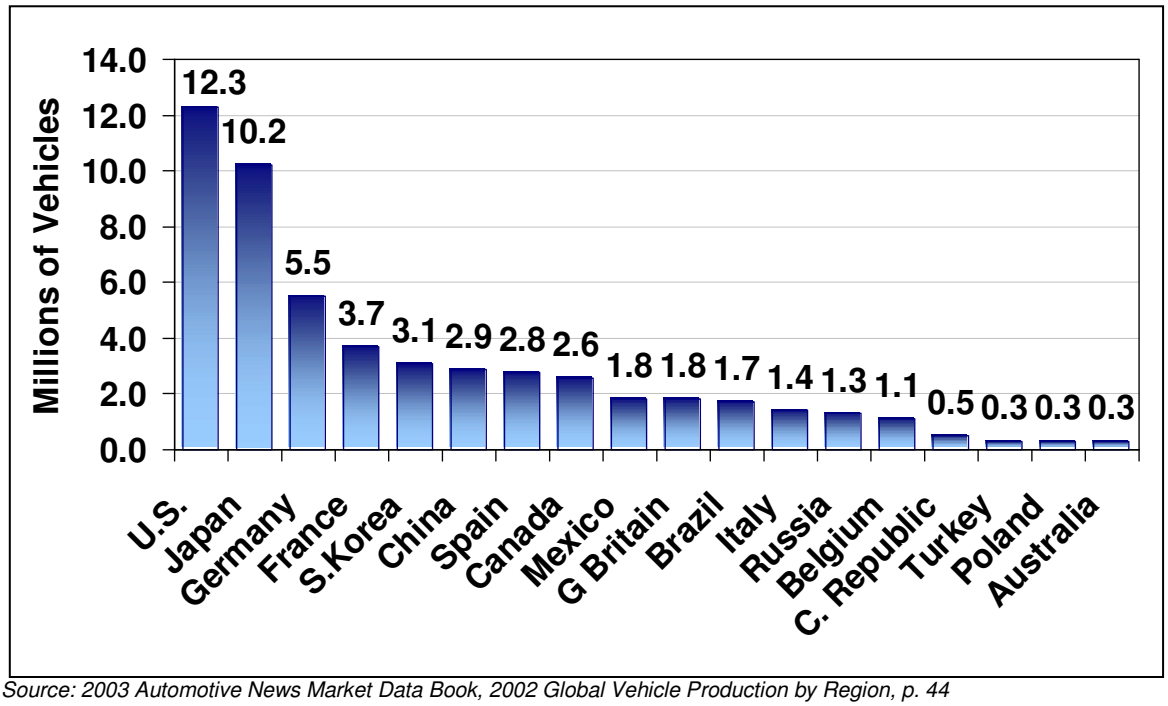
The first factor is a clear pattern of growth in the overall size of the automotive market in the 1990s – driven by growth in both personal income and the formation of U.S. households. The second factor is the remarkable commitment to price incentives by major vehicle makers in the wake of 9-11 for the purpose of sustaining vehicle demand and the U.S. economy in general. Finally, the continuing pattern of vehicle innovation and model differentiation provided by the industry for the benefit of consumers— especially in recent years, the continuing development of trucks and truck-like products that now comprise almost 59 percent of U.S. light vehicle production. As shown in figure 1.4, light truck production in the United States more than doubled between 1990 and 2002.

Figure 1.1: 2002 Vehicle Sales in Major Countries



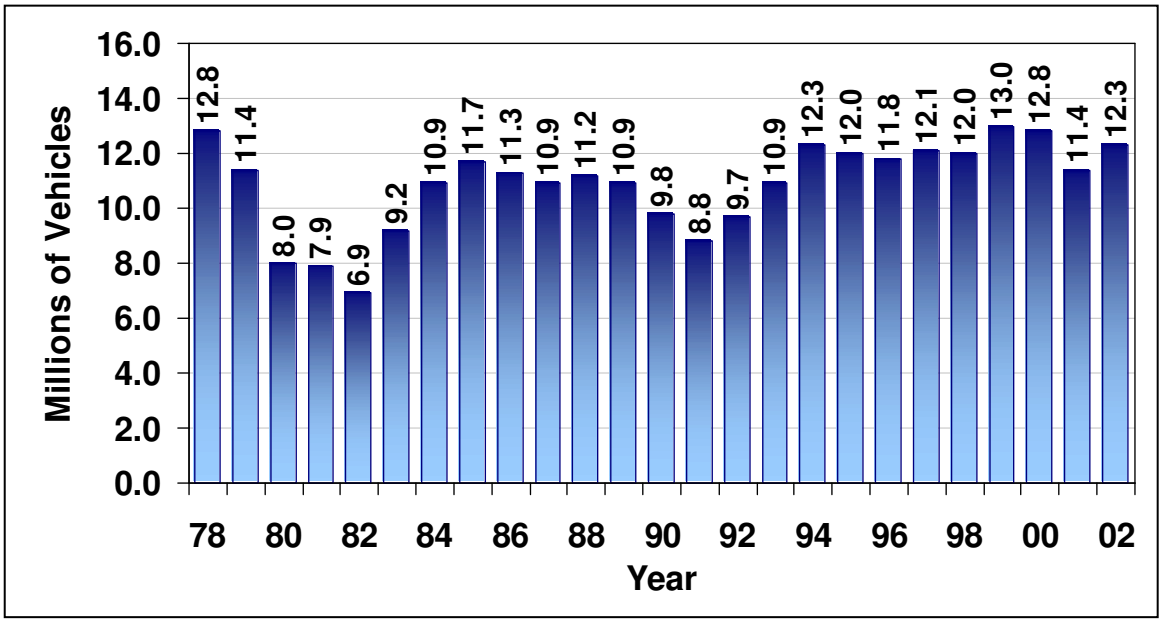
Source: 2003 Automotive News Market Data Book, 2002 Global Vehicle Sales by Region, p. 47

Figure 1.2: 2002 Vehicle Production in Major Countries



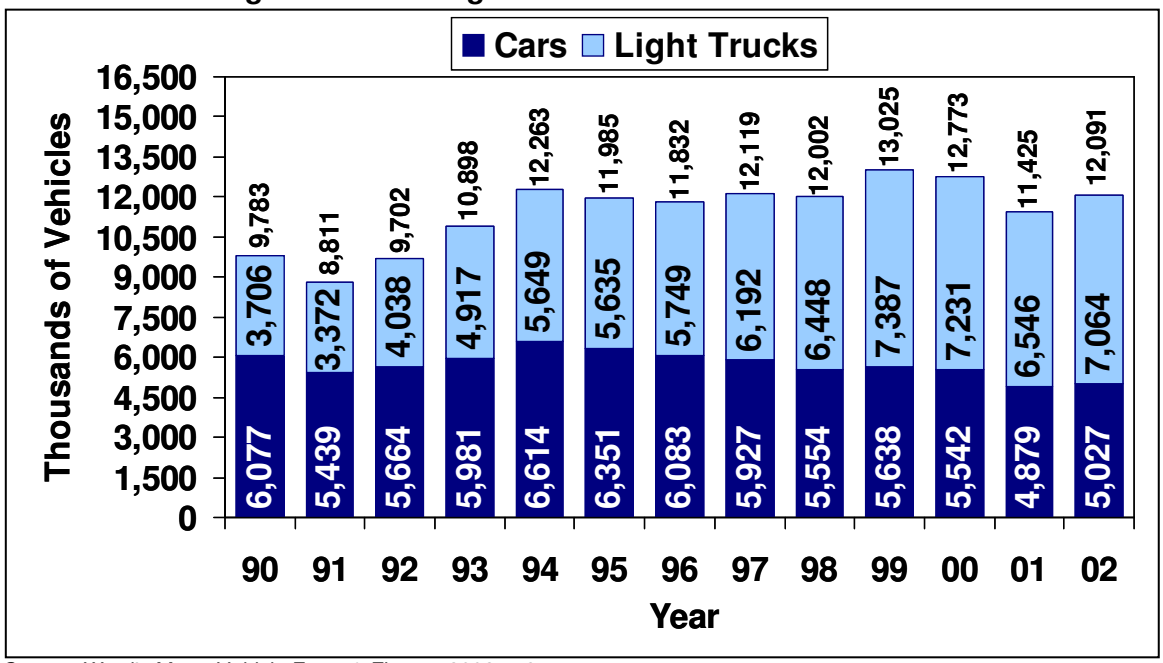
Source: 2003 Automotive News Market Data Book, 2002 Global Vehicle Production by Region, p. 44

Figure 1.3: Total U.S. Motor Vehicle Production 1978-2002



Source: Ward's Motor Vehicle Facts & Figures, Ward's Communications, 2003

Figure 1.4: U.S. Light Vehicle Production 1990-2002



Source: Ward's Motor Vehicle Facts & Figures 2002, p.3

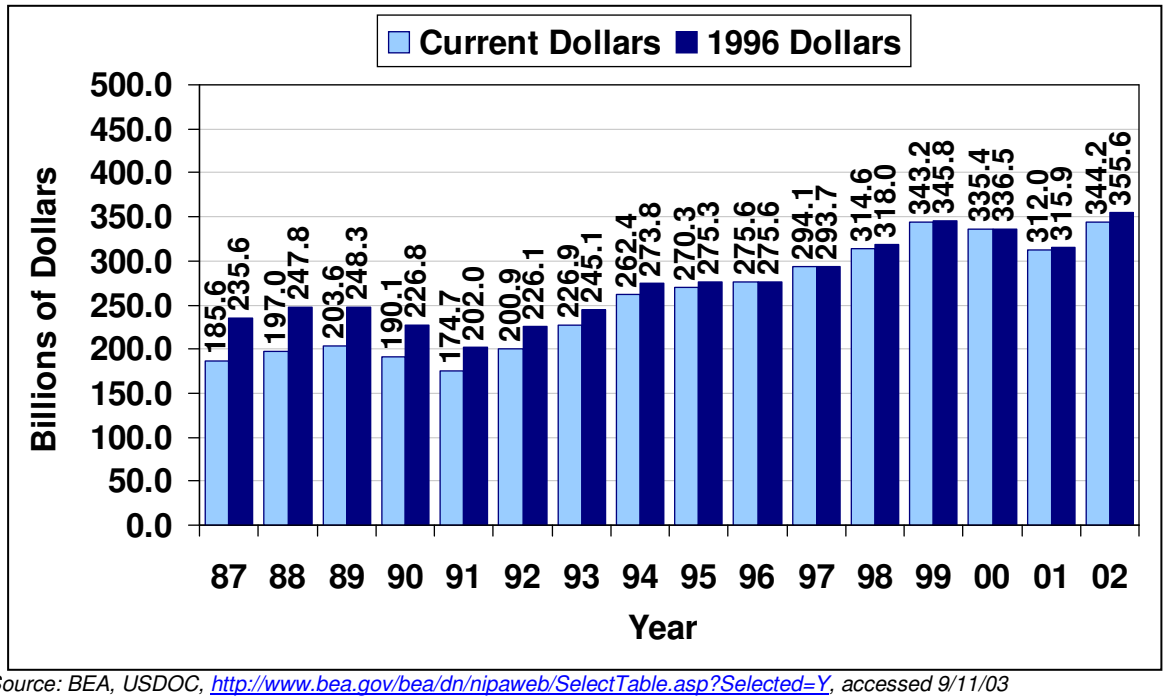
ELEMENTS OF SIGNIFICANCE IN THE U.S. ECONOMY

The automotive industry produces a higher level of output in the United States than any other single industry, and this output has been growing. Figure 1.5 shows a noteworthy record of growth in the constant dollar value of automotive output during the 1987-2002 period. The U.S.

Bureau of the Census (USBOC) produces the data series illustrated in figure 1.5 for the Bureau of Economic Analysis of the U.S. Department of Commerce (USDOC). The dollar totals are estimates of the retail value of light motor vehicles sold to individuals, businesses, and governments in a given year. They include the value contributed by new vehicle dealerships. The figures are adjusted for import value and inventory adjustment between years. The figures thus represent the U.S. value-added for vehicles sold in the United States.

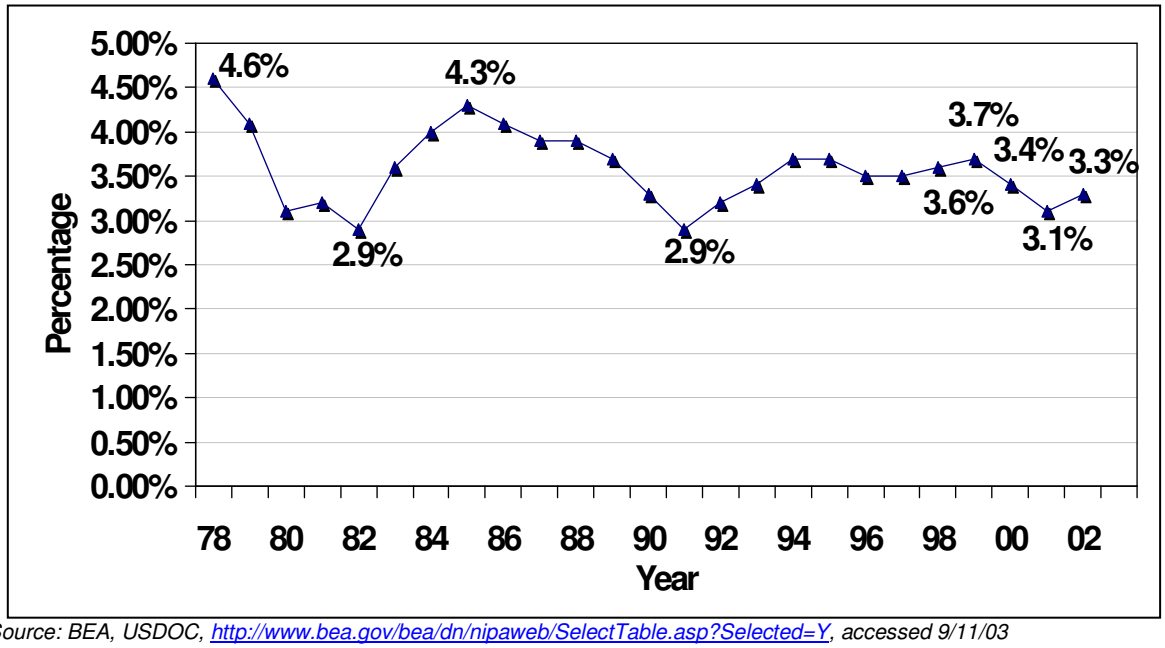
Measured in constant 1996 dollars, automotive output increased by 51 percent during 1987-2002. More importantly, recent growth in automotive output contributed significantly to the record growth of the U.S. economy. The contribution of automotive output to the U.S. GDP has remained substantial despite structural change in the overall economy. As shown in figure 1.6, U.S. motor vehicle output represented 3.3 percent of U.S. GDP in 2002, well above the industry's average share in the early 1990s. This level of GDP share is highly uncharacteristic during a period of overall economic weakness in the U.S. economy when the private sector's share of the economy usually declines – and underlines the role of the industry in softening the harshness of the recent slowdown in the U.S. economy.

Figure 1.5: U.S. Automotive Output 1987-2002



Source: BEA, USDOC, http://www.bea.gov/bea/dn/nipaweb/SelectTable.asp?Selected=Y, accessed 9/11/03

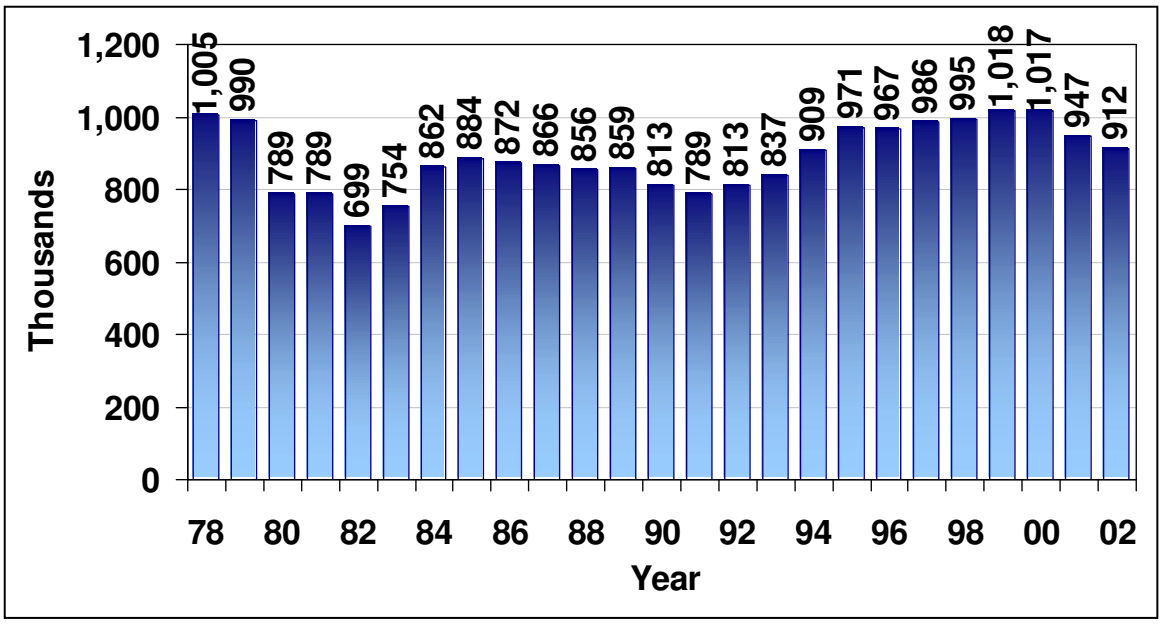
Figure 1.6: U.S. Automotive Output 1987-2002



Source: BEA, USDOC, http://www.bea.gov/bea/dn/nipaweb/SelectTable.asp?Selected=Y, accessed 9/11/03

Employment is always a major factor when measuring the significance of any economic activity. Employment in motor vehicle manufacturing is tabulated by the U.S. Department of Labor's Bureau of Labor Statistics for the three-digit industrial classification SIC 371: the motor vehicle and motor vehicle equipment industry. The data are based on employer establishment surveys. This industry classification, however, does not include all employment generated by auto parts manufacturing. These employment figures do cover vehicle assembly and most major component manufacturing. Figure 1.7 tells an interesting story. Employment in SIC 371 in 1999 was equal to the industry's all-time record in 1978 of one million employees, and thus has now fully recovered from its formerly depressed levels. Recent levels of SIC 371 employment of 947,000 in 2001 and 912,000 in 2002 are remarkable during a U.S. recession – especially when compared to trough employment levels in 1982 and 1992.

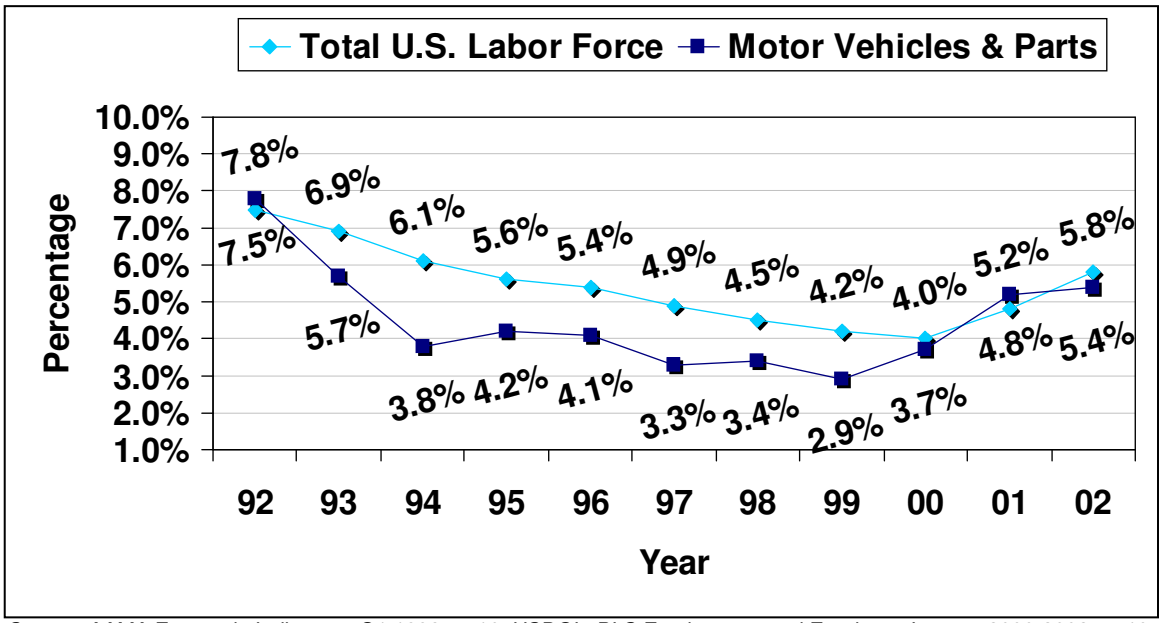
Figure 1.7: Total U.S. Employment: Motor Vehicles and Equipment 1978-2002



Source: Ward's Motor Vehicle Facts & Figures 1999, p.77; USDOL, BLS, Employment and Earnings, January 2000-2003, p. 229,231; http://www.bls.gov/January 21, 2003.

The unemployment rate is also a strong indicator of national well-being. As figure 1.8 illustrates, the measured unemployment rate for those who report employment in the U.S. automotive industry has consistently been lower than the overall U.S. rate of unemployment since 1993 except for one year. In 1999, for example, the national unemployment rate was 4.2 percent compared with only 2.9 percent in the automotive industry. Although the industry unemployment rate did rise slightly above the national rate in 2001, it has clearly fallen below the overall rate in 2002 – resting at 5.4 percent compared to 5.8 percent for the nation. Clearly, the auto industry has contributed to the lower rates of U.S. unemployment during the recent national recovery.

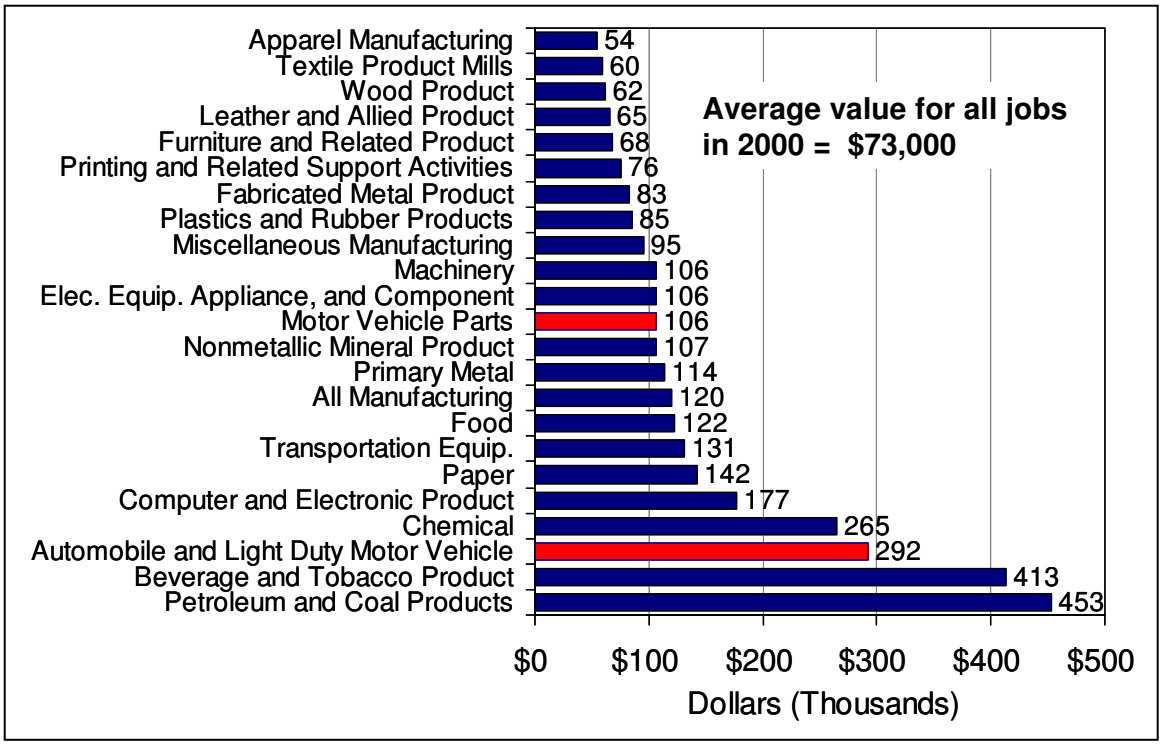
Figure 1.8: Unemployment Rate 1992-2002



Source: AAMA Economic Indicators, Q1 1998, p. 16; USDOL, BLS Employment and Earnings, January 2000-2002, p. 10, 202. http://www.bls.gove/January 21, 2003.

The productivity of the automotive industry can be compared with other U.S. industries in terms of value added per employee. Value added includes the sum of profits, rent, interest, and labor compensation paid within the industry. It is thus a measure of the actual value produced by an industry. As shown in figure 1.9, the motor vehicle manufacturing industry ranked third among major manufacturing industry groups in terms of value added per employee. The industry's value added of $292,000 per worker was 143 percent higher than the overall value-added ratio for U.S. manufacturing ($120,000). Only two major industries exceeded the motor vehicle industry's level of productivity (beverage and tobacco products and petroleum and coal products). These two industries, of course, employed far fewer workers in 2001. In fact, the average job in the United States produced $73,000 in 2000 (GDP/total employment). Motor vehicle company employees produced exactly four times as much value as the average U.S. employee in 2000.

Figure 1.9: 2000 Value Added per Employee

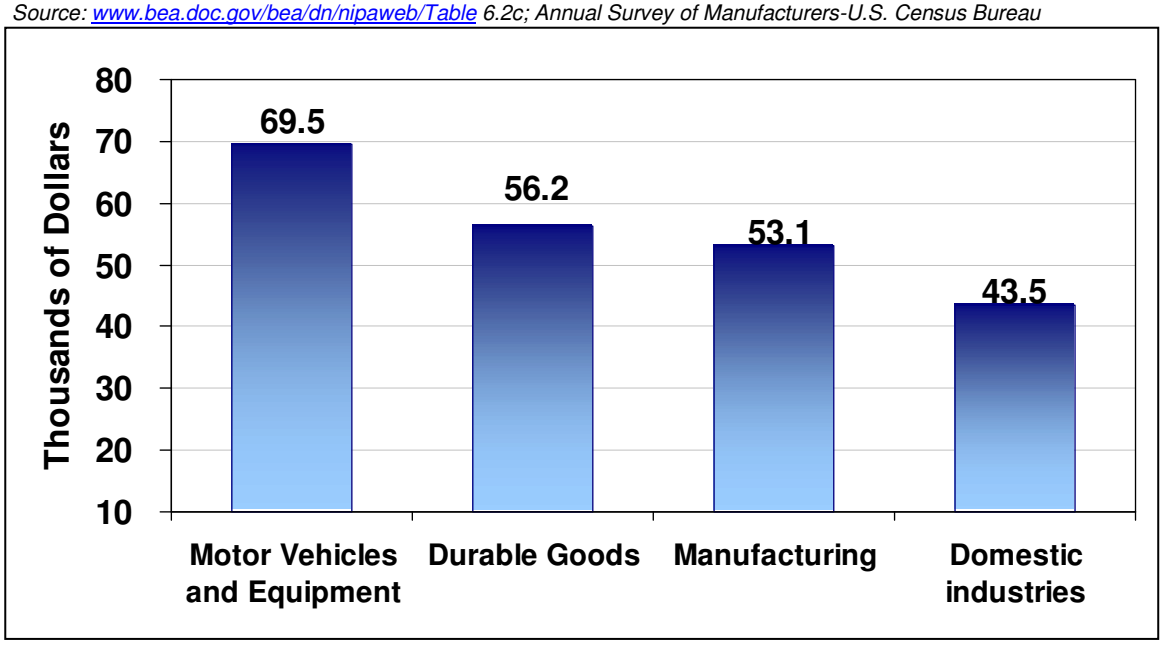


Source: U.S Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufacturers, Statistics for Industry Groups and Industries: 2000. Table 2, Statistics for Industry Groups and Industries: 2000 and Earlier Years.

High levels of automotive productivity are suggested by high relative levels of compensation (wages plus benefits) paid to employees within the industry. The average compensation received by employees in SIC 371, or motor vehicles and equipment manufacturing in 2001, was $69,500. As shown in figure 1.10, this compares favorably with the average compensation received by employees in all of U.S. manufacturing ($53,100). In fact, the average compensation per employee nationwide in 1998 only reached $43,500. The average job in the automotive manufacturing sector was compensated at a level 60 percent higher than the average U.S. job.

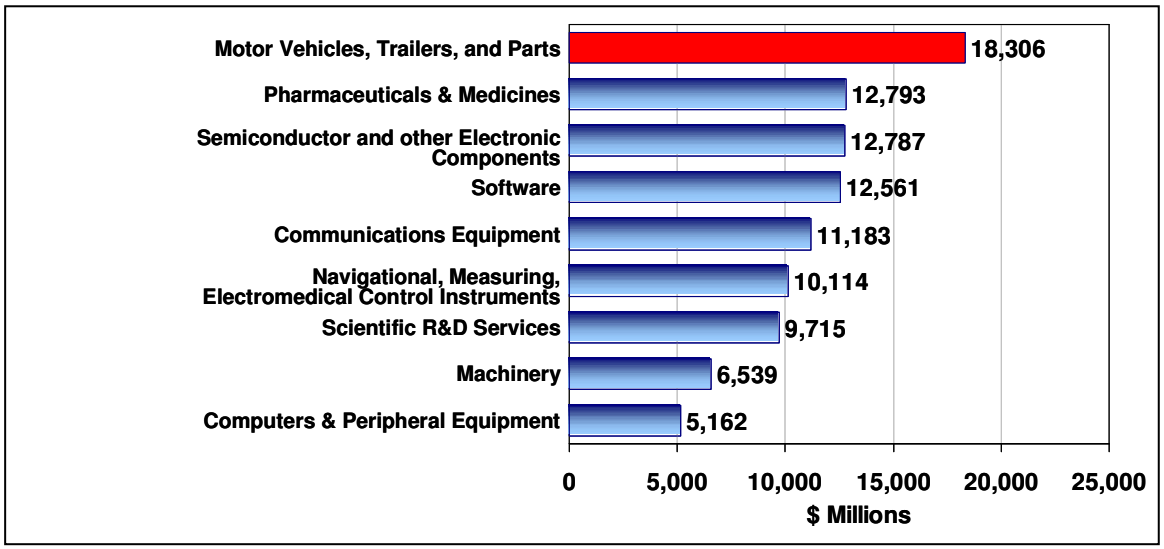
Figure 1.10: 2001 Compensation per Full and Part-time Employee for U.S. Economic Sectors

Source: www.bea.doc.gov/bea/dn/nipaweb/Table 6.2c; Annual Survey of Manufacturers-U.S. Census Bureau



The automotive industry has traditionally ranked at or very near the top among all U.S. industries in terms of R&D expenditures. The National Science Foundation (NSF) ranked the 39 largest "3-digit" industry groups in terms of 2000 industrial R&D spending in the United States. As shown in figure 1.11, the motor vehicle and motor vehicle equipment manufacturing industry group is ranked first by a considerable margin over manufacturing industries such as pharmaceuticals and medicines, semiconductor and other electronic components, and even the large computer services industry.

Figure 1.11: R&D Spending by Industry, 2000 Motor Vehicle Industry Is First of 39 Major U.S. Industry Groups



Source: National Science Foundation, Research and Development in Industry: 2000, Table E-2

This overview so far has investigated a number of well-known measures of the contribution of the automotive industry to the U.S. economy. We have shown the U.S. industry to be the largest automotive industry in the world. It is an industry that has matched its peak historical employment and maintained its share of GDP. In recent years, the industry has contributed to higher rates of economic growth and lower rates of U.S. unemployment. Finally, the industry ranks among the top industries in the nation in terms of R&D spending and the compensation of employees. Yet this overview does not fully cover the widespread linkages the automotive industry maintains with many other large manufacturing and service industries in the United States. A full accounting of the presence of the automotive industry in the economy must estimate the industry's creation of jobs and income throughout the U.S. economy. This involves the estimation of jobs and income created in the production of commodities and services supplied to the industry by other industries; and jobs and income created as a result of spending by industry employees on products and services produced by other industries.

Our 2001 study[2] of the economic contribution of automotive manufacturing and new vehicle sales to the U.S. economy in 1998 relied on survey data obtained from 21 automotive firms in the U.S. market that year. Our study used a well-regarded input-output model of the U.S.

[2] Fulton, George A., Sean P. McAlinden, et al. *Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States*. Winter 2001.

economy to estimate the total contribution of the automotive industry on U.S. private sector employment and income.

TOTAL CONTRIBUTION OF AUTOMOTIVE MANUFACTURING

Our 2001 study[3] produced summary estimates of the employment and income contributions of automotive manufacturing to the private sector of the U.S. economy in 1998. These estimates are shown in table 1.1.[4] According to the data compiled from the survey of motor vehicle firms (reported in appendix B of our 2001 study),[5] 621,255 workers were employed in automotive manufacturing nationwide in 1998. This is shown as direct employment in table 1.1. Indirect employment from these automotive manufacturing activities (i.e., automotive suppliers) is estimated to be 1,796,000 jobs. The sum of direct and indirect jobs equals 2,417,300 private sector jobs. The resulting number of jobs created (direct plus indirect) for every direct job introduced constitutes the "employment multiplier." In this case, the employment multiplier is 3.9. This employment multiplier can be interpreted in two ways: (1) there are 3.9 times as many jobs generated as there are direct jobs (2,417,300 ÷ 621,300 = 3.9), or (2) there are 2.9 indirect jobs generated for every direct job (1 direct job + 2.9 indirect jobs = 3.9 jobs).

The contribution of automotive manufacturing to compensation in the private sector (calculated as the direct plus indirect effects) is estimated to be about $111 billion, measured in 1998 dollars. This estimate of compensation is prior to deductions for personal income taxes and contributions to social insurance programs, and does not include transfer payments.

To put the employment and compensation contributions in some context, these contributions are represented in table 1.1 as a share of the total private sector economy for the United States. The economic contribution of direct and indirect automotive manufacturing activities in 1998 represents 1.8 percent of the private sector jobs and 2.6 percent of the private sector compensation in the U.S. economy. The compensation share is greater than the employment share because compensation in the auto industry is higher on average than in other industries.

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[3] Ibid.

[4] The following definitions will assist in interpreting the tables: Employment represents the total number of private sector jobs, including the self-employed. All of the employment numbers in the tables have been rounded to the nearest hundred. Compensation in the private sector consists of wage and salary disbursements, fringe benefits, and net incomes of owners of unincorporated businesses. We selected 1998 because it was the most recent year for which all primary and secondary data were available.

[5] Fulton, George A, Sean P. McAlinden et al. *Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States*. Winter 2001.

In the bottom panel of table 1.1, we show the total spin-off effect, which includes the expenditure-induced effect in addition to the indirect effect. Our estimate of the expenditure-induced effect is 2,290,700 jobs which, when added to the 2,417,300 direct plus indirect jobs, equals 4,708,000 total jobs. The corresponding employment multiplier equals 7.6 (4,708,000 total jobs ÷ 621,300 direct jobs). The corresponding contribution to compensation in the private sector is approximately $177 billion, measured in 1998 dollars. These contributions represent 3.5 percent of the private sector jobs and 4.1 percent of the private sector compensation in the U.S. economy.

In summary, the employment contribution currently associated with automotive manufacturing activity in the United States is estimated to be about 2.4 million jobs in the private sector attributable to the industry directly and its suppliers, and 4.7 million when all spin-off effects are included. The compensation contribution is estimated to be about $111 billion attributable to the industry directly and its suppliers, and $177 billion when all spin-off effects are included.

As shown in table 1.1, there are 2.9 supplier jobs for every direct automotive manufacturing job (1,796,000 ÷ 621,300). There are 3.7 expenditure-induced jobs for every direct job (2,290,700 ÷ 621,300). This indicates that automotive manufacturing jobs are leveraged into a much higher proportion of spin-off jobs; specifically, 6.6 spin-off jobs per direct job (2.9 supplier jobs + 3.7 expenditure-induced jobs), yielding the relatively large multiplier of 7.6 in table 1.1.

Table 1.1: Private Sector Contributions of Automotive *Manufacturing* in the United States 1998 Contribution of the Total Automotive Industry

Activities excluding expenditure-induced effect	
Employment	
Direct	621,300
Indirect	1,796,000
Total (direct + indirect)	2,417,300
Multiplier	3.9
Compensation ($billions US)	111.22
Contributions as a % of total U.S. economy	
Employment	1.8
Compensation	2.6
Activities including expenditure-induced effect	
Employment	
Expenditure-induced	2,290,700
Total (direct + indirect + expenditure-induced)	4,708,000
Multiplier	7.6
Compensation ($billions US)	176.99
Plus: transfer payments	-15.28
Less: social insurance contributions	12.21
Less: personal income taxes	30.34
Equals: Private disposable personal income	119.16
Contributions as a % of total U.S. economy	
Employment	3.5
Compensation	4.1

NOTE: Values for employment are rounded to the nearest hundred workers.

Source: Fulton, George A., Sean P. McAlinden, et al. Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States. Winter 2001, p. 22.

Combining the estimates for automotive manufacturing shown above with the estimates for new vehicle dealers, also estimated in our 2001 study,[6] produces a "bottom line" for the automotive industry as a whole. This results in the estimates of total U.S. private sector contributions from automotive industry activities shown in table 1.2.

Direct employment of 1,338,700 jobs (621,300 automotive manufacturing jobs + 717,400 new vehicle dealer jobs) combined with indirect employment of 2,162,200 sums to a contribution to private sector employment of 3,500,900. The corresponding employment multiplier is 2.6 (3,500,900 ÷ 1,338,700); that is, there are 2.6 times as many jobs generated as there are direct

[6] Ibid.

jobs. The compensation contribution (calculated as the direct plus indirect effects) is estimated to be $152.10 billion, measured in 1998 dollars. The economic contribution of direct and indirect automotive industry activities in 1998 represents 2.6 percent of the private sector jobs and 3.6 percent of the private sector compensation in the U.S. economy.

Table 1.2: Private Sector Contribution of the Automotive *Industry* in the United States 1998

Activities excluding expenditure-induced effect	
Employment	
Direct	1,338,700
Indirect	2,162,200
Total (direct + indirect)	3,500,900
Multiplier	2.6
Compensation ($billions US)	152.10
Contributions (as a % of total U.S. economy)	
Employment	2.6
Compensation	3.6
Activities including expenditure-induced effect	
Employment	
Expenditure-induced	3,133,700
Total (direct + indirect + expenditure-induced)	6,634,600
Multiplier	5.0
Compensation ($billions US)	242.80
Plus: transfer payments	-21.62
Less: social insurance contributions	16.91
Less: personal income taxes	41.46
Equals: Private disposable personal income	162.81
Contributions (as a % of total U.S. economy)	
Employment	4.9
Compensation	5.6

NOTE: Values for employment are rounded to the nearest hundred workers.

Source: Fulton, George A., Sean P. McAlinden, et al. Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States. Winter 2001, p. 36.

In the bottom panel of table 1.2, we show the total spin-off effect, which includes the expenditure-induced effect in addition to the indirect effect. Our estimate of the expenditure-induced effect is 3,133,700 jobs which, when added to the 3,500,900 direct plus indirect jobs, equals 6,634,600 total jobs. The corresponding employment multiplier is 5.0 (6,634,600 ÷ 1,338,700). The corresponding contribution to compensation in the private sector is

approximately $243 billion, measured in 1998 dollars. These contributions represent 4.9 percent of the private sector jobs and 5.6 percent of the private sector compensation in the U.S. economy.

The estimate of compensation is prior to deductions for personal income taxes and contributions to social insurance programs, and does not include transfer payments. As shown in the bottom panel of table 1.2, a reduction in transfer payments of over $21 billion dollars is associated with the total automotive industry in 1998, and personal income tax revenues are increased by over $41 billion. The implication for disposable income, or personal income after taxes and including transfers, is an increase of almost $163 billion in the domestic economy for 1998.

In summary, the employment contribution currently associated with total automotive industry activity in the United States is estimated to be about 3.5 million jobs in the private sector attributable to the industry directly and its suppliers, and 6.6 million when all spin-off effects are included. The compensation contribution is estimated to be about $152 billion attributable to the industry directly and its suppliers, and $243 billion when all spin-off effects are included.

The total automotive industry contribution to employment is distributed across major industry divisions, as shown in table 1.3. The employment contribution is shown for both indirect and expenditure-induced effects; direct employment is 1,338,700.

To summarize, almost four in ten indirect jobs generated are in manufacturing, and most of them are in durable goods. On the other hand, nine in ten expenditure-induced jobs are in the private nonmanufacturing sector, three-quarters of them in retail trade and services. When direct employment is included in the total, three out of ten jobs generated are in manufacturing; the rest are in the private nonmanufacturing sector, and about three-quarters of those are in retail trade and services.

Table 1.3: Private Sector Contributions of the Automotive *Industry by Industry* in the United States, 1998

Industry division (SIC code)	Indirect	Expenditure-induced	Total
Manufacturing	790,500	374,700	1,165,200
Durable goods	537,600	200,100	737,700
Nondurable goods	252,900	174,600	427,500
Private nonmanufacturing	1,371,700	2,759,000	4,130,700
Construction (15-17)	114,100	89,300	203,400
Trucking (42)	75,800	47,000	122,800
Credit and finance (61, 62, 67)	22,200	61,600	83,800
Wholesale trade (50-51)	247,100	142,000	389,100
Retail trade (52-59)	133,200	879,300	1,012,500
Services (70-89)	600,600	1,187,500	1,788,100
Business services (73)	319,600	228,300	547,900
Professional services (81, 87, 89)	126,100	150,000	276,100
Nonprofit services (83, 84, 86)	11,100	201,300	212,400
Other private nonmanufacturing	178,700	352,300	531,000
Total private nonfarm employment	2,162,200	3,133,700	5,295,900

Total direct + indirect = 3,500,900

Total direct + indirect + expenditure-induced = 6,634,600

NOTE: Values for employment are rounded to the nearest hundred workers.

Source: Fulton, George A., Sean P. McAlinden, et al. Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States. Winter 2001, p. 38.

PART II: UPSTREAM ECONOMIC CONTRIBUTION

This part of our study highlights "upstream" economic contributions of motor vehicle manufacturing to specific U.S. industries. All of the employment contributions discussed below were included in supplier employment in table 1.3 in Part I of this study. For example, many materials-producing industries, such as metals industries, rely on automotive industry purchases for a substantial share of their production. In 2001, about 32 percent of all aluminum and 14 percent of all U.S. steel purchases can be attributed to the automotive industry. After netting for imports, we estimate that the automotive industry's purchases of these two metals alone contributed about 34,000 jobs to the economy in 2000.[7] [8] [9]

While the automotive industry uses large amounts of materials to manufacture its products, it also serves as a model of materials recycling. Ninety five percent of the vehicles scrapped annually are processed for recycling, with 75 percent of the materials in those vehicles salvaged for re-use. The automotive industry also uses recycled materials in its manufacturing operations. For example, about 80 percent of the aluminum used to manufacture vehicles is recycled aluminum.[10] A more detailed discussion of the industry's recycling efforts is provided in Part III: Downstream Economic Contribution.

Vehicles manufactured by the automotive industry use world-class technology. The average vehicle contains between 40 and 50 microprocessors.[11] In the year 2000, the automotive industry used about $12.4 billion of electronics.[12] [13] About 85 percent of these electronic components are manufactured by the automotive industry itself, amounting to about $10.5 billion in the year 2000.[14] [15] Our 2001 contribution study estimates that the automotive industry contributed over 59,000 jobs to the electronics industry in 1998.[16] [17]

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[7] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[8] U.S Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufacturers, Statistics for Industry Groups and Industries: 2000. Table 2, Statistics for Industry Groups and Industries: 2000 and Earlier Years.
[9] U.S. Industry and Trade Outlook 2000, The McGraw-Hill Companies and U.S. Department of Commerce/International Trade Administration, Table 13-1: Steel Mill Products (SIC 3312, 3315, 3316, 3317) Trends and Forecasts, p.13-4.
[10] The Aluminum Association, http://www.aluminum.org.
[11] Bass, Michael J. and Clayton M. Christensen. The Future of the Microprocessor Business. IEEE Spectrum Online (April 2002). Accessed at http://www.spectrum.ieee.org/WEBONLY/publicfeature/apr02/mlaw.html.
[12] McAlinden, Sean P., Abel Feinstein and Brett C. Smith. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. UMTRI-2000-24-2. Ann Arbor, MI: The University of Michigan Transportation Research Institute, Office for the Study of Automotive Transportation, 2000.
[13] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[14] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.
[15] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[16] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls By Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.

In order to manufacture vehicles, the automotive industry purchases many products and services from other American industries. Industries as diverse as apparel, construction, and business services are necessary for the automotive industry to function. Conversely, many sectors of the service-producing economy rely on the automotive sector as a major, or *the* major, customer of their output. In 2001, for example, the automotive industry's use of the trucking and warehousing industry contributed 70,700 U.S. jobs. In total, the automotive industry contributed over 2.1 million jobs to other industries in 2001.[18] [19]

Listed below is a summary of the automotive industry's upstream economic contribution, organized by product. For each individual industry, we try to provide the share of the vehicle that industry represents, share of that industry reliant upon automotive consumption, and the number of jobs contributed to that industry by automotive industry consumption. This information is also provided in table form as Appendix 1.

[17] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.
[18] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls by Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.
[19] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.

METALS

STEEL

- In 2001, the typical car contained 1,781 pounds of steel or 41 percent of the vehicle's weight.[20]
- The automotive industry used 14,059,000 tons of steel in 2001, accounting for 14 percent of U.S. steel consumption.[21]
- Adjusted for imports, the automotive industry's use of steel provided 15,475 jobs in the U.S. steel industry in the year 2000.[22] [23] [24]

IRON

- In 2001, the typical car contained 345 pounds of iron or 10 percent of the vehicle's weight.[25]
- The automotive industry used 3,075,000 tons of iron in 2001, accounting for 31.4 percent of U.S. iron consumption.[26]
- Adjusted for imports, the automotive industry's use of iron provided 3,384 jobs in the U.S. iron industry in the year 2000.[27] [28] [29]

ALUMINUM

- In 2001, the typical car contained 256.5 pounds of aluminum or 8 percent of the vehicle's weight.[30]
- The automotive industry used 3,946,208 tons of aluminum in 2001, accounting for 31.6 percent of U.S. aluminum consumption.[31]
- Adjusted for imports, the automotive industry's use of aluminum provided 25,859 jobs in the U.S. aluminum industry in the year 2000.[32] [33] [34]

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[20] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[21] Ibid.
[22] Ibid.
[23] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufactures, Statistics for Industry Groups and Industries: 2000. Table 2, Statistics for Industry Groups and Industries: 2000 and Earlier Years.
[24] U.S. Industry and Trade Outlook 2000, The McGraw-Hill Companies and U.S. Department of Commerce/International Trade Administration, Table 13-1: Steel Mill Products (SIC 3312, 3315, 3316, 33317) Trends and Forecasts, p.13-4.
[25] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[26] Ibid.
[27] Ibid.
[28] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufactures, Statistics for Industry Groups and Industries: 2000. Table 2, Statistics for Industry Groups and Industries: 2000 and Earlier Years.
[29] U.S. Industry and Trade Outlook 2000, The McGraw-Hill Companies and U.S. Department of Commerce/International Trade Administration, Table 13-1: Steel Mill Products (SIC 3312, 3315, 3316, 33317) Trends and Forecasts, p.13-4.
[30] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[31] Ibid.
[32] Ibid.
[33] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufactures, Statistics for Industry Groups and Industries: 2000. Table 2, Statistics for Industry Groups and Industries: 2000 and Earlier Years.
[34] U.S. Industry and Trade Outlook 2000, The McGraw-Hill Companies and U.S. Department of Commerce/International Trade Administration, Table 14-1: Aluminum Industry (SIC 3334, 3341, 3353, 3354, 3355) Trends and Forecasts, p.13-4.

COPPER AND BRASS

- In 2001, the typical car contained 46 pounds of copper and brass or 1 percent of the vehicle's weight.[35]
- The automotive industry used 737 million pounds of copper in 2001, accounting for 9 percent of U.S. copper consumption.[36]
- Adjusted for imports, the automotive industry's use of copper provided 1,393 jobs in the U.S. copper industry in the year 2000.[37] [38] [39]

ZINC

- In 2001, the typical car contained 11 pounds of zinc or less than 1 percent of the vehicle's weight.[40]
- The automotive industry used 241,500 tons of zinc in 2001, accounting for 23 percent of U.S. zinc consumption.[41]

DURABLE GOODS METAL MANUFACTURING

- In 1998, 8 percent of all U.S. workers employed in primary metals manufacturing industries were engaged in producing automotive products, amounting to 59,100 jobs.[42] [43]
- In 1998, 12 percent of all U.S. workers employed in fabricated metal products manufacturing industries were engaged in producing automotive products, amounting to 181,100 jobs.[44] [45]

[35] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[36] Ibid.
[37] Ibid.
[38] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufactures, Statistics for Industry Groups and Industries: 2000. Table 2, Statistics for Industry Groups and Industries: 2000 and Earlier Years.
[39] U.S. Industry and Trade Outlook 2000, The McGraw-Hill Companies and U.S. Department of Commerce/International Trade Administration, Table 14-2 Cooper Industry (SIC 3331, 3351, 3357, 3366) Trends and Forecasts, p.14-5.
[40] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[41] Ibid.
[42] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls By Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.
[43] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.
[44] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls By Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.
[45] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.

PLASTICS AND RUBBER

- In 2001, the typical car contained 253 pounds of plastic or 8 percent of the vehicle's weight.[46]
- The automotive industry used 1,990,730 tons of plastic in 2001, accounting for 3.9 percent of U.S. plastic consumption.[47]
- In 2001, the typical car contained 145.5 pounds of rubber or 4 percent of the vehicle's weight.[48]
- The automotive industry used 1,945,000 metric tons of rubber in 2001, accounting for 68 percent of U.S. rubber consumption.[49]
- In 1998, 9 percent of all U.S. workers employed in Rubber and Miscellaneous Plastic Products industries were engaged in producing automotive products, amounting to 95,200 jobs.[50] [51]

ELECTRONICS

- The average vehicle contains between 40 and 50 microprocessors.[52]
- Vehicles sold in the U.S. contained about $2.4 billion worth of computer chips in 1998, or about $154 per vehicle.[53] [54]
- 7.6 percent of the component value (not including assembly cost) of the average U.S. produced automobile is comprised of electronic content. This implies a total of $12.4 billion for the year 2000 and amounts to about $970 per vehicle produced in the U.S.[55] [56]
- In 1998, 3 percent of all U.S. workers employed in the electronics industry were engaged in producing automotive products, amounting to 59,400 jobs.[57] [58]

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[46] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[47] Ibid.
[48] Ibid.
[49] Ibid.
[50] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls By Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.
[51] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.
[52] Bass, Michael J. and Clayton M. Christensen. The Future of the Microprocessor Business. IEEE Spectrum Online (April 2002). Accessed at http://www.spectrum.ieee.org/WEBONLY/publicfeature/apr02/mlaw.html.
[53] McAlinden, Sean P., Abel Feinstein and Brett C. Smith. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. UMTRI-2000-24-2. Ann Arbor, MI: The University of Michigan Transportation Research Institute, Office for the Study of Automotive Transportation, 2000.
[54] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[55] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.
[56] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[57] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls By Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.
[58] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.

PAINT

- The automotive industry used over 100 million gallons of paint in 2001, with a total value of $2.9 billion.[59]
- The automotive industry's paint purchases amounted to about 8.4 percent of all paint produced in the U.S. in 2001.[60]
- The paint purchased by the automotive industry produced greater than average value for the paint industry: while automotive paint purchases accounted for 8.4 percent of total paint purchases by volume, they accounted for nearly 19 percent of total paint industry dollar sales.[61]
- The automotive industry's use of paint provided 4,458 jobs in the paint industry in the year 2000.[62] [63]

GLASS

- In 2001, the typical car contained 98.5 pounds of glass or 3 percent of the vehicle's weight.[64]
- The automotive industry used 1,238,447 tons of glass in 2001, accounting for about 23 percent of U.S. glass consumption.[65]
- Adjusted for imports, the automotive industry's use of glass provided 23,578 jobs in the U.S. glass industry in the year 2000.[66] [67] [68]

HEATING AND COOLING

- The U.S. auto industry used over $1.2 billion worth of air conditioning systems in 2001.[69]

INDUSTRIAL MACHINERY AND EQUIPMENT

- In 1998, 4 percent of all U.S. workers employed in industrial machinery and equipment manufacturing industries were engaged in producing automotive products, amounting to 78,500 jobs. [70] [71]

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[59] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Current Industrial Reports, Report MA325F(01)-1, Paint and Allied Products: 2001.
[60] Ibid.
[61] Ibid.
[62] Ibid.
[63] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufactures, Statistics for Industry Groups and Industries: 2000. Table 2, Statistics for Industry Groups and Industries: 2000 and Earlier Years.
[64] Ward's Motor Vehicle Facts & Figures 2002, Ward's Communications, p. 60-61.
[65] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Current Industrial Reports, Report MA327A(01)-1, Flat Glass: 2001.
[66] U.S. Industry and Trade Outlook 2000, The McGraw-Hill Companies and U.S. Department of Commerce/International Trade Administration, Table 8-12: Flat Glass (SIC 3211) Trends and Forecasts, p.8-11.
[67] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufactures, Statistics for Industry Groups and Industries: 2000. Table 2, Statistics for Industry Groups and Industries: 2000 and Earlier Years.
[68] U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Current Industrial Reports, Report MA327A(01)-1, Flat Glass: 2001.
[69] Ibid.
[70] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls By Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.
[71] Fulton, George A., et al. Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States. Winter 2001.

APPAREL AND OTHER TEXTILE PRODUCTS

- In 1998, 4 percent of all U.S. workers employed in apparel and other textile products manufacturing industries were engaged in producing automotive products, amounting to 34,400 jobs.[72] [73]
- The automotive industry used 482 million square yards of textiles in 2001, accounting for 1 percent of U.S. textile consumption.[74]

TRUCKING AND WAREHOUSING

- In 1998, 4 percent of all U.S. workers employed in the Trucking and Warehousing industries were engaged in producing automotive products, amounting to 70,700 jobs.[75] [76]

[72] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls By Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.
[73] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.
[74] American Textile Manufacturers Institute, Scope and Importance of the U.S. Textile Industry Accessed at http://www.atmi.org/.
[75] U.S. Department of Labor, Bureau of Labor Statistics, Table B1: Employees on Nonfarm Payrolls By Industry. Accessed at http://data.bls.gov/labjava/outside.jsp?survey=ee.
[76] McAlinden, Sean P., et al. Michigan Automotive Partnership Research Memorandum No. 2, Michigan: The High-Technology Automotive State. 2000.

PART III: DOWNSTREAM ECONOMIC CONTRIBUTION

This part of the study details the economic role of the use of the motor vehicle in the U.S. economy. The sheer number of vehicles and miles traveled (see Appendix 2) has created a need for a massive set of support industries. Additionally, the existence of the motor vehicle has fostered a diverse set of employment opportunities for millions of Americans. A number of downstream or aftermarket contributions are described in such sectors as energy, repair services, car rental and parking services, used vehicle sales and public highway construction.

In the following section, we first detail, in part A, the downstream economic contributions provided by the support services industries vital to maintaining the American fleet of motor vehicles. Secondly, in part B, we attempt to highlight the socioeconomic contributions resulting from the many employment opportunities that make integral use of a motor vehicle.

Many of the jobs we discuss in this section are already listed in table 1.3 and are generated by the sale of new light vehicles and related warranty service in the U.S. economy. Two other totals of U.S. employment related to the use of motor vehicles were not included in our original study. The first type of downstream employment is related primarily to maintaining and operating motor vehicles. The second type of employment is socioeconomic and is related to the use of the motor vehicle directly on the job or the recycling of vehicles themselves. These other employment contributions from the motor vehicle in the U.S. economy are added to our original 2001 study[77] final total in table 3.3 to arrive at a total U.S. employment contribution from the motor vehicle to the U.S. economy.

For each individual segment, we try to provide the share of that industry reliant upon automotive consumption, as well as the number of jobs contributed to that industry by automotive industry consumption. This information is also provided in table form as Appendix 3.

A. DOWNSTREAM IMPACTS

NEW LIGHT VEHICLE AUTOMOTIVE RETAIL

In order to sell new motor vehicles to the public and provide warranty services, OEMs have established a dealer network to handle the retail sales of cars and light trucks. In the United

[77] Fulton, George A., Sean P. McAlinden et al. *Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States*. Winter 2001.

States, there are nearly 22,000 new vehicle dealerships[78]. These dealerships together support a vast number of direct and indirect jobs. They are:

- 717,400 people were employed in 1998 by the new vehicle dealerships for the purpose of selling new vehicles and providing warranty service.[79]
- An additional 1,209,200 people were employed in 1998 in industries that supply new vehicle dealerships and also the spinoff jobs.[80] Included in this total are:
  - 168,000 employed manufacturing durable and nondurable goods
  - 46,900 construction workers
  - 17,900 truck drivers
  - 22,500 employed in credit and finance
  - 59,300 employed in wholesale trade
  - 260,500 employed in retail trade
  - 489,500 other service sector workers
  - 144,600 other private nonmanufacturing jobs

The job impacts totaled here for new vehicle automotive retail are included in table 3.3 below.

ADVERTISING

As with most goods and services, it is necessary to advertise automotive products to potential customers. Not surprisingly, automotive-related companies spend a huge amount of money advertising and differentiating their products from the offerings of their competitors. Total domestic advertising spending for 1999 in the United States was almost $88 billion. Of that, almost $14.6 billion, or 16.6 percent, was spent on automotive-related products.[81] We applied the 16.6 percent figure to the total advertising industry employment, 284,000,[82] to calculate the number of people employed as a result of automotive advertising. We estimate that 47,144 people were employed due to spending on automotive advertising in 1999.

The job impacts totaled here for advertising are included in table 3.3 below.

[78] National Automobile Dealers Association, 2001
[79] Fulton, George A., Sean P. McAlinden et al. *Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States*. Winter 2001.
[80] Ibid.
[81] Advertising Age, 1999 http://www.adage.com/page.cms?pageId=476
[82] Department of Labor, Bureau of Labor Statistics, 2000, http://data.bls.gov/cgi-bin/dsrv, accessed 12/18/02

RAIL

With about 12 million vehicles built annually at 64 large scale assembly plants concentrated mainly east of the Mississippi, there is a need to transport assembled motor vehicles and automotive parts to many areas of the country. Some vehicles can be transported by motor vehicle-carrying trucks, but the vast majority of the vehicles shipped around the country travel part of the way by railroad car. In fact, 70 percent of all U.S. produced motor vehicles are shipped by rail. Automobile-related shipping accounts for 1,265,000 carloads of railroad freight, or fully 8 percent of total annual carloads carried by America's railroads.[83] Taking 8 percent of the total number of railroad employees[84], we were able to estimate the number of employees supporting the shipments of automobiles and parts via U.S. railroads. As a result, we estimate:

- 18,400 people are employed by all U.S. railroads as a result of automotive freight

The job impacts totaled here for rail are included in table 3.3 below.

JOBS RELATED TO THE USE OF THE MOTOR VEHICLE

USED VEHICLE AUTOMOTIVE RETAIL

In 1997, there were over 23,000 used vehicle dealerships in the United States.[85] Most of these are part of a new vehicle dealership, with the rest being stand-alone operations. There are a substantial number of jobs that are dedicated to used vehicle sales and service along with the related indirect spinoff jobs. These include:

- 92,752 employees dedicated to used vehicle sales[86]
- 328,843 people employed in used vehicle operations and off-warranty service[87]

The job impacts totaled here for used vehicle automotive retail are not included in table 1.3 above but are shown as jobs related to the use of motor vehicles in table 3.1 below.

[83] Association of American Railroads http://www.aar.org/index.asp, website accessed 12/18/02
[84] Department of Labor, Bureau of Labor Statistics, 2000, http://data.bls.gov/cgi-bin/dsrv, accessed 12/18/02
[85] U.S Census Bureau-1997 Economic Census, Retail Trade Series
[86] Ibid.
[87] Ibid.

MAINTENANCE, REPAIR, RENTAL, AND PARKING

All of the motor vehicles on the road need maintenance and repair many times during their life. As a result, an extensive network of maintenance establishments including repair shops, tire dealerships, and parts stores are located throughout the country. A breakdown of these establishments follows:

- 678,600 people employed at 142,372 automotive repair establishments[88]
- 334,566 people employed at 42,519 automotive parts and accessories stores[89]
- 142,664 people employed at 17,288 tire dealerships[90]
- 137,700 people employed at 13,683 carwashes[91]
- 143,800 passenger car rental employees (includes vans, SUVs, and other light trucks)[92]
- 80,900 parking employees (includes valets)[93]

The job impacts totaled here for maintenance, repair, rental, and parking are not included in table 1.3 above but are shown as jobs related to the use of motor vehicles in table 3.1 below.

FUEL

The fuel needs of all automobiles driven on the road generate employment benefits in two ways. The first benefit is employment created at petroleum refineries and motor fuel retail stations. The second benefit is comprised of taxes collected on motor fuel by the federal and state governments. The proceeds from these taxes are earmarked for the rebuilding of infrastructure and other highway improvements, creating the need for a considerable number of construction workers employed in the road and highway construction sector.

The revenue generated by motor fuel taxes in 2001 totaled roughly $72 billion.[94] State and local expenditures on highways in 1999 totaled slightly more than $101 billion.[95] Motor fuel related employment is as follows:

[88] Department of Labor, Bureau of Labor Statistics (BLS), 2000, http://data.bls.gov/cgi-bin/dsrv, accessed 12/18/02.
[89] Ibid.
[90] Ibid.
[91] Ibid.
[92] Ibid..
[93] Ibid.
[94] American Petroleum Institute. http://api-ec.api.org/policy//index.cfm?bitmask=001001005000000000. Accessed 12/18/02.
[95] U.S. Census Bureau--http://www.census.gov/govs/www/estimate.html. Accessed 12/18/02.

- 42,100 employed in petroleum refining[96]. (Approximately 50 percent of a barrel of crude oil is made into motor fuel. Therefore, we took 50 percent of the total refinery employment listed by BLS as the employment dedicated to the automobile.)
- 21,100 employed manufacturing oil and gas field equipment[97]. (We used 50 percent of the total employment, as above.)
- 81,684 gasoline stations with convenience stores employ 613,957 people, while another 308,105 people are employed at the 45,000 other gasoline stations (no convenience store.)[98]
- 289,000 people are employed by the road and highway construction industry[99].

The job impacts totaled here for fuel are not included in table 1.3 but are shown as jobs related to the use of motor vehicles in table 3.1 below.

RECYCLING

With millions of vehicles scrapped each year (14 million in 2000[100]), there is a thriving business in salvaging useful parts from these motor vehicles. After all the useful parts are salvaged, the remaining materials—mostly metals—are separated and sold to metal recyclers where they then reenter the raw material stream. Of all the vehicles scrapped each year, 95 percent enter the recycling infrastructure. Of those vehicles, fully 75 percent of the materials are salvaged for re-use[101]. According to the Automobile Recyclers Association, there are:

- 46,000 people are employed at 6,000 recycling businesses.[102]

The sum of the other employment related to automotive recycling employment were not included in table 1.3 above and are instead added to table 3.1.

[96] Department of Labor, Bureau of Labor Statistics (BLS), 2000 http://data.bls.gov/cgi-bin/dsrv, accessed 12/18/02
[97] Ibid.
[98] Ibid.
[99] Ibid.
[100] Ward's Motor Vehicle Facts & Figures 2001, Ward's Communications, p. 60-61.
[101] Automobile Recyclers Association, 1997. http://www.autorecyc.org/. Accessed 12/18/02
[102] Ibid.

Table 3.1: Downstream Employment

Downstream Employment	**3,260,077**
Used Vehicle dealers (cars and trucks)	92,752
Used Vehicle Operations and Off-Warranty Service Employees	328,843
Automotive Repair (body, paint, and general repair)	678,600
Carwashes	137,700
Automotive parts and accessories	334,556
Tire Dealers	142,664
Gasoline Stations with Convenience Store	613,957
Other Gasoline Stations	308,105
Oil and Gas Field Machinery manufacturing	21,100
Petroleum Refining	42,100
Passenger Car Rentals	143,800
Automobile Parking	80,900
Highway and street construction workers	289,000
Automotive Recycling (scrapyards)	46,000

B. SOCIOECONOMIC IMPACTS

The motor vehicle contributes enormously to the American public's sense of personal freedom, access to employment opportunities, and quality of life. Owning an automobile ensures that anyone can choose where to live, work, shop, or travel, unconstrained by limited transportation options. By the year 2000, there were roughly 217 million vehicles on America's roads[103] (1.1 vehicles per licensed driver), traveling 2.5 trillion miles[104] (11,500 miles per vehicle), while consuming 160 billion gallons of gasoline[105] (767 gallons per vehicle). Most of the miles traveled were in direct support of the American household. According to the latest National Personal Transportation Survey (NPTS), each household averaged almost 6.5 trips daily, with the average trip length just over 9 miles[106].

Every workday, more than 118 million people (88 percent of all working Americans) drive a motor vehicle to work as their primary means of transportation—almost 90 percent of them driving alone.[107] According to the NPTS, the average workplace commute is 11.8 miles one-way, effectively creating a region of 437 square miles from which the average driver can choose

[103] Ward's Motor Vehicle Facts & Figures 2001, Ward's Communications, p. 60-61.
[104] U.S. Bureau of Transportation Statistics, National Transportation Statistics 2001, http://www.bts.gov/publications/nts/html/table_01_32.html. Accessed on 12/17/02.
[105] American Petroleum Institute. http://api-ec.api.org/policy//index.cfm?bitmask=001001005000000000. Accessed 12/18/02.
[106] National Personal Transportation Survey, U.S. Federal Highway Administration, 1995
[107] U.S. Bureau of Transportation Statistics, National Transportation Statistics 2001, http://www.bts.gov/publications/nts/html/table_01_32.html. Accessed on 12/17/02.

his or her place of employment. Additionally, an area of 98 square miles, or 5.6 miles one-way, defines the region where the average driver shops for goods and services[108].

In the following section, we attempt to quantify the socioeconomic contributions resulting from the many employment opportunities that make integral use of a motor vehicle.

OTHER EMPLOYMENT RELATED TO THE USE OF MOTOR VEHICLES

A number of people in the country make their living in occupations where a motor vehicle plays an integral role. For instance, a vast amount of goods are transported throughout the country via long- and short-haul trucks. Additionally, people with infrequent transportation needs rely on bus, taxi, and limousine drivers to take them to their destination, whereas vehicle rental firms cater to the customers whose transportation needs are longer in duration, or who need tighter control of their time.

These transportation needs generate the following employment levels:

- 3,088,000 truck drivers[109]
- 280,000 taxicab drivers and chauffeurs[110]
- 539,000 bus drivers[111]

The job impacts totaled here for occupational driving employment are not included in table 1.3 above but are shown as jobs related to the use of motor vehicles in table 3.2 below.

TRAVEL

The motor vehicle plays an integral part in the travel patterns of the American public, as more than three-quarters of all trips taken involve a car, truck or recreational vehicle (RV). An impressive number of people are employed due to the needs of automotive-traveling Americans. However, the employment figure listed here should not be totaled with the other automotive industry-derived employment, due to the problem of double-counting. Many of the travel-related jobs, such as gasoline station, convenience store, and repair shop employees have already been summed in previous sections.

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[108] National Personal Transportation Survey, U.S. Federal Highway Administration, 1995
[109] U.S. Bureau of Transportation Statistics, National Transportation Statistics 2001, http://www.bts.gov/publications/nts/html/table_01_32.html. Accessed on 12/17/02.
[110] Ibid.
[111] Ibid.

- In 2001, there were 783,860,000 domestic person-trips (at least 50 miles one-way) taken in a car, truck or RV (includes rental vehicles as primary mode). This accounts for 77 percent of all trips taken.[112]
  - 6,100,000 travel-related employees support motor vehicle travel.[113] (This figure was derived by multiplying total travel industry employment by 77 percent.)
  - $427,504,000,000 generated in motor vehicle travel-related expenditures.[114] (We applied the same 77 percent figure to total travel-related expenditures, as above.)

OTHER SOCIOECONOMIC IMPACTS

Other sectors are economically reliant on the motor vehicle industry. However, the employment that results from this reliance is difficult to derive. For instance, while we know that motor vehicle use generates a substantial amount of tunnel, bridge, and ferry fees, we have been unable to calculate total employment. Automotive-related employment in the insurance industry is similarly difficult to calculate. We provide the economic contributions below.

FINANCE AND INSURANCE

- $699 per insured vehicle[115]

BRIDGE, TUNNEL, FERRY, ROAD TOLLS

- $4,900,000,000 annual consumer expenditures.[116]

Table 3.2: Socioeconomic Employment

Socioeconomic Employment	**3,907,000**
Taxicab drivers and chauffeurs	280,000
Truck drivers	3,088,000
Bus drivers	539,000

[112] Travel Industry Association of America, http://www.tia.org/Travel/tvt.asp. Accessed 12/18/02.
[113] Ibid.
[114] Ibid.
[115] National Association of Insurance Commissioners, 2000, http://www.naic.org/pressroom/fact_sheets/Avg_Auto_Rates.doc. Accessed 12/18/02.
[116] Bureau of Economic Analysis http://www.bea.doc.gov/bea/dn1.htm

In Appendix 3, we estimate total downstream and socioeconomic employment resulting from the sale and use of the automobile to be 9.1 million. We combine this total estimate of employment related to automobiles with our table 1.3 estimates of employment contributed by new vehicle employment and sales in table 3.3. The total sum employment (netted for double-counting) is 13.3 million. The U.S. Department of Labor estimates total U.S. employment in 2001 to be 135 million. Therefore, we believe new vehicle production, sales, and other jobs related to the use of automobiles are responsible for 1 out of every 10 jobs in the U.S economy.

Table 3.3: Total Motor Vehicle Related Employment Represents 10 Percent of U.S. Employment – 1998-2001

A.	Automotive Manufacturing Related Employment	
	Total Direct Employment	621,255
	Manufacturing Supplier Employment	724,900
	Non Manufacturing Supplier Employment	1,071,100
	Manufacturing and Extraction Spinoff Employment	2,382,919
	Total	4,800,174
B.	New Car Dealership Related Employment	
	New Car Dealership Employment	717,400
	New Car Dealership Supplier Employment	366,200
	New Car Dealership Spinoff Employment	843,000
	Total	1,926,600
C.	Downstream and Socioeconomic Employment	
	Downstream Employment	3,260,077
	Motor Vehicle Use Employment	3,907,000
	Total	7,167,077
	Total Gross Employment Related to Motor Vehicles	13,893,851
	Employment Net of Downstream Employment Already Included in Spinoff and Supplier Employment Above*	13,293,851
	2001 U.S. Total Employment	135,208,000
	Automotive Share of Total U.S. Employment	9.8%

*Total Gross Employment netted by initial estimate of 600,000 jobs counted in both supplier/spinoff categories and downstream and socioeconomic categories.

APPENDIX 1

	2001	
	Pounds in Car	**Percent of Car**
Regular steel	1,349.0	41
High and regular strength steel	351.5	11
Stainless steel	54.5	2
Other steels	25.5	1
Iron	345.0	10
Plastics and composites	253.0	8
Aluminum	256.5	8
Copper and brass	46.0	1
Powder metal parts	37.5	1
Zinc die castings	11.0	0
Magnesium castings	8.5	0
Fluids and lubricants	196.0	6
Rubber	145.5	4
Glass	98.5	3
Other steels	131.0	4
Total	**3,309.0**	**100**

**Source: Ward's Motor Vehicle Facts & Figures 2002*

		Total U.S. Consumption	Value of Shipments	Value of Imports	Value of Exports	Domestic Share of Consumption	Consumption of Domestic	Automotive Consumption	Automotive Share	U.S. Employment	Adjusted. Auto. Emplmnt.
Aluminum	Thousands lbs.	24,976,000	11,325	3,950	1,365	71.6%	17,883,606	7,892,416	31.6%	81,833	18,516
Copper & Cpr Alloy	Thousands lbs.	8,196,000	2,460	1,219	631	60.0%	4,918,138	737,000	9.0%	25,824	1,393
Gray Iron	Tons	5,648,000						1,707,000	30.2%	7,481	2,261
Ductile Iron	Tons	3,992,000						1,286,000	32.2%	5,287	1,703
Malleable Iron	Tons	160,000						82,000	51.3%	211	108
Total Iron	Tons	9,800,000	72,975	13,900	4,800	83.1%	8,140,299	3,075,000	31.4%	12,982	3,384
Lead	Metric Tons	1,700,000						1,232,000	72.5%		-
Plastic	Thousands lbs.	101,958,000	53,653	5,515	11,769	88.4%	90,094,915	3,981,460	3.9%	63,793	2,201
Glass	Tons	5,417,006	2,930	520	725	80.9%	4,383,302	1,238,447	22.9%	127,451	23,578
Natural Rubber	Metric Tons	1,024,000						754,000	73.6%		-
Synthetic Rubber	Metric Tons	1,836,000						1,191,000	64.9%	10,638	6,901
Total Rubber	Metric Tons	2,860,000						1,945,000	68.0%	10,638	7,235
Alloy Steel	Tons	4,789,000						574,680	12.0%	6,345	761
Stainless Steel	Tons	1,837,000						477,620	26.0%	2,438	634
Total Steel	Tons	98,940,000	72,975	13,900	4,800	83.1%	82,183,789	14,059,000	14.2%	131,108	15,475
Paint	Millions of gallons	1,187						100	8.4%	52,867	4,458
Textile	Mill. Square Yards	45,000						348	0.8%	336,947	2,606
Zinc	Tons	1,050,000						241,500	23.0%		-
										843,443	78,846

Souce: U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufactures, Statistics for Industry Groups and Industries: 2000; Ward's Motor Vehicle Facts & Figures 2002

	SIC	Total	Automotive	Automotive Share
Primary Metal Industries	33	714,600	59,100	8%
Fabricated metal products	34	1,509,200	181,100	12%
Industrial machinery and equipment	35	2,205,800	78,500	4%
Electronic and other electrical equipment	36	1,707,100	59,400	3%
Apparel and other textile products	23	765,800	34,400	4%
Printing and publishing	27	1,564,600	40,600	3%
Rubber and miscellaneous plastics products	30	1,004,900	95,200	9%
Construction	15-17	6,020,000	91,300	2%
Trucking and warehousing	42	1,744,000	70,700	4%
Credit and Finance	61, 62, 67	1,542,300	16,700	1%
Wholesale trade	50-51	6,800,000	226,300	3%
Retail trade	52-59	22,295,000	109,100	0%
Services	70-89	36,825,100	427,100	1%
Business services	73	8,618,000	208,700	2%
Professional services	81, 87, 89	4,161,100	101,300	2%
Nonprofit services	83, 84, 86	5,111,900	9,000	0%
Other durable goods			110,200	
Other nondurable goods			66,400	
Other private nonmanufacturing			129,900	
			1,796,000	

Source: George A. Fulton, Sean P. McAlinden, and Barbara Richardson. Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States. Ann Arbor, MI: The University of Michigan Institute for Labor and Industrial Relations, The University of Michigan Transportation Research Institute, Office for the Study of Automotive Transportation, and the Center for Automotive Research, 2001 and U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual Survey of Manufactures, Statistics for Industry Groups and Industries: 2000

APPENDIX 2

GENERAL

- Total vehicles on the road—217,000,000
- Total light vehicle miles traveled—2,417,852,000,000
  - Approximately 11,500 miles per vehicle
- 160,000,000,000 gallons of motor fuels consumed annually
- 118,000,000 people use a motor vehicle as their primary means of transportation to work
  - 88 percent of all workers
- Each U.S. household averages 6.4 vehicle trips per day
- Average home-to-work distance is 11.8 miles
  - 437 square mile region
- Average shopping trip (one-way) is 5.6 miles
  - 98 square mile region

APPENDIX 3

Downstream and Socioeconomic Employment Totals

	Total	Automotive-related	Notes
Downstream Employment			
New Vehicle dealership employment (new cars, trucks, and warranty services)	717,400	717,400	
Manufacturing	168,000		
Durable Goods		103,300	
Nondurable goods		64,700	
Private Nonmanufacturing	1,041,200		
Construction		46,900	
Trucking		17,900	
Credit & finance		22,500	
Wholesale Trade		59,300	
Retail Trade		260,500	
Services		489,500	
Other Private Nonmanufacturing		144,600	
Total New Vehicle Dealer Supplier Employment	1,209,200	1,209,200	
Total New Vehicle Dealer Related Employment	1,926,600	1,926,600	
Used Vehicle dealers (cars and trucks)	92,752	92,752	
Used Vehicle Operations and Off-Warranty Service Employees	328,843	328,843	
1997 Automotive Repair (body, paint, and general repair)	678,600	678,600	
Carwashes	137,700	137,700	
Automotive parts and accessories	334,556	334,556	
Tire Dealers	142,664	142,664	
Gasoline Stations with Convenience Store	613,957	613,957	
Other Gasoline Stations	308,105	308,105	
Oil and Gas Field Machinery manufacturing	42,200	21,100	50% of barrel converted to motor gasoline. Auto-related employment is 50% of total
Petroleum Refining	84,200	42,100	50% of barrel converted to motor gasoline. Auto-related employment is 50% of total
Passenger Car Rentals	143,800	143,800	
Automobile Parking	80,900	80,900	
Highway and street construction workers	289,000	289,000	
Downstream Sub-Total		3,214,077	
Socioeconomic Employment			
Taxicab drivers and chauffeurs	280,000	280,000	
Truck Drivers	3,088,000	3,088,000	
Bus drivers	539,000	539,000	
Automotive Recycling (scrapyards)	46,000	46,000	
Socioeconomic Sub-Total		3,953,000	
Total--Downstream and Socioeconomic		9,093,677	

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