CONTRIBUTION OF TOYOTA MOTOR NORTH AMERICA TO THE ECONOMIES OF SIXTEEN STATES AND THE UNITED STATES IN 2006

PREPARED FOR

TOYOTA MOTOR NORTH AMERICA, INC.

BY

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The statements, findings, and conclusions herein are those of the authors and do not necessarily reflect the views of the project sponsor.

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Kim Hill, MPP
Associate Director, Economics and Business Group
Director, Automotive Communities Program

Debbie Maranger Menk
Project Manager

Center for Automotive Research
1000 Victors Way, Suite 200
Ann Arbor, MI 48108
734.662.1287
www.cargroup.org

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Executive Summary

In 1957, Toyota Motor Sales U.S.A., Inc. set up a small dealership in Hollywood, California. By 1975, Toyota became the bestselling import brand in the United States. In 1986, Toyota began manufacturing operations in the United States with General Motors at a joint-venture manufacturing facility in Fremont, California. In 2003, Toyota crossed the two million sales threshold for the first time and in 2006 Toyota sold over 2.5 million vehicles in the United States. The process of building motor vehicles necessitates a great many workers assembling those vehicles. In addition to the workers employed in Toyota's U.S. assembly operations, many more people are needed to supply the goods and services that are directly or indirectly related to the operations of a motor vehicle company. This study will estimate the total number of workers related to Toyota's U.S. motor vehicle assembly operations.

This study is an update of an earlier study published by the Center for Automotive Research, "Contribution of Toyota to the Economies of Fourteen States and the United States in 2003," published by CAR with two states – Illinois and Mississippi – added. This study has two distinct purposes: (1) to estimate the employment and economic contributions of Toyota's manufacturer-related operations (defined in this analysis as: manufacturing, marketing, distribution, research, development and design, headquarters, and all other operational activities within the company) and dealer-related operations to the nation as a whole and sixteen individual states, and (2) to forecast an estimate of the employment and economic impact of the recently announced vehicle manufacturing facility in Tupelo, Mississippi to the economy of the State of Mississippi.

These estimates were derived using the latest version of a state-of-the-art economic model with direct employment and compensation inputs (as of December 31, 2006) supplied by Toyota Motor North America. For manufacturer-related activities in 2006, Toyota directly employed 33,187 people compensated at $2.6 billion, while an additional 85,040 people were employed at Toyota, Lexus and Scion dealerships selling and servicing new Toyota vehicles and compensated at $3.6 billion (see Table 2.9 on page 38 for further details). The 2006 manufacturing-related employment represents an increase of more than 4,000 people from 2003, with annual compensation up by $700 million in 2006 from 2003, while new vehicle sales and service-related employment increased by more than 10,000 people and their annual compensation increased by $1 billion when compared with 2003.

Using the 2006 direct employment and compensation figures as modeling inputs, this study estimates:

- Approximately 381,398 private sector jobs, and $24.48 billion in annual compensation, are generated by Toyota's total U.S. automotive operations, including new vehicle development and production, along with sales and service of new Toyota vehicles. This total includes direct employment at Toyota and in its dealership network in the United States. The total also includes intermediate, or supplier, employment and spin-off jobs that are created as a result of the spending of Toyota's direct employees and their suppliers in the United States. These estimates are separate from the forecasted employment impacts of Toyota's new assembly facility in Tupelo, Mississippi (see below).
- Direct, intermediate, and spin-off employment generated by Toyota's manufacturer-related activities in the United States is estimated to be approximately 198,668 jobs in the private sector, with an associated compensation of $13.7 billion.
- Total direct, intermediate, and spin-off employment generated by Toyota's new vehicle sales and service of new vehicles in the United States is estimated to be about 182,730 jobs in the private sector, with an associated compensation of approximately $10.8 billion.
- The estimated forecast of direct, intermediate, and spin-off employment in the State of Mississippi from the Tupelo assembly facility, once it is fully operational, is approximately 4,320 jobs, with an expected annual compensation of $261.6 million.

This study indicates job creation is occurring on a very large scale as a result of Toyota's U.S. operations, but not at the level of the job creation numbers from the previous study. Many supplier jobs from throughout the U.S. automotive industry have moved out of the country dramatically reducing overall employment in the supplier sector's lower tiers. However, the remaining jobs in the U.S. auto industry and those contributed to by the industry are, on average, very well-compensated. The estimated 381,398 jobs generated as a result of Toyota's U.S operations generate more than $24 billion in annual compensation, an increase of $10 billion over the 2003 study's compensation estimates.

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Introduction

The motor vehicle industry is the largest manufacturing industry in the United States. No other single industry is linked so closely to the U.S. manufacturing sector or directly generates so much retail business and employment. This study describes the economic contribution of an important company included in the U.S. motor vehicle industry: Toyota's U.S. operations.

The importance of this study is directly related to the importance of foreign direct investment and operations in the sustainability of the overall U.S. automotive industry. While there has been a necessary restructuring of the domestic auto industry in the United States, international manufacturers have continued to expand operations in the United States. Toyota was one of the international automakers to make this decision. A better understanding, then, of the role of Toyota in the U.S. economy leads to a better understanding of the industry as a whole and how it will change in the future and further impact the U.S. economy.

The Center for Automotive Research (CAR) conducted an earlier study, "Contribution of Toyota to the Economies of Fourteen States and the United States in 2003."[1] This current study updates that study and describes the economic contribution of Toyota's total manufacturing and non-manufacturing operations in the United States. The first section of the current study, presents an updated overview of Toyota's 50-year history in the United States. The report also discusses Toyota's achievements in sales, production, and quality performance.

The second section of the study estimates the contribution of Toyota's U.S. operations and dealership partners to employment and income to the economies of sixteen states and the United States in 2006. The 16 states analyzed in detail include Michigan, Alabama, Arkansas, California, Georgia, Illinois, Indiana, Kentucky, Maryland, Mississippi, Missouri, North Carolina, Ohio, Tennessee, Texas and West Virginia. Toyota's economic contribution was analyzed using an economic model provided by the Regional Economic Modeling, Inc. (REMI). Additionally, the REMI economic model is used to empirically analyze the additional impact on the Mississippi economy of Toyota's future assembly facility in Tupelo, Mississippi. The facility's expected annual contribution to employment and income in Mississippi is estimated through 2014.

The employment and compensation data used to perform the research was, in the case of Toyota's U.S. operations, provided by Toyota. The remaining data on the U.S. economy and

[1] Hill, Kim. "Contribution of Toyota to the Economies of Fourteen States and the United States in 2003" Center for Automotive Research, Ann Arbor Michigan, 2003

the automotive industry was collected by CAR from a wide variety of publicly available sources, which are listed in the Reference section.

Section I: Overview

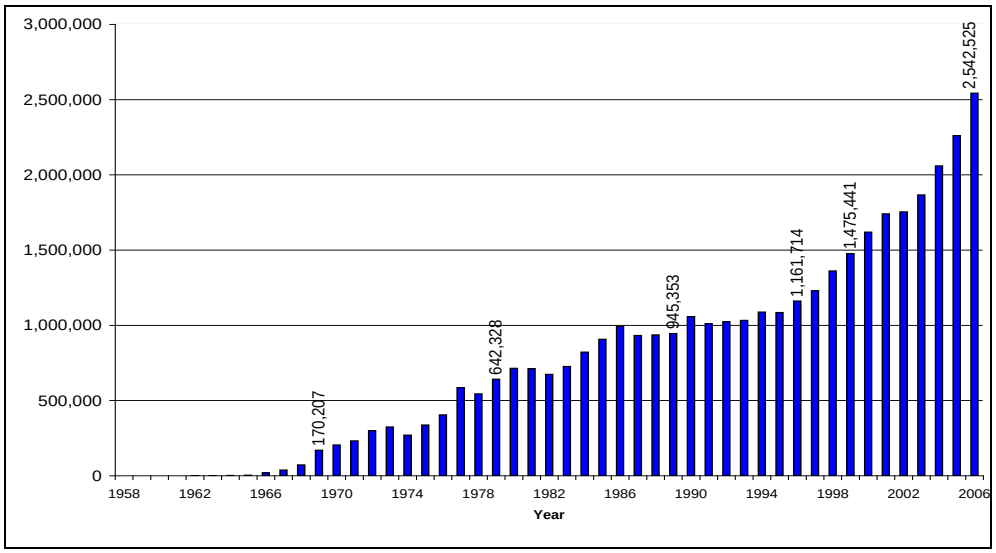
Toyota's stated mission is to enrich society through building cars. As Toyota's 2006 annual report states,

> *"This means we realize we have a higher responsibility than just being a profitable company. For long-term success, we know Toyota must contribute to the betterment of society, to our employees and to future generations...We want to be a company that can continue to grow in any era and in any conditions…Always welcoming change and eager to take on challenges, we are transforming…in preparation for making our next stride forward."*

It is fitting to start a report such as this with this statement. An economic impact study, at its heart, is the study of how many additional economic opportunities are provided as the result of a given industry. Contributing well-paying jobs to society and thus improving its overall quality of life is part of the social contract. In this first section, the study tracks Toyota's growth as a company in the United States, while the second section details what Toyota contributes back to the U.S. society through job creation. This study also serves as a proxy for the contributions of the U.S. auto industry, of which Toyota is a subset, to the U.S. economy.

Toyota began selling vehicles in the Unites States in 1958. Its initial offerings were—apart from a small number of Toyopet sedans—Land Cruisers. The introduction of the Toyota Corona sedan in 1965 helped Toyota achieve its first sales success, with total U.S. vehicle sales amounting to 37,890 units in 1966. Figure 1.1 illustrates Toyota's complete U.S. sales history. Since first documenting Toyota's U.S. sales in the first report in 2003, the company has seen sales climb above 2 million and reaching just over 2.5 million units in 2006 when the company attained a U.S. light vehicle market share of 15.4 percent.

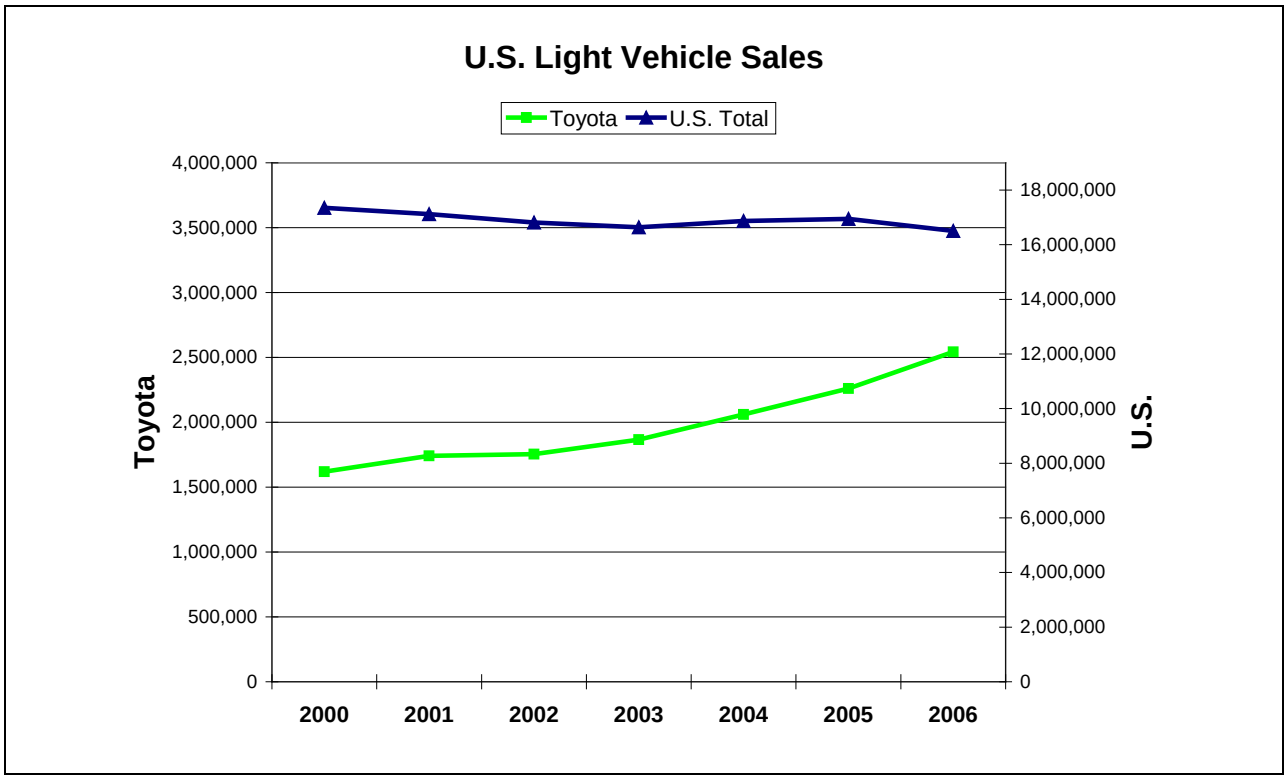
Figure 1-1: Toyota U.S. Sales: 1958 – 2006



Sources: Ward's Automotive Yearbooks 1998 – 2007; Automotive News Global Market Data Books 1996 - 2007.

At the time of the earlier study, Toyota's annual sales had just topped 2 million vehicles. This represents growth in sales of nearly 25 percent or more than 10 percent annually from 2003 to 2006. This growth in sales comes at a time when overall light vehicle sales in the U.S. have stayed flat at about 16 million vehicles per year. Not only have overall vehicle sales stayed flat, but an intensely global marketplace has brought in more competitors, more products and more variety of products for U.S. consumers. As can be seen in figure 1.2, this has typically meant that North American vehicle manufacturers have found themselves losing market share – not Toyota.

Figure 1-2: U.S. Light Vehicle Sales, National and Toyota: 2000 – 2006



Toyota has been manufacturing vehicles in the United States for more than 20 years. Toyota's U.S. production began in 1986 with a joint venture with General Motors in the New United Motor Manufacturing, Inc. (NUMMI) operation in Fremont, California. Toyota's first fully owned U.S. assembly facility, located in Georgetown, Kentucky, began producing the Toyota Camry in 1988. Figure 1.3 shows total light vehicle production in the United States and for Toyota, while figure 1.4 illustrates Toyota's U.S. vehicle production history. As can be seen, Toyota's U.S. production has risen steadily to a level of 1,209,381 units in 2006. This production level will continue to grow when Toyota's Tupelo, Mississippi assembly facility begins producing the Toyota Highlander in 2010 at a capacity level of 150,000 units.

Figure 1-3: U.S. Light Vehicle Production, National and Toyota: 2000 - 2006

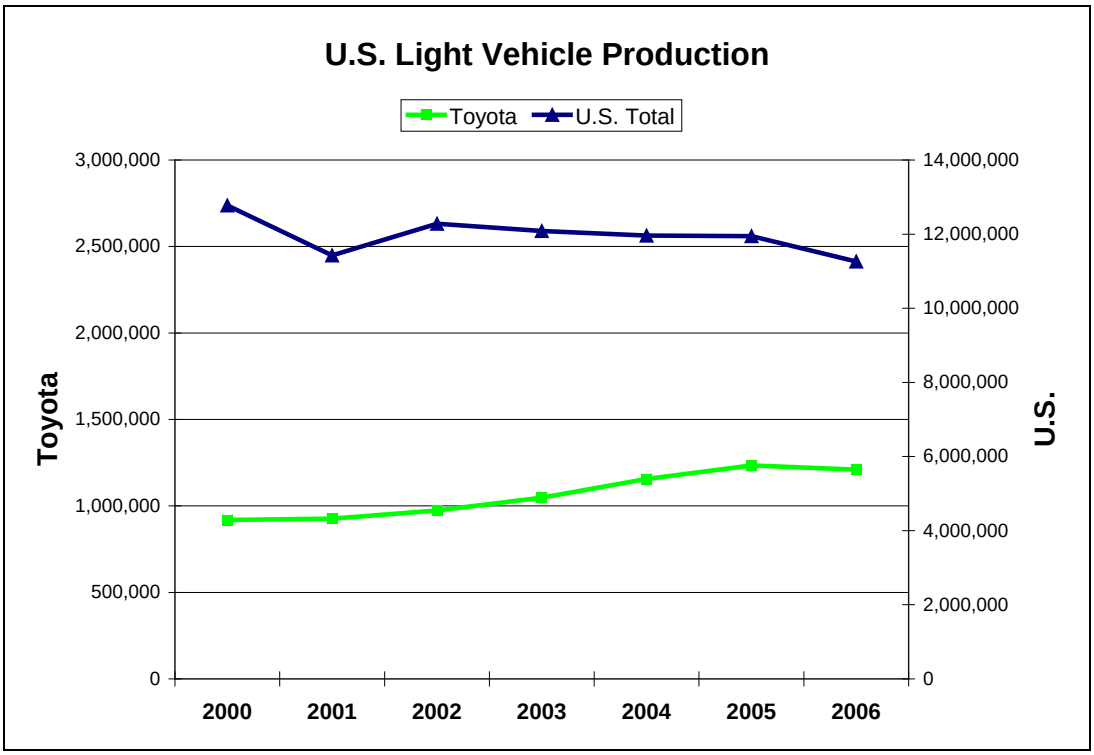
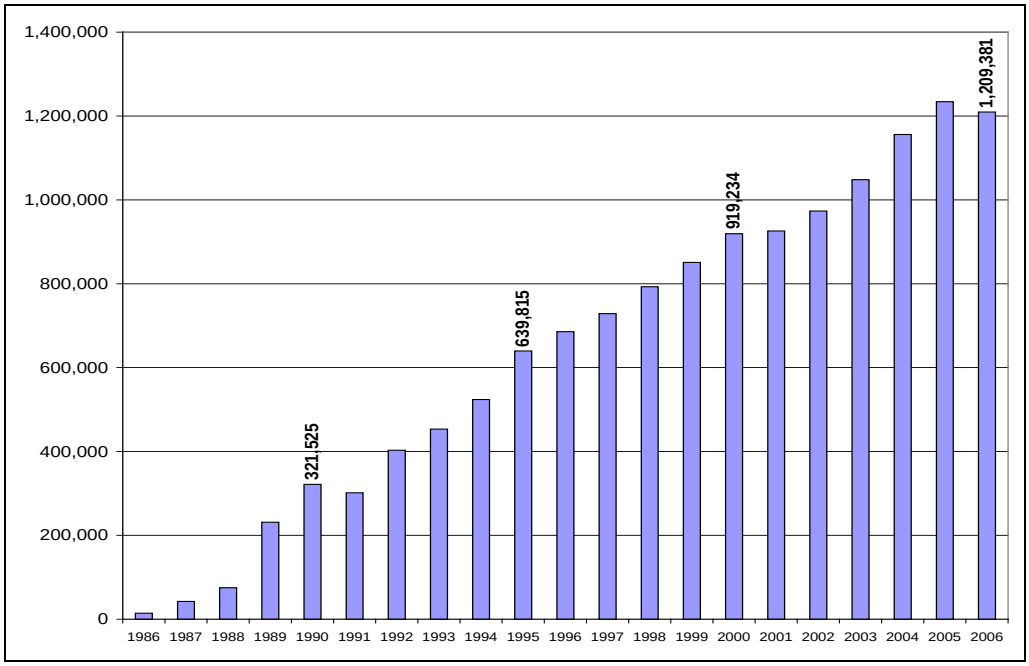


Figure 1-4: Toyota U.S. Production: 1986 - 2006



Sources: Ward's Automotive Yearbooks 1998 – 2007; Automotive News Global Market Data Books 1996 - 2007.

Table 1.1 details Toyota's assembly plants in the United States. Table 1.2 shows Toyota engine production in the United States. Approximately 20,500 Toyota employees were reported at its assembly, powertrain and engine operations in 2006. Not all of these employees, however, were engaged in manufacturing at these sites, and as the second section of this study shows, total Toyota U.S. employment exceeded 33,000 in 2006. Many employees work in such non-manufacturing operations as research, development and design, marketing, administration, purchasing, port services, warehousing, and other corporate duties. Table 1.3 shows Toyota's announced increase of more than 2,000 U.S. manufacturing jobs by 2010. Most of these jobs will be located at a new assembly plant in Mississippi—which is a special focus later in this study.

Table 1-1: Toyota U.S. Motor Vehicle Assembly Facilities

Facility Location	Product	Employment	2006 Production
Georgetown, KY (Assembly)	Vehicles	6,124	503,888
Fremont, CA (NUMMI)	Vehicles	5,142	370,299
Princeton, IN	Vehicles	4,666	327,065
San Antonio, TX	Vehicles	1,986	3,518
Total		*17,918*	*1,204,770*

Sources: Toyota. The Center for Automotive Research. Ward's Automotive Yearbooks 1998 – 2007; Automotive News Global Market Data Books 1996 - 2007

Table 1-2: Toyota U.S. Motor Vehicle Powertrain Manufacturing Facilities

Facility Location	Product	Employment	2006 Production
Georgetown, KY (Engine)	Engines	723	502,642
Buffalo, WV	Engine & Transmissions	1,002	431,949 380,556
Huntsville, AL	Engines	889	262,042
Bodine Aluminum Troy & St. Louis, MO, Jackson, TN	Heads, Blocks Engine Components	984	Heads:1,821,634 Blocks: 1,218,396

Sources: Toyota. The Center for Automotive Research. Ward's Automotive Yearbooks 1998 – 2007; Automotive News Global Market Data Books 1996 - 2007.

Table 1-3: Toyota Planned Facility Additions and Expansions

Facility Location	State	Additional Employment	Capacity in Thousands	Investment in Millions	Year Complete
Subaru of Indiana Automotive, Inc.	IN	2,000	100	$230	2007
Toyota Technical Center, U.S.A, Inc.	MI	400		$187	2010
Toyota Motor Manufacturing, Mississippi, Inc.	MS	2000	150 *(announced)*	$1,300	2010
Total		*4,400*	250	*$1,717*	

Sources: Toyota and research by the Center for Automotive Research.

Motor vehicle manufacturing employment and vehicle parts manufacturing employment trends in the United States have been in decline since 2003. Motor vehicle manufacturing employment has dropped by 28,500 people and 10.8 percent between 2003 and 2006 as seen in figure 1.5. Similarly, motor vehicle parts manufacturing in the same time period has dropped 53,700 jobs or 7.6 percent as shown by figure 1.6. However, between 2003 and 2006, Toyota has been adding employment at its manufacturing facilities. Overall, a phenomenon has been building in the industry during the last decade and is only now beginning to show in the economic modeling: despite increasing numbers of direct assembly employment, many lower tier supplier jobs in the industry have moved offshore in attempts to lower production costs, thus bringing the overall employment count down.

Figure 1-5: Motor Vehicle Manufacturing Employment, 2003 – 2006

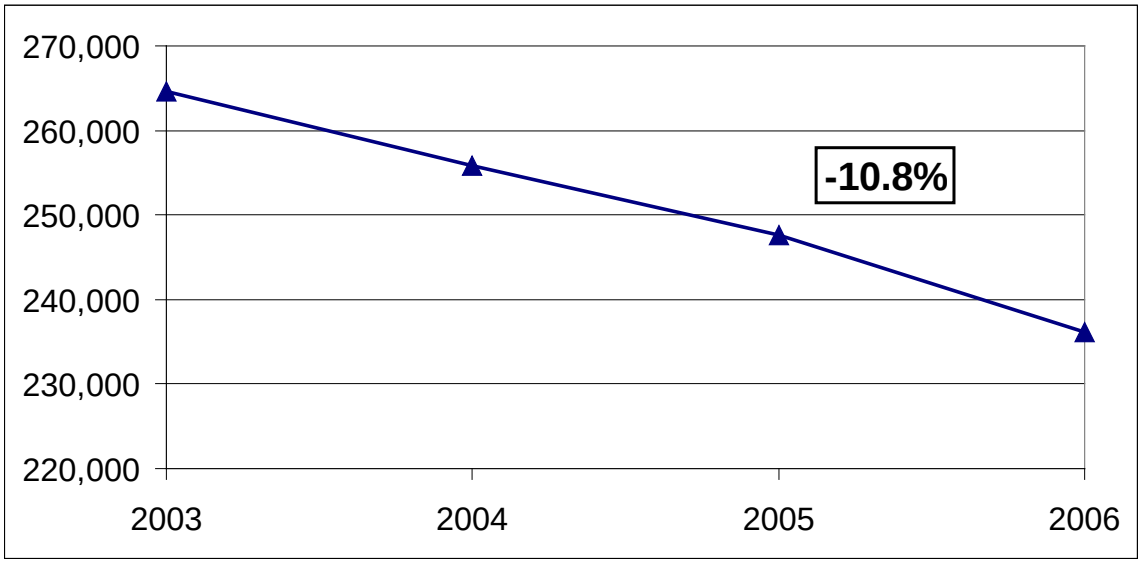
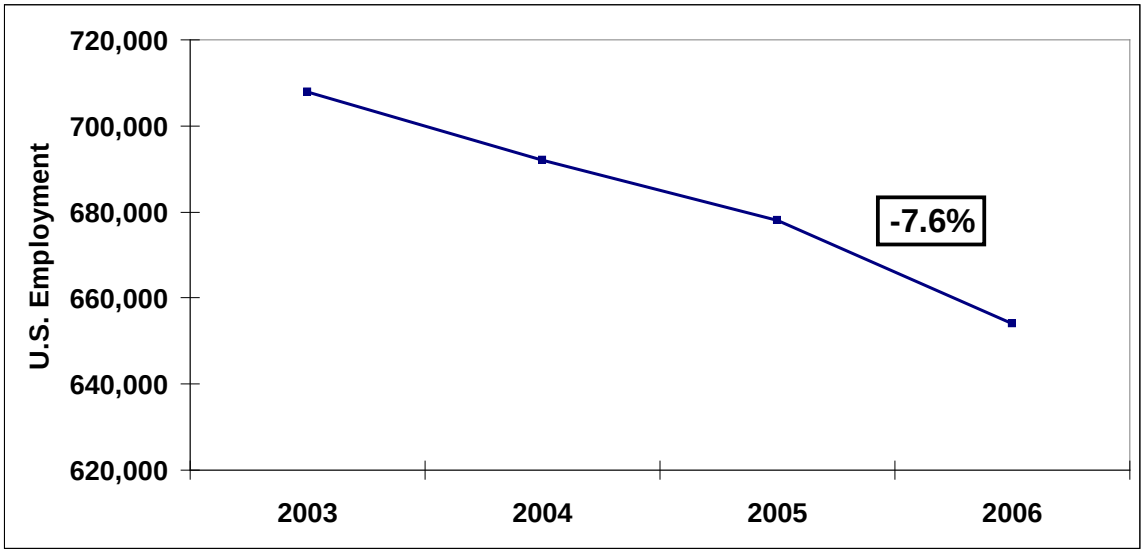


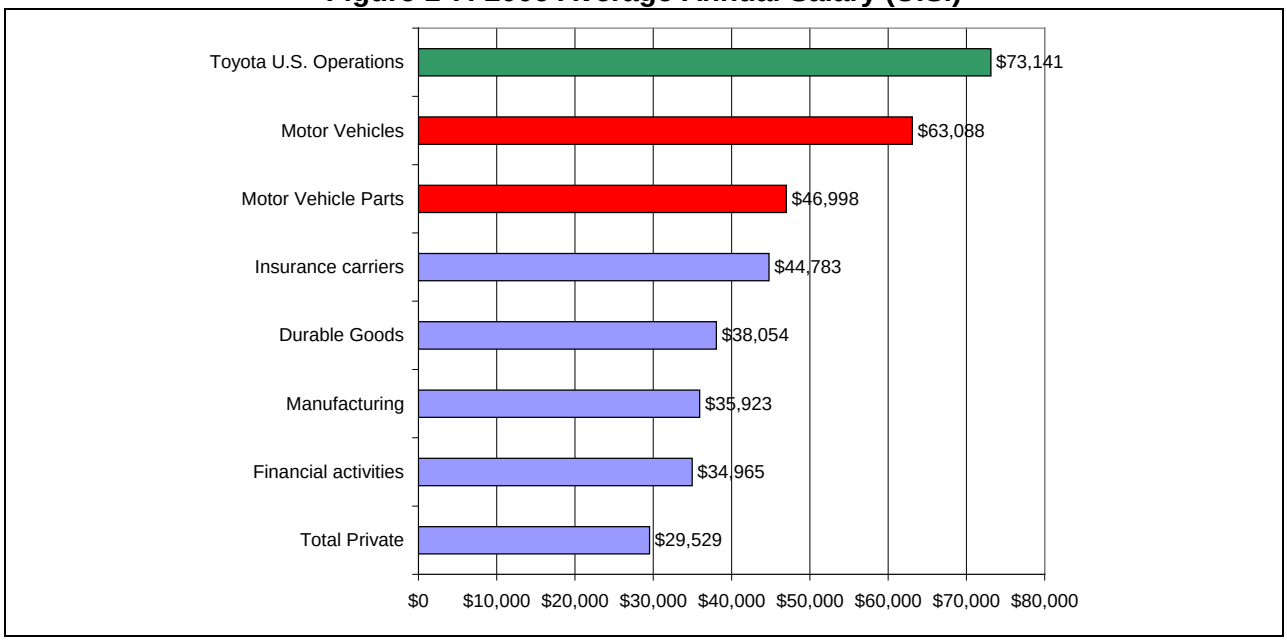
Figure 1-6: Motor Vehicle Parts Manufacturing Employment, 2003 – 2006



Compensation

A relative comparison of Toyota per-employee payroll is given in figure 1.7. The Toyota 2006 U.S. average of $73,141 per employee is based on information collected from the company for this study and compares quite favorably to the overall industry average of $63,088 for all motor vehicle producers. The Toyota and motor vehicle company averages are well above averages in such industries as insurance, durable goods manufacturing, and the financial sector (as reported by the U.S. Department of Labor's Bureau of Labor Statistics). In fact, the average U.S. job in 2006 provided only $29,529, less than one half of Toyota's average compensation level.

Figure 1-7: 2006 Average Annual Salary (U.S.)

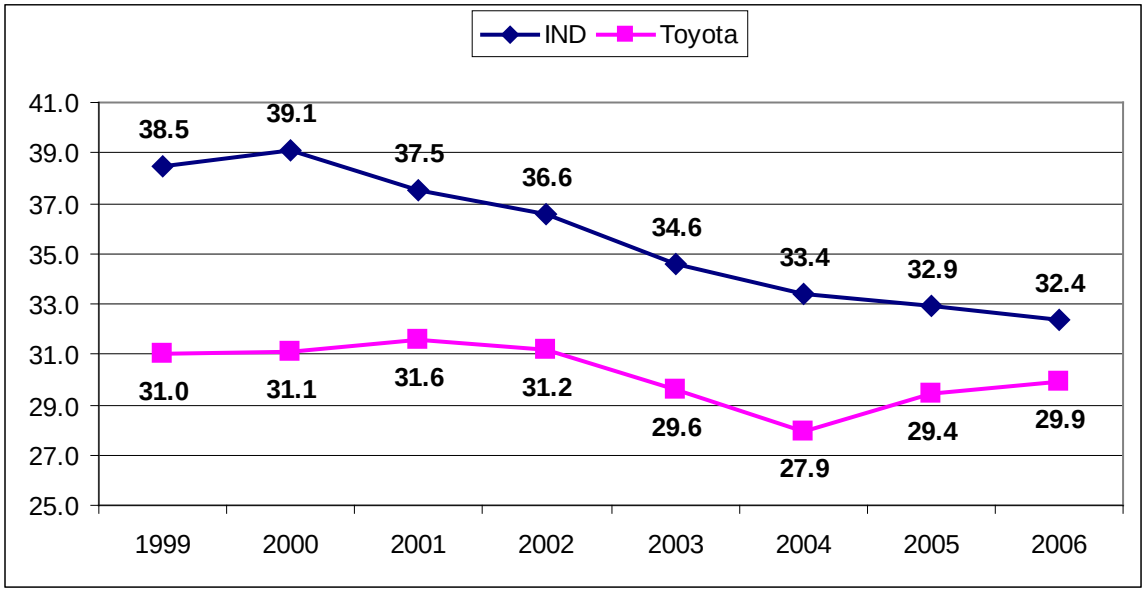


Sources: Toyota, the Center for Automotive Research, and the Bureau of Labor Statistics, Employment Series CEU.

The Leaders of Lean Manufacturing

Toyota is well known for its lean manufacturing practices, which almost every other automaker has attempted to adopt. Philosophies that stress the elimination of waste throughout the Toyota system and constant improvement are characteristic of Toyota operations in manufacturing and non-manufacturing. Toyota also believes that, "Eliminating waste is just one-third of the equation for making lean successful. Eliminating overburden to people and equipment and eliminating unevenness in the production schedule are just as important."[2] Figure 1.8 illustrates the total Hours Per Vehicle (HPV) of manufacturing labor input (a total of hours used in vehicle assembly, engine and transmission assembly, and stamping of major vehicle body panels), as reported in the well-respected *Harbour Report*[3] over the last five years. Harbour's HPV analysis is the most reliable manufacturing productivity comparison available for the North American auto industry. The HPV for Toyota, as well as a composite figure for the other major automakers producing vehicles in the United States, is shown for the last seven years.

Figure 1-8: Harbour Total Hours per Vehicle
Toyota vs. Industry
Productivity Estimates: 1999 – 2006



Sources: The Harbour Report 2000 – 2007, Harbour Consulting. Research by the Center for Automotive Research.

The complexity of the content of vehicles has increased significantly in recent years, particularly with the growth in electronic components integrated into vehicles. Additionally, the variety of

[2] Liker, Jeffery "The Toyota Way: 14 Management Principles From The World's Greatest Manufacturer" New York: McGraw-Hill, 2004. p.38

vehicles introduced into the market has greatly increased. These factors have made quality control a challenge for all automakers. Regardless, Toyota has maintained productivity levels that are higher than the average level of the rest of the industry.

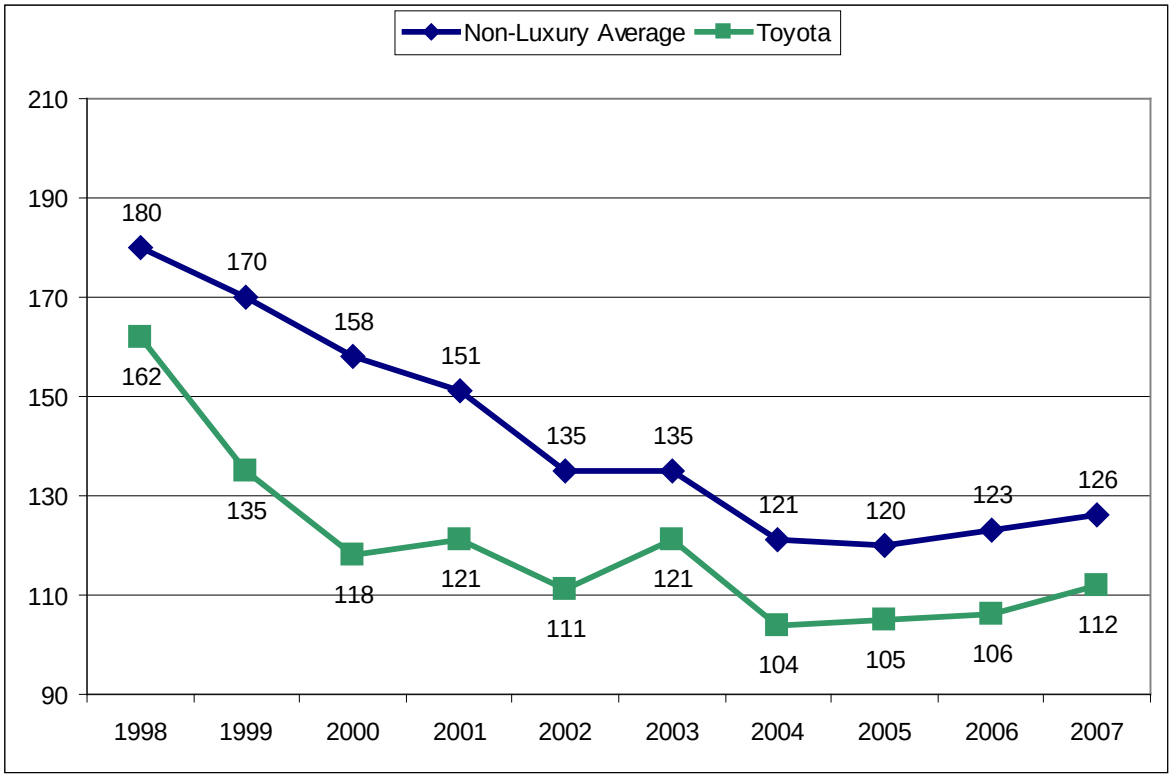
The importance of Toyota's productivity demonstration in the U.S. economy isn't, of course, restricted to the auto industry which uses Toyota's performance as a standard benchmark for improvement. Many companies throughout U.S. manufacturing and, indeed, in the service and retail sectors, also benchmark Toyota and its practices for productivity improvement. The U.S. economy has recently experienced strong, almost historic, productivity growth in recent years. Although the source of this growth can be partially attributed to the greater use of information technology, some observers also point out the competitive effect of international companies on the entire U.S. economy.[4]

3 Harbour and Associates. The Harbour Report 2003. Troy, MI, and Harbour Consulting. The Harbour Report, North America. 2004-2007, Troy, MI.

4 For instance, see: Spear, Steven, and Brown, H. Kent "Decoding the DNA of the Toyota Production System". Boston: Harvard Business Review. Sept/Oct 1999 Vol. 77, Issue. 5.; Spear, Steven "Learning to Lead at Toyota." Harvard Business Review. Boston: May 2004 Vol. 82, Issue. 5.; Furman, Cathie "Implementing a Patient Safety Alert System". Nursing Economics. Pitman: Jan/Feb 2005 Vol. 23, Issue 1.; Elsey, Barry "The Training and Development of Kaizen and Technology Transfer Instructors in the Toyota Corporation: A Practical and Conceptual Perspective in Human Resource Development". Training & Management Development Methods. Bradford: 2001 Vol. 15, Issue 4.; Kasul, Ruth A., Motwani, Jaideep G. "Successful Implementation of TPS in a Manufacturing Setting: A Case Study". Industrial Management + Data Systems. Wembley: 1997 Vol. 97, Issue 7.; Gross, John M., McInnis, Kenneth R. "Kandan Made Simple Simple: Demystifying and Applying Toyota's Legendary Manufacturing Process." New York: ANACOM, 2003.; Besser, Terry L. "Team Toyota: Transplanting the Toyota Culture to the Camry Plant in Kentucky". New York: State University of New York Press, 1996.; Womack, James P., Jones, Daniel T., Roos, Daniel "The Machine That Changed the World: The Story of Lean Production". New York: Harper Collins, 1990.; Liker, Jeffery "The Toyota Way: 14 Management Principles From The World's Greatest Manufacturer" New York: McGraw-Hill, 2004.; Taiichi, Ohno "Toyota Production System: Beyond Large-Scale Production" New York: Productivity Press, 1988.

The high levels of productivity achieved by Toyota's U.S. manufacturing operations are achieved jointly with the high quality of its products. Figure 1.9 illustrates the well known Initial Quality Study (IQS) results from the highly-regarded independent firm, J.D. Power and Associates. The number of problems reported per 100 vehicles in the first 90 days (PP100) is shown for all non-luxury vehicles sold in the United States, as well as Toyota Division vehicles (not including Lexus), during 1999-2006. Although the overall industry has posted impressive improvements in quality during this time period, Toyota has maintained its lead in quality. During the seven-year period analyzed, Toyota's PP100 score has decreased from 162 to 112, an improvement of 30 percent. While the industry as a whole has improved its quality performance, Toyota has been able to maintain an advantage during the timeframe of this analysis.

Figure 1-9: Non-Luxury Vehicles Problems per 100 Vehicles: 1998 – 2007



Sources: J.D. Power and Associates Initial Quality Study (IQS) 2007, Center for Automotive Research..

Sustainable Development

Toyota aims "for growth that is in harmony with the environment throughout all areas of business activities." They "strive to develop, establish and promote technologies enabling the environment and economy to coexist harmoniously."[5]

While Toyota has set a moving standard in world class manufacturing productivity and quality, it has also made a corporate commitment to setting another standard in environmental technology in motor vehicles. For example, the Toyota Prius is an international symbol of marketable "green" vehicles and continues to generate high levels of demand. The "Greenest Vehicles" list from the American Council for an Energy Efficient Economy (ACEEE) is reproduced in table 1.4. The list takes fuel economy and engine emissions into consideration when ranking vehicles using a "Green Score." This chart shows the rankings of vehicles at the time of publication, and does not use the new testing methods for hybrids that will be issued for 2008. In the 2007 rankings, Toyota placed four vehicles in the top 10; two of the top five "greenest" vehicles are Toyotas.

In addition to reducing fuel consumption and engine emissions, Toyota has dedicated itself to protecting the environment by producing its vehicles in environmentally-friendly facilities. Toyota has achieved a 50 percent reduction in landfill waste from its manufacturing facilities. Two of its plants, in West Virginia and Alabama, send less than five percent of their hazardous waste to landfills. Toyota's manufacturing processes focus on reducing waste, reducing emissions and reducing the use of substances of concern. Toyota has worked to support automobile recycling and has developed methods to dismantle vehicles and reclaim materials from end-of-use vehicles.

[5] Toyota Annual Report, 2006. Pg 55.

Table 1-4: American Council for an Energy Efficient Economy
Greenest Vehicles for 2007 List

Make and Model	Specifications [a]	Emission Standard[b]	MPG: City	MPG: Hwy	Green Score
Honda Civic GX	1.8L 4, auto [CNG]	Tier 2 bin 2 / PZEV	28	39	57
Toyota Prius	1.5L 4, auto CVT	Tier 2 bin 3 / PZEV	60	51	55
Honda Civic Hybrod	1.3L 4, auto CVT	Tier 2 bin 2 / PZEV	49	51	53
Nissan Altima Hybrid	2.5L 4, auto CVT	PZEV	42	36	48
Toyota Yaris	1.5L 4, manual	Tier 2 bin 5 / ULEV II	34	40	47
Toyota Corolla	1.8L 4, manual	Tier 2 bin 5 / ULEV II	32	41	46
Toyota Camry Hybrid	2.4L 4, auto CVT	Tier 2 bin 3 / PZEV	40	38	46
Honda Fit	1.5L 4, manual	Tier 2 bin 5 / LEV II	33	38	45
Kia Rio / Rio 5	1.6L 4, manual	Tier 2 bin 5 / ULEV II	32	35	45
Hyundai Accent	1.6L 4, manual	Tier 2 bin 5 / ULEV II	32	35	45
Hyudai Elantra	2.0L 4, auto	PZEV	28	36	45
Honda Civic	1.8L 4, auto	Tier 2 bin 5 / ULEV II	30	40	44

[CNG] denotes compressed natural gas fuel.
"auto CVT" denotes continuously variable automatic transmission.
[a] Certain other configurations of these models (with different transmissions or meeting different emission standards) score nearly as well.
[b] A listing with two emission standards (e.g., Tier 2 bin 2/ PZEV) denotes a single vehicle carrying both a Federal and California emission certification. Green Scores for such listings reflect the cleaner of the two certifications.
[c] Compressed natural gas (CNG) vehicle fuel economy given in gasoline-equivalent miles per gallon.

Source: American Council for an Energy Efficient Economy. (The Greenest Vehicles of 2007.

In summary, a company can contribute to an economy in many ways beyond its level of current employment and income, or the employment and income it might generate at other firms. The guiding principles at Toyota emphasize business operations that are dedicated to the best interests of the company's customers, employees, shareholders, business partners, and local and global communities. Economists have recognized innovation, productivity performance, and the inherent value or quality of products as major benefits of a company's contribution—especially when it provides a model to other firms to emulate within an industry or throughout an entire economy (even if forced only by competition). In recent years, the value of environmental performance has certainly become more recognized. This study estimates the employment and income benefits of Toyota's current contribution to the economy. As Toyota becomes further ingrained in the U.S. economy, its indirect contributions to the betterment of U.S. society will continue to accumulate.

Section II: The Economic Impact Analysis

The economic impact analysis is divided into three parts. The first part details the economic contribution of Toyota's U.S. operations to the economy of the United States and also specifically the states of Michigan, Alabama, Arkansas, California, Georgia, Illinois, Indiana, Kentucky, Maryland, Mississippi, Missouri, North Carolina, Ohio, Tennessee, Texas and West Virginia. Results in this part include national and regional analyses of the economic contributions attributed to the manufacturing, marketing, distribution, research, development and design, headquarters, and all other operational activities within the company. For simplicity, all of these activities will be referred to in the report as manufacturer-related operations. These activities constitute the complete operations of Toyota, a vehicle manufacturer and sales firm, in the United States. The second part, referred to as dealer operations, takes a detailed look at Toyota's new vehicle dealers and their economic contributions throughout the same sixteen states and the country as a whole. The third part of the report forecasts expected additional contributions to the Mississippi state economy resulting from the construction and subsequent assembly operations of the recently announced assembly facility being built in the Tupelo, Mississippi region.

This study is the first economic impact study performed by CAR which shows the effects of globalization and the adverse employment impacts of lower tier, high labor content operations being moved offshore from the United States. The entire automobile industry has over the past decade, or more, striven to reduce costs. A necessary component in this effort has been to move higher labor content parts-making operations to lower wage countries. While many arguments can be made as to the wisdom of such wholesale decisions, it is clear the impact on the U.S. parts supplier labor market have been dire.

What this study shows, for the first time, is a significant reduction in the jobs multiplier—derived by dividing total employment by direct employment. While this study is an analysis using Toyota-supplied data, this is not a Toyota-specific phenomenon. This study then becomes a look at the industry on average and serves as a proxy for the industry. However, while the jobs multiplier may be lower than previous studies, there is a significant increase in overall compensation and, thus, average compensation per employee.

Vehicle Manufacturer Activities

The tables in this section detail the estimated employment and income contributions by Toyota's U.S. manufacturer-related operations to the private sector economies of the sixteen states and country as a whole as of December 31, 2006. The estimates of employment are broken out by direct employment (people employed directly by Toyota); intermediate employment (people employed by suppliers who supply Toyota and the suppliers who supply them); and spin-off employment (expenditure-induced employment resulting from spending by direct and intermediate employees who earn an income as a result of Toyota-related activities).

Employment and income estimates are derived from analyses using a regional economic model, supplied by Regional Economic Models, Inc. (REMI), of Amherst, MA. The model and methodology used will be further discussed in a later section. Direct employment data was provided by Toyota, with the intermediate and spin-off effects generated by the model. Direct employment data included white- and blue-collar job classifications.

Complete U.S. manufacturer-related operations employment and payroll data supplied by Toyota totaled 33,187 employees who were compensated over $2.6 billion annually, as of December 31, 2006. The employment and payroll data was coded according to NAICS into six categories for input into the model—motor vehicle manufacturing (category numbers: NAICS 3361-3363); management of companies (NAICS 551); professional, scientific and technical services (NAICS 541); securities, commodity contracts and investments (NAICS 523); warehousing and storage (NAICS 493); and wholesale trade (NAICS 42). The motor vehicle assembly data is netted for production at the New United Motor Manufacturing, Inc. (NUMMI) plant a joint venture between Toyota and General Motors which builds Pontiac Vibes for GM and Toyota's Corolla. GM's share of NUMMI production is slightly less than 25 percent. Subtracting 25 percent off the total employment and payroll at NUMMI provides the net employment and payroll necessary for production of Toyota vehicles at the plant.

As can be seen in table 2.1, there are 58,930 intermediate jobs resulting from Toyota's direct employment. The sum of employment in the direct and intermediate categories totals 92,117 total jobs. The spin-off jobs associated with spending (from the people who work in the direct and intermediate jobs) add another 106,551 jobs, bringing the total jobs associated with Toyota's automotive activities in the United States (direct plus intermediate plus spin-off) to 198,668 jobs. The ratio of total jobs created (direct plus intermediate plus spin-off) to direct employment equals the employment multiplier of 6.0 (198,668 ÷ 33,187). This means there are 5.0 additional jobs in the U.S. economy for every one job at Toyota.

Table 2-5: Total Contribution of Toyota's Manufacturer-related Operations to the Private Sector Economy in the United States, 2006

Economic Impact	Manufacturer-related
Employment	
Direct	33,187
Intermediate	58,930
Total (Direct + Intermediate)	92,117
Spin-off	106,551
Total (Direct + Intermediate + Spin-off)	198,668
Multiplier: (Direct + Intermediate + Spin-off)/Direct	6.0
Compensation ($billions nominal)	13.716
Less: transfer payments & social insurance contributions	-2.464
Less: personal income taxes	-1.764
Equals private disposable personal income ($billions nominal)	9.488
Contribution as % of total private economy	
Employment	0.11
Compensation	0.10

Compensation in the private sector associated with the total jobs (direct plus intermediate plus spin-off) amounts to $13.7 billion. After accounting for transfer payments, social insurance contributions, and personal income taxes, the private disposable personal income (or personal income after taxes, including transfers) is over $9.4 billion in 2006.

To put the compensation and employment numbers in context, the direct, intermediate, and spin-off jobs associated with Toyota's U.S. manufacturer-related operations account for 0.11 percent of employment in the entire U.S. economy and 0.10 percent of total U.S. compensation.

Table 2.2 provides a more detailed look at the intermediate and spin-off employment associated with Toyota's manufacturer-related operations. In the intermediate employment category, there are 58,930 jobs spread across numerous manufacturing and non-manufacturing industries. As discussed earlier, the intermediate category captures the employment necessary to satisfy Toyota's demand for the materials and services it needs to design, produce and sell motor vehicles. This can be broadly considered Toyota's U.S. supplier network. This supply network consists of the suppliers who supply parts and services directly to Toyota along with the

suppliers who supply the basic materials and services to Toyota's suppliers. Some of these companies supply basic commodities and can be several steps removed from the vehicle design and manufacturing process; however, they are categorized as suppliers of Toyota.

Table 2-6: Intermediate and Spin-off Employment Contribution of Toyota's Manufacturer-related Operations in the U.S., 2006

Economic Impact	Intermediate	Spin-off
Manufacturing	**8,447**	**14,045**
Primary metal mfg	996	1,160
Fabricated metal prod mfg	1,989	2,051
Motor vehicle mfg	1,532	3,589
Plastics, rubber prod mfg	795	855
Other Manufacturing	3,135	6,390
Non-Manufacturing	**50,483**	**92,506**
Professional and Technical Services	9,448	4,899
Administration and Services	9,279	1,900
Wholesale Trade	4,416	3,875
Retail Trade	4,609	16,301
Transportation, Warehousing	3,343	4,218
Finance, Insurance	4,607	4,714
Management of Companies	1,737	832
Other Services (excluding Government)	3,994	9,646
Other Non-Manufacturing	9,050	46,121
Total	**58,930**	**106,551**

Note: Due to rounding, columns or rows may not sum exactly.

As shown in table 2.2, we find 8,447 intermediate jobs in the manufacturing sector, mostly in the obvious industries necessary to produce automobiles—such as 996 jobs in primary metal manufacturing, 1,989 in fabricated metal products manufacturing, and 795 in plastics and rubber products manufacturing. Additionally, this category contains another 1,532 people who are involved in motor vehicle and parts manufacturing. These people are manufacturing the motor vehicles and parts necessary to produce the parts and services demanded by Toyota and do not include any of the 33,187 people directly employed by Toyota. There are an additional 3,135 people employed in other manufacturing industries.

The bulk of the employment in the intermediate category is in the non-manufacturing sector, which totals 50,483 jobs. Industries within this category are not normally thought to be associated with automobile manufacturing in such high numbers. However, as a result of the separation of the complete vehicle design and parts manufacturing processes from within the automobile manufacturing company to the supplier sector—an area in which Toyota has been at the forefront since its establishment in the North American market—many more distinct industries have become major suppliers to the automobile industry. Industries of note in the non-manufacturing category are professional and technical services which employ 9,448; administration and services, 9,279 jobs; wholesale trade, 4,416 jobs; and finance and insurance, 4,607 jobs.

Table 2.2 shows there are 106,551 total spin-off jobs associated with Toyota's U.S. automobile manufacturing operations. These are expenditure-induced jobs, created as a result of spending by the people employed in the direct and intermediate categories. As could be expected, a large portion of the spin-off jobs are in the non-manufacturing sector of retail trade, which employs 16,301 people. When employees use their paychecks to purchase a wide range of goods including electronics equipment, clothing, food, and even new automobiles, employment is created to supply their demands. Table 2.2 shows there are 3,589 jobs related to manufacturing motor vehicles and parts based on the demand of the employees in the direct and intermediate sectors. This employment number does not include any of the 33,187 jobs at Toyota which have been accounted for in the direct employment category.

Tables 2.3 and 2.4 detail the varying shares of intermediate and spin-off employment located in the sixteen states in the study, along with the balance of the United States.

Table 2-7: Intermediate Employment Contribution of Manufacturer-related Operations Nationally and by State, 2006

Economic Impact	U.S.	MI	TN	OH	CA	MO	NC	GA	TX	AL	AR	MD	WV	IN	KY	MS	IL	Rest of U.S.
INTERMEDIATE	**58,930**	**2,404**	**1,066**	**2,544**	**13,890**	**1,688**	**621**	**909**	**3,940**	**1,044**	**188**	**516**	**646**	**6,408**	**7,513**	**2,179**	**139**	**13,234**
Manufacturing	**8,446**	**444**	**123**	**390**	**1,965**	**257**	**75**	**80**	**614**	**163**	**22**	**20**	**53**	**1,376**	**1,156**	**241**	**13**	**1,456**
Primary metal mfg	996	42	11	63	198	28	4	4	76	38	4	2	19	207	139	23	1	141
Fabricated metal prod	1,990	104	28	96	501	61	13	10	186	45	4	3	14	305	250	66	3	303
Motor vehicle mfg	1,532	152	17	49	248	68	3	3	72	25	0	0	3	451	379	8	1	52
Plastics, rubber prod	796	40	13	42	168	27	8	8	62	14	2	2	6	142	116	24	2	121
Other Manufacturing	3,134	107	53	140	849	74	48	56	219	41	11	14	11	273	273	120	6	839
Non-Manufacturing	**50,483**	**1,960**	**944**	**2,154**	**11,925**	**1,431**	**546**	**829**	**3,326**	**881**	**166**	**496**	**594**	**5,032**	**6,357**	**126**	**1,938**	**11,778**
Professional and Technical Services	9,447	367	152	387	2,718	240	92	143	601	146	25	96	89	789	1,036	350	19	2,196
Administration and Services	9,280	397	212	452	2,091	220	124	205	569	153	36	129	81	803	984	471	26	2,328
Wholesale Trade	4,416	180	85	196	980	155	50	56	347	104	16	19	66	588	685	132	11	746
Retail Trade	4,609	201	87	176	774	178	36	46	293	126	13	24	131	820	1,050	106	13	534
Transportation, Warehousing	3,343	96	67	133	817	85	32	52	292	42	13	19	14	316	329	130	6	897
Finance, Insurance	4,607	140	74	184	969	110	44	74	307	57	12	93	26	298	371	232	9	1,608
Management of Companies	1,737	77	30	89	423	69	28	34	74	22	8	7	11	161	178	68	6	453
Other Services (excluding Government)	3,994	150	76	151	843	153	39	47	280	106	12	17	98	574	806	95	12	534
Other Non-Manufacturing	9,049	352	159	387	2,311	220	103	172	562	124	32	90	78	683	919	353	25	2,482

Note: Due to rounding, columns or rows may not sum exactly.

Table 2-8: Spin-off Employment Contribution of Manufacturer-related Operations Nationally and by State, 2006

Economic Impact	U.S.	MI	TN	OH	CA	MO	NC	GA	TX	AL	AR	MD	WV	IN	KY	MS	IL	Rest of U.S.
INTERMEDIATE	**106,551**	**5,384**	**3,718**	**6,926**	**17,530**	**2,837**	**1,929**	**2,580**	**6,018**	**1,883**	**754**	**1,439**	**1,277**	**9,693**	**10,233**	**705**	**5,629**	**28,017**
Manufacturing	**14,044**	**1,397**	**781**	**1,613**	**737**	**376**	**549**	**467**	**503**	**394**	**256**	**83**	**94**	**1,089**	**417**	**231**	**944**	**4,111**
Primary metal mfg	1,160	64	54	177	4	26	21	29	42	60	31	9	27	139	43	11	83	340
Fabricated metal prod	2,050	145	126	293	31	51	59	43	77	54	39	8	16	139	41	26	243	661
Motor vehicle mfg	3,591	872	252	564	6	116	89	74	51	83	32	11	9	431	143	58	156	646
Plastics, rubber prod	854	54	63	132	14	21	38	30	23	20	20	6	6	87	27	15	70	229
Other Manufacturing	6,387	261	287	447	683	161	343	291	310	177	134	50	37	292	163	122	393	2,236
Non-Manufacturing	**92,508**	**3,987**	**2,937**	**5,313**	**16,792**	**2,461**	**1,380**	**2,113**	**5,515**	**1,489**	**498**	**1,357**	**1,182**	**8,604**	**9,817**	**474**	**4,685**	**23,906**
Professional and Technical Services	4,897	313	151	296	618	68	72	131	149	91	15	241	41	184	188	17	410	1,912
Administration and Services	1,899	135	135	177	181	30	45	92	87	30	11	23	17	142	124	12	90	569
Wholesale Trade	3,870	130	181	304	483	104	96	214	240	69	33	42	39	235	247	27	360	1,067
Retail Trade	16,302	745	520	872	3,466	453	151	280	999	279	53	170	275	2,014	2,516	54	607	2,848
Transportation, Warehousing	4,218	134	241	293	278	136	134	188	276	85	95	65	36	208	154	72	311	1,512
Finance, Insurance	4,716	172	131	286	659	109	108	100	256	67	25	74	39	276	304	26	354	1,731
Management of Companies	834	61	10	160	0	63	40	29	0	3	19	4	2	18	9	5	80	331
Other Services (excluding Government)	9,646	375	295	494	2,034	250	112	163	686	171	43	121	141	969	1,140	43	424	2,185
Other Non-Manufacturing	46,130	1,922	1,273	2,432	9,073	1,247	621	915	2,823	694	205	617	592	4,559	5,135	220	2,049	11,752

Note: Due to rounding, columns or rows may not sum exactly.

As shown in table 2.5, (the list of U.S. and state totals for direct, intermediate, and spin-off manufacturer-related employment) California and Kentucky have significant numbers of jobs in the intermediate (13,890 – CA, 7,513 – KY) and spin-off (17,530 – CA, 10,233 – KY) categories partially as a result of the large number of people directly employed by Toyota within the states (9,994 and 8,943, respectively). While California's and Kentucky's employment impacts are expected, due to the large number of direct jobs within the two states, what is truly interesting are the job impacts in other states where there are relatively few direct jobs. In a few states, it appears large numbers of jobs are generated due to the states' proximity to nearby Toyota manufacturing and technical facilities. For instance, in Ohio and Illinois, there is direct employment of only 157 and 242, respectively. Neither of these states has a major Toyota facility within it borders, but Toyota's intermediate—or supplier—job contribution in Ohio is estimated to be an additional 2,544 employees, and similarly, in Illinois, an additional 2,179 supplier jobs are estimated. Ohio abuts the states of West Virginia, Kentucky and Indiana—all of which are home to major Toyota manufacturing facilities—and is undoubtedly seeing gains in employment due to supplying those facilities. Illinois is similar in that it has a common border with Indiana and appears to contain a substantial number of jobs at supplier firms who have Toyota as a customer. In Michigan, the employment is higher, due to the presence of the Toyota Technical Center—an R&D and product development facility. A technical center does not have the same job impacts as a manufacturing facility because it does not rely on outside suppliers as much as manufacturing facilities. However, Michigan is also benefiting from its close geographic proximity to states in which Toyota has a major manufacturing presence. In Michigan's case, Indiana to the south and the province of Ontario to the east, both have assembly plants which are customers for Michigan-based suppliers. Michigan, Ohio, and Illinois each see major additional impact from substantial numbers of highly-compensated spin-off jobs resulting from the spending of the direct and indirect employees.

These regional geographic impacts should not be surprising for a mature industry such as automobile manufacturing—which is now established in most of the states east of the Mississippi River. Direct suppliers and their suppliers have located throughout the country for a variety of reasons and have a significant effect on the economies in every state.[6] Each individual state's economic impacts primarily reflect the effect of total national Toyota employment on the state's employment and income. Even in California, the 41,414 jobs

[6] The Office for the Study of Automotive Transportation, Transportation Research Institute, and the Institute of Labor and Industrial Relations, University of Michigan. The Contribution of the International Auto Sector to the U.S. Economy. A study prepared for the Association of International Automobile Manufacturers, Inc., Ann Arbor, March, 1998.

contributed by Toyota arise from not only the California activities of Toyota, but instead from total U.S. Toyota manufacturer-related activities and employment. Therefore, a multiplier is not calculated for any individual state—except where a specific investment has been added to the state, as in the case of the Tupelo assembly plant discussed later in this paper.

Table 2-9: Total Employment Contribution of Manufacturer-related Operations, Nationally and by State, 2006

Economic Impact	U.S.	MI	TN	OH	CA	MO	NC	GA	TX	AL	AR	MD	WV	IN	KY	IL	MS	Rest of U.S.
DIRECT	33,187	636	127	157	9,994	1,017	21	68	2,090	675	0	661	960	4,816	8,943	242	0	2,780
INTERMEDIATE	58,930	2,404	1,066	2,544	13,890	1,688	621	909	3,940	1,044	188	516	647	6,408	7,513	2,179	139	13,234
TOTAL (Direct + Intermediate)	92,117	3,040	1,193	2,701	23,884	2,705	642	977	6,030	1,719	188	1,177	1,607	11,224	16,456	2,421	139	16,014
Spin-off	106,551	5,384	3,718	6,926	17,530	2,837	1,929	2,580	6,018	1,883	754	1,439	1,277	9,693	10,233	705	5,629	28,017
TOTAL (Direct + Intermediate + Spin-off)	198,668	8,424	4,911	9,627	41,414	5,542	2,571	3,557	12,048	3,602	942	2,616	2,883	20,917	26,689	8,050	844	44,031
National Multiplier	**6.0**																	

Note: Due to rounding, columns or rows may not sum exactly.

Automobile Dealers

Automobile dealers associated with selling, financing, and servicing new Toyota cars and trucks also contribute to the United States and states' economies. The tables in this section detail the estimated employment and income contributions by Toyota's U.S. new vehicle dealer operations to the private sector economies of the sixteen states and the country as a whole, as of December 31, 2006. The estimates of employment are broken out by direct employment (people employed directly by Toyota), intermediate employment (people employed by suppliers who supply Toyota dealerships and the suppliers who supply them), and spin-off employment (expenditure-induced employment resulting from spending by direct and intermediate employees who earn an income as a result of Toyota dealer-related activities).

Complete U.S. dealer-related operations employment and payroll data supplied by Toyota Motor North America totaled 121,486 employees, compensated with over $5.2 billion annually as of December 31, 2006. The total Toyota dealer employment and payroll data was reduced by 30 percent to net out activities related to used vehicle sales and servicing (non-warranty). The net new vehicle dealer employees and payroll is 85,040 and $3.6 billion, respectively. The data was coded according to NAICS category for retail trade (NAICS 44-45) for input into the model. Table 2.6 shows another 31,590 jobs are associated with suppliers to the dealerships, across many industries. Finally, 66,100 spin-off jobs are a result of the spending of the employees in the direct and intermediate jobs. Altogether, this totals 182,730 jobs—a multiplier of 2.1, which means there are 1.1 additional jobs in the U.S. economy for every one job at a Toyota dealership. The multiplier effect for new vehicle dealers is much lower than the multiplier associated with Toyota's manufacturing activities because the dealer supplier network is not as broad as that which supports manufacturing, nor is the compensation for the dealer jobs as high on average as it is for the manufacturing-related jobs.

Table 2-10: Total New Dealer Employment Contribution to the Private Sector Economy, U.S., 2006

Economic Impact	Dealers
Employment	
Direct	85,040
Intermediate	31,590
Total (Direct + Intermediate)	116,630
Spin-off	66,100
Total (Direct + Intermediate + Spin-off)	182,730
Multiplier: (Direct + Intermediate + Spin-off)/Direct	2.1
Compensation ($billions nominal)	10.765
Less: transfer payments & social contributions	-1.906
Less: personal income taxes	-1.424
Equals private disposable personal income ($billions nominal.)	7.435
Contribution as % of total private economy	
Employment	0.10
Compensation	0.08

Compensation for the 182,730 total jobs associated with new vehicle dealer activities totals over $10.7 billion. After subtracting transfer payments, social insurance payments, and personal income taxes, the private disposable personal income for all people associated with Toyota new car dealerships in the U.S. totals nearly $7.44 billion.

To put the compensation and employment numbers in context, the direct, intermediate, and spin-off jobs associated with Toyota new vehicle sales, financing, and service account for 0.10 percent of employment in the entire U.S. economy and 0.08 percent of total U.S. compensation.

New vehicle dealer employment figures for the 16 individual states, the rest of the United States, and national employment results are shown in table 2.7. Direct dealer employment and total employment figures (direct + intermediate + spin-off) in the 16 states closely correlate to the population of each of the states, as more vehicle dealerships are needed to service larger populations. However, intermediate employment does not mirror the states' populations. Rather, as with the manufacturing operations, supplier location is due to factors other than state population. Therefore, an even dispersion of supplier jobs across the states is not to be expected. Table 2.8 shows that intermediate and spin-off employment resulting from the new

vehicle dealer activities is distributed across a number of major industry divisions. While the new vehicle dealer activities generate about 6,956 manufacturing jobs, or about 7 percent of the total intermediate and spin-off employment, the bulk of intermediate and spin-off employment—93 percent, or 90,734 jobs—are located in non-manufacturing industries. In fact, when the 13,200 jobs in the retail trade sector are combined with the 85,040 direct jobs, more than 50 percent of all jobs related to new vehicle dealer activities are in the retail trade sector.

Table 2-11: Total New Dealer Employment Contribution by State and Nationally, 2006

Economic Impact	U.S.	MI	TN	OH	CA	MO	NC	GA	TX	AL	AR	MD	WV	IN	KY	IL	MS	Rest of U.S.
DIRECT	85,039	1,212	1,826	2,286	14,660	777	2,381	2,755	6,732	1,121	575	2,507	719	1,267	998	2,946	1,227	41,050
INTERMEDIATE	31,587	555	516	807	6,286	326	696	926	2,535	291	156	541	85	385	232	1,127	197	15,926
TOTAL (Direct + Intermediate)	116,626	1,767	2,342	3,093	20,946	1,103	3,077	3,681	9,268	1,412	731	3,048	804	1,652	1,230	4,073	1,424	56,975
Spin-off	66,103	1,360	1,592	1,986	10,759	936	1,930	2,208	5,736	954	562	1,579	377	1,229	766	2,481	783	30,865
TOTAL (Direct + Intermediate + Spin-off)	182,729	3,127	3,934	5,079	31,705	2,039	5,007	5,888	15,004	2,366	1,293	4,627	1,182	2,881	1,995	6,554	2,208	87,840
National Multiplier	**2.1**																	

Note: Due to rounding, columns or rows may not sum exactly.

Table 2-12: Intermediate and Spin-off Employment Contribution of New Vehicle Dealers in U.S., 2006

Economic Impact	Intermediate	Spin-off	Total
Manufacturing	**2,621**	**4,335**	**6,956**
Primary metal mfg	77	69	146
Fabricated metal prod mfg	464	336	800
Motor vehicle mfg	82	470	552
Plastics, rubber prod mfg	260	235	495
Other Manufacturing	1,738	3,225	4,963
Non-Manufacturing	**28,969**	**61,765**	**90,734**
Professional and Technical Services	5,159	2,298	7,457
Administration and Services	7,080	1,159	8,239
Wholesale Trade	1,308	1,800	3,108
Retail Trade	1,482	11,716	13,198
Transportation, Warehousing	1,829	1,927	3,756
Finance, Insurance	2,724	2,788	5,512
Management of Companies	1,658	410	2,068
Other Services (excluding Government)	1,313	6,553	7,866
Other Non-Manufacturing	6,416	33,114	39,530
Total	**31,590**	**66,100**	**97,690**

Note: Due to rounding, columns or rows may not sum exactly.

Total U.S. Contribution of Toyota Manufacturer- and Dealer-Related Activities

Table 2.9 sums the combined effects from Toyota's manufacturing operations (shown in table 2.1), and new vehicle dealer activities (shown in table 2.6), to produce the total effect from all of Toyota's U.S. manufacturing- and dealer-related operations. Summing direct employment of 118,227 (33,187 manufacturer-related + 85,040 new vehicle dealer operations), intermediate employment of 90,520 (58,930 manufacturer-related + 31,590 dealer-related); and spin-off employment of 172,651 (106,551 manufacturer-related + 66,100 dealer-related) produces a private sector employment total of 381,398 employees. Comparing total employment to direct employment produces an overall employment multiplier of over 3.2 (381,398 ÷ 118,227), meaning there are 2.2 additional jobs in the U.S. economy for every one job at Toyota or its dealers. These manufacturer and dealer-related jobs represent 0.21 percent of all private sector employment in the U.S in 2006.

Table 2-13: Total Manufacturer- and Dealer-related Employment in the U.S., 2006

Economic Impact	Manufacturer -related	New Vehicle Dealer-related	Total
Direct	33,187	85,040	118,227
Intermediate	58,930	31,590	90,520
Total (Direct + Intermediate)	92,117	116,630	208,747
Spin-off	106,551	66,100	172,651
Total (Direct + Intermediate + Spin-off)	198,668	182,730	381,398
Multiplier: (Direct + Intermediate + Spin-off)/Direct	6.0	2.1	3.2
Compensation ($billions nominal)	13.716	10.765	24.481
Less: transfer payments, social contributions	-2.464	-1.906	-4.370
Less: personal income taxes	-1.764	-1.424	-3.188
Equals private disposable personal income ($billions nominal)	9.488	7.435	16.923
Contribution as % of total private economy			
Employment	0.11	0.10	0.21
Compensation	0.10	0.08	0.18

Note: Due to rounding, columns or rows may not sum exactly.

Total compensation for all 381,398 private sector workers associated with Toyota's U.S. operations is $24.48 billion, which represents 0.18 percent of the private sector compensation in the U.S. economy. After netting out transfers, social insurance contributions, and personal income taxes, the private disposable personal income is $16.9 billion.

Table 2.10 sums the combined effects from Toyota's manufacturing operations (shown in table 2.5), and new vehicle dealer activities (shown in table 2.7), to produce the total effect from all of Toyota's U.S. manufacturing- and dealer-related operations across each of the 16 individual states and nationally.

Table 2-14: Total Manufacturer- and Dealer-related Employment in the U.S. by State and Nationally, 2006

Economic Impact	U.S.	MI	TN	OH	CA	MO	NC	GA	TX	AL	AR	MD	WV	IN	KY	IL	MS	Rest of U.S.
Manufacturer-related																		
Direct Employment	33,187	636	127	157	9,994	1,017	21	68	2,090	675	0	661	960	4,816	8,943	242	0	2,780
Intermediate	58,930	2,404	1,066	2,544	13,890	1,688	621	909	3,940	1,044	188	516	646	6,408	7,513	2,179	139	13,234
Spin-off	106,551	5,384	3,718	6,926	17,530	2,837	1,929	2,580	6,018	1,883	754	1,439	1,277	9,693	10,233	5,629	705	28,017
New Vehicle Dealers																		
Direct Employment	85,039	1,212	1,826	2,286	14,660	777	2,381	2,755	6,732	1,121	575	2,507	719	1,267	998	2,946	1,227	41,050
Intermediate	31,587	555	516	807	6,286	326	696	926	2,535	291	156	541	85	385	232	1,127	197	15,926
Spin-off	66,103	1,360	1,592	1,986	10,759	936	1,930	2,208	5,736	954	562	1,579	377	1,229	766	2,481	783	30,865
Total Employment	**381,397**	**11,551**	**8,845**	**14,706**	**73,119**	**7,581**	**7,578**	**9,445**	**27,052**	**5,968**	**2,235**	**7,243**	**4,065**	**23,798**	**28,684**	**14,604**	**3,052**	**131,871**

Note: Due to rounding, columns or rows may not sum exactly.

Table 2.11 shows the change in employment and employment impacts from Toyota operations in the U.S. from 2003 and 2006. Direct employment at Toyota's U.S. operations rose by nearly 15 percent during the time period of 2003 and 2006. However, intermediate employment (in the supplier sector) fell by 20 percent. Of note, though, the total jobs created by Toyota's U.S. operations remain essentially the same, compared to 2003—dropping by only 1.3 percent.

The dramatic drop in intermediate employment is not the result of anything specific to Toyota's operations, but rather is symptomatic of the nationwide and industry-wide relocation of high-labor intensive, low skill, lower tier supplier jobs to low wage countries around the globe. Within this same 2003-2006 time period, however, annual compensation increased significantly by $10 billion or 70 percent for all jobs (direct, intermediate and spin-off) created by Toyota's U.S. operations. It is probable that many low-skill, low wage jobs have left the U.S. economy, and a greater proportion of higher-compensated jobs remain. An analysis of the occupational categories most impacted as a result of Toyota's U.S. operations shows that five highly compensated job categories account for nearly 60 percent of the total $24 billion compensation. The employment in these five categories—management of companies, information technology, manufacturing, finance/insurance, and professional/technical services—account for over 40 percent of all the jobs created by Toyota's U.S. operations. The absence of many low-wage jobs in the aggregate job total is, in effect, increasing the compensation for all jobs over 2003 compensation levels.

Table 2-15: Comparison of results from 2003 Study[7] and 2006 Study

Total Manufacturer and Dealer related employment	2003 Study	2006 Study	% Change
Direct	103,195	118,227	14.6%
Intermediate	113,650	90,520	-20.4%
Total (Direct + Intermediate)	216,845	208,747	-3.7%
Spin-off	169,455	172,651	1.9%
Total (Direct + Intermediate + Spin-off)	386,300	381,398	-1.3%
Multiplier: (Direct + Intermediate + Spin-off)/Direct	3.7	3.2	
Compensation ($billions nominal)	14.394	24.481	70.1%
Less: transfer payments, social contributions and taxes	-4.634	-7.558	63.1%
Equals private disposable personal income ($billions nominal)	9.76	16.923	73.4%

[7] Hill, Kim. "Contribution of Toyota to the Economies of Fourteen States and the United States in 2003." Center for Automotive Research, Ann Arbor Michigan, 2003

Mississippi Economic Forecast

In 2007, Toyota announced it would build an assembly plant to manufacture Toyota Highlanders near Tupelo, Mississippi. It is expected that 2010 will be the first full year of production at the plant. This analysis will evaluate the future potential additional economic impact of the Toyota assembly facility on the Mississippi state economy through direct, intermediate, and spin-off employment effects. This forecasted employment is in addition to the existing Toyota-related employment as of December, 2006 estimated in the previous section of this report. The analysis models both the effect that is caused by the construction and equipment investment activities from 2007 through 2009 as the company builds and equips the plant as well as the employment impacts of the operational phase of the plant. This operational phase of the plant is modeled through 2014. Table 2.12 shows the employment forecast for the year 2011, a typical year for operational results.

Table 2-16: Mississippi Projected Employment Impact for the year 2011

	Mississippi	Total U.S.
Total Employment	4,320	10,859
Direct Plant Employment	2,000	2,000
Intermediate Employment	1,073	2,996
Spin-Off Employment	1,247	7,863
Multiplier		5.4
Compensation (Millions $)	261.6	774.4
Less Transfer Payments	44.1	151.8
Less Taxes	25.1	89.4
Disposable Personal Income	192.4	533.2

Toyota provided estimates of the cost of construction and manufacturing equipment purchases, along with the projected employment level and compensation of the fully operational plant. Toyota estimates total investment in the physical structure to be $1.3 billion, spread over 2007-2009. The company also estimates 2,000 workers in the plant when it is fully operational in 2010. In the model, the structural investment costs are allocated between construction and equipment purchases. The number of workers to be employed annually at the plant once

assembly operations commence are also entered. The REMI model calculates the number of jobs created by the construction activity and equipment purchases, based on the monetary inputs. For the assembly operations, the assumption was made that one-half of the Tupelo facility workforce (1,000 employees) will be in place for training and testing of the new facility in 2009, with a full workforce of 2,000 employees in place in 2010.

There is another automotive assembly plant located in Mississippi. However, it is unlikely that the automotive sector of the Mississippi economy is large enough to provide all of the equipment required by Toyota for the Tupelo assembly plant. Some equipment may have to be procured from outside of the state. Therefore, the simulation assumes some of the demand for the assembly plant will be provided regionally rather than strictly within Mississippi. Tupelo is located near borders with Arkansas and Tennessee, and as such, these states are likely to see significant employment in intermediate (supplier) and spin-off jobs resulting from the direct employment that the plant provides. These results, given for the year 2011, the first full year of operations after the construction phase has ended, are also shown in Table 2.12. It is estimated the plant will add 4,320 employees to the state of Mississippi, while it will add approximately 10,900 jobs to the region. The entire impact of the plant on the southeastern region of the United States shows an employment multiplier of 5.4, that is, there are 4.4 jobs in the area for every one job at the plant.

Expected private sector compensation within Mississippi resulting from Toyota's Tupelo plant is forecast to be over $260 million in 2011, and nearly $775 million for the United States (primarily the southeastern part of the country). When netting for transfer payments, social insurance contributions, and personal income taxes, the private disposable personal income generated in Mississippi from the activities related to the Toyota Tupelo facility is nearly $200 million in 2011, $340 for the rest of the nation, and therefore over $500 million for the entire country (including Mississippi).

Methods

The basic approach in these analyses has been to use a specially constructed regional economic impact model, input Toyota-specific data, and generate estimates of the economic contribution associated with Toyota's U.S. operations.

The Macroeconomic Model

For the estimation of employment and compensation associated with Toyota's U.S. operations, and to forecast the expected contribution of a new assembly plant to the Mississippi economy, an economic model supplied and constructed specifically for this study by Regional Economic Models, Inc. (REMI) of Amherst, Massachusetts was used. Adjustments are then made to the model to reflect the general characteristics of the automobile industry and Toyota's specific employment and compensation data. The REMI model, which has been fully documented and peer-reviewed, was designed for the type of analyses employed in this current study and has been used by CAR and other organizations for over two decades for these types of analyses.

The version of the model used in this study represents the economies of 16 states— Michigan, Texas, Ohio, California, Missouri, Tennessee, North Carolina, Georgia, Alabama, Arkansas, Maryland, West Virginia, Indiana, Kentucky, Illinois, and Mississippi —and the rest of the United States. This model allowed for simulating the interaction among all the regional economies and the rest of the nation, providing for an accounting of interregional trade and migration. Therefore, the model can simulate economic impacts that may occur in any one region, resulting from changing Toyota's level of activities in any or all of the regions.

The data provided by Toyota for input into the model included employment and compensation for each region at the end of 2006 and, in the case of the Mississippi forecast, expected construction and equipment purchase expenses. Before the data was input, it was first coded according to the North American Industry Classification System (NAICS). Adjustments were made in the data to accurately reflect assembly employment by netting out GM-related workers at NUMMI. Additional adjustments were done to estimate the used vehicle dealer employees and subtract them from the total to derive new vehicle dealer employment, and a separate Mississippi scenario to determine a range of job creation estimates was also run.

The general methodology in the analyses is to run baseline simulations for each region's economy, then subtract Toyota's activities in each of the regions and run another set of simulations. The difference between the simulations represents the impact Toyota has on each region. The Mississippi scenario is similar, except the employment is added to the model and the differences compared.

Changes to the REMI Model: Version 6.0 to Version 9.0

This study used REMI Model 9.0, an update of the model, REMI Model 6.0, that was used for the earlier study, "Contribution of Toyota to the Economies of Fourteen States and the United States in 2003." The primary change to the model that affected results, was the updating of the underlying business, demographic, and trade data from government sources. The results that shown in this study reflect the economic changes affecting the automotive industry in the United States. High labor, low technology jobs have largely moved offshore, and products created from this type of labor are now sourced from overseas production facilities. Due to the lag in the publication of government data, sometimes by two or three years, the effects of this offshore outsourcing are only recently becoming evident in model results.

Within the REMI model, other changes from the earlier versions are that migration equations, that is the movement of population from area (or state) to area, often due to economic pulls or pushes, have been updated to more accurately reflect the mobility of the population. Investment equations have been modified to reflect the age structure of existing facilities by area. The results of this are that investment demand forecasts more accurately reflect a given area's need to replace capital structures.

In the compensation module, transfer payment categories and variables have changed. Overall transfer payments continue to reflect actual economic activity. However, detailed categories within transfer payments (social insurance payments, transfer receipts, other miscellaneous categories) are not comparable between version 6.0 and version 9.0. Therefore, in this study, these items have been reported in the broader category of transfer payments and social contributions.

These changes to the model allow for the most detailed and accurate study of the employment and compensation attributable to the automotive industry and individual firms' activities.

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