

Employment and Economic Growth in the U.S. Automotive Manufacturing Industry: Considering the Impact of American and Japanese Automakers

Michael F. Thompson: Economic Research Analyst, Indiana Business Research Center, Kelley School of Business, Indiana University

Ali Arif Merchant: Research Assistant, Indiana Business Research Center, Kelley School of Business, Indiana University

What can we learn about recent trends in the automotive manufacturing industry that may help us understand factors behind the current downturn, as well as potential for future growth? This article looks at states across the contiguous United States to understand employment and gross domestic product (GDP) growth within this declining industry and its automotive parts manufacturing sub-sector between 1998 and 2008. This research also assesses the influential impact of the annual revenues earned by the top six automotive companies in the United States—the Detroit Three (General Motors, Ford, and Chrysler) and the top three Japanese companies (Toyota, Honda, and Nissan). Controlling for several influential factors, we find that employment and GDP growth among states is generally linked to the improved revenues of U.S. companies relative to Japanese companies. The one notable exception is Toyota whose revenues were not significantly associated with increases or decreases in state employment or GDP.

Companies in the automotive manufacturing industry are classified by the North American Industrial Classification System (NAICS) as part of the larger transportation equipment manufacturing industry (NAICS 336).¹ Specifically, this research will focus on the employment and GDP associated with the production of cars, as well as light and heavy-duty trucks, by analyzing manufacturers in

FIGURE 1: Average Percentage of State GDP in Automotive Manufacturing, 1998 to 2008

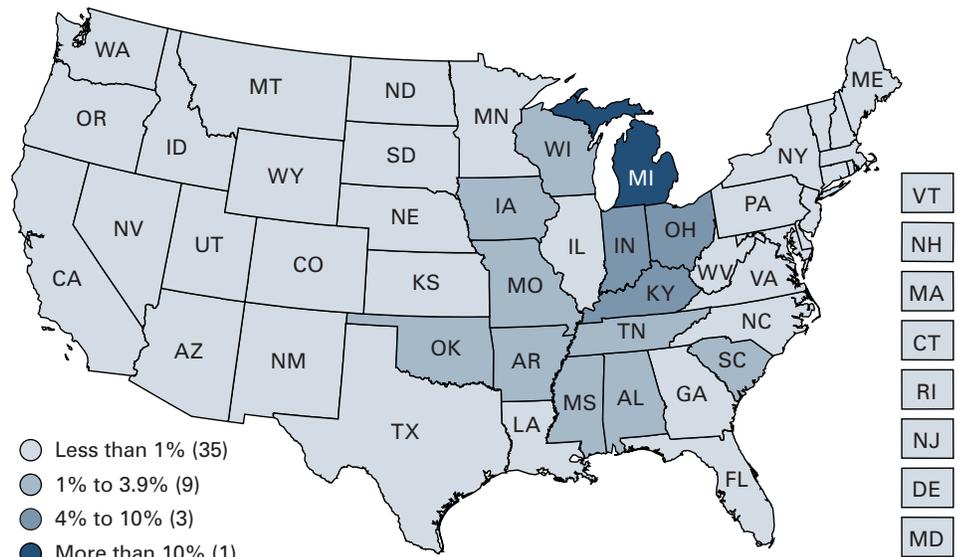
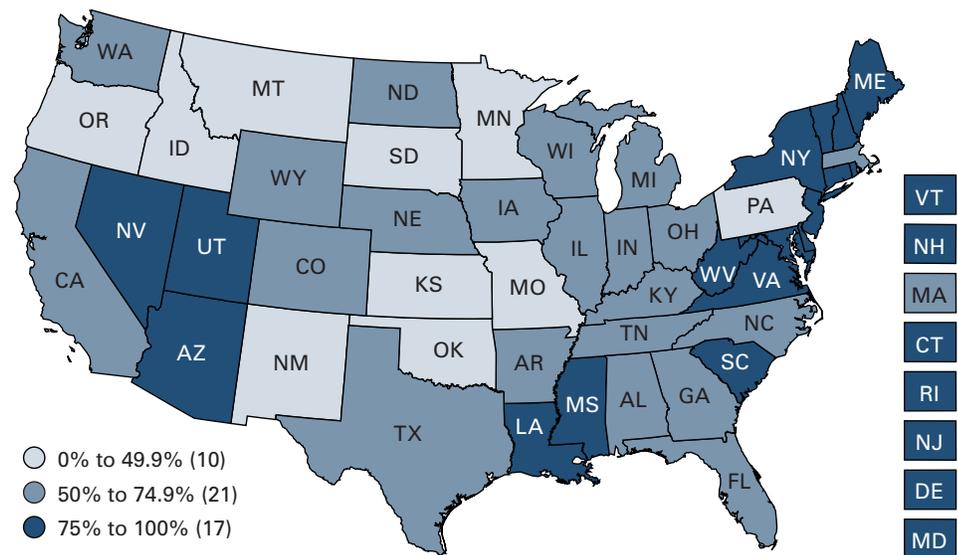


FIGURE 2: Percentage of Automotive Employment Manufacturing in Automotive Parts Manufacturing, 2008



the following three 4-digit NAICS categories:

- **3361: Motor Vehicle Manufacturing:** Establishments (often called original equipment manufacturers or “OEMs”) that primarily assemble entire motor vehicles including cars, mini-vans, light trucks, sport utility vehicles (SUVs), electric automobiles for highway use, fire-trucks, tractors, and buses.
- **3362: Motor Vehicle Body and Trailer Manufacturing:** Firms that manufacture motor vehicles bodies as well as cabs and trailers. Often these include assembling cars in kit form, special purpose vehicle bodies, stretch limo assemblies, dump truck lifting mechanisms, flatbed trailers, and self-contained Recreational Vehicles (RVs).
- **3363: Motor Vehicle Parts Manufacturing:** Firms that do not assemble complete motor

vehicles or bodies but focus on manufacturing motor vehicle parts, engines or rebuild motor parts. Such components include hoses and belts, springs, diesel engine parts, brake and electric system components, steering and suspension, and seats and trimming for automobiles.

The automotive manufacturing industry is an important component of the U.S. economy and is particularly important in several Midwestern and Southern states. **Figure 1** shows the average proportion of each state’s GDP that can be attributed to the automotive manufacturing industry over the past decade.

As expected, the Midwestern states of Michigan (10.3 percent), Indiana (6.3 percent), and Ohio (4.7 percent) are among the four states with over 4 percent of state GDP dependant on automotive manufacturing, with Kentucky the only other state with such a high percentage of GDP

directly linked to this industry. **Figure 1** also shows the concentration of the automotive manufacturing industry along the corridor of states stretching from the Great Lakes to the Gulf Coast—often referred to as “Auto Alley.”²

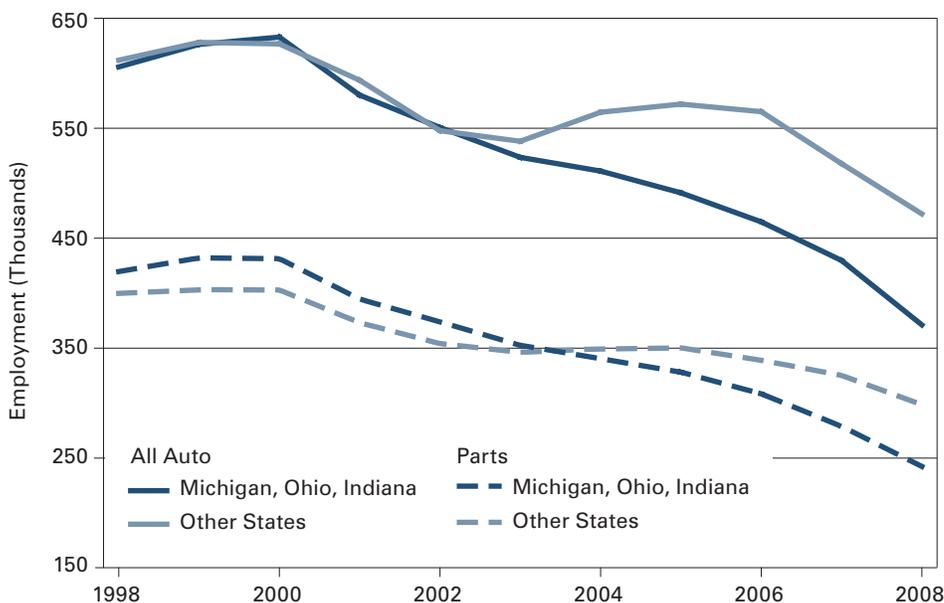
Interestingly, most employment in this industry is upstream of the original equipment manufacturers (OEMs) since Klier and Rubenstein emphasize that carmakers increasingly focus on final assembly having largely passed on the responsibility of manufacturing the bulk of their auto parts to independent suppliers.³ **Figure 2** summarizes the percentage of each state’s automotive employment that works for automotive parts manufacturers (NAICS 3363) and we see they are the largest sub-sector of employment in all but ten of the contiguous states.

Job and GDP Growth in the Automotive Manufacturing Industry

Within this industry, the overall trends are declining employment and GDP growth volatility between 1998 and 2008. However, these trends gain complexity when we pay particular attention to parts suppliers and when we consider differences between Midwestern states and the rest of the country. **Figure 3** shows a fairly constant decline in the automotive manufacturing industry and for the parts manufacturing sub-sector over this ten-year period. However, the employment pattern was noticeably different for other states between 2002 and 2006 where automotive manufacturing employment held constant and even increased slightly before declining between 2006 and 2008.

One of the primary drivers for the job loss was a disproportionately high growth in automotive parts

■ **FIGURE 3: Automotive Manufacturing in the Midwest and Other States, 1998-2008**



Note: “Other States” does not include Alaska and Hawaii and some employment is suppressed due to non-disclosure requirements. Auto refers to the sum of NAICS 3361, 3362, and 3363. Parts refers only to NAICS 3363.
Source: IBRC, using data from the U.S. Bureau of Labor Statistics

imports. Collins, McDonald and Mousa explain that, between 2000 and 2006, the trade gap (imports over exports) had grown from 7 percent to about 51 percent and, coupled with the declining sales of the Detroit Three, this trade deficit led to a downward employment trend in parts manufacturing nationwide. This drop in employment was particularly severe in the Midwest, which experienced increased domestic competition for jobs from southeastern states where wages were 23 percent lower than corresponding automotive parts jobs in 2006. Additionally, as output per worker grew 28.6 percent, fewer employees were needed in the Midwest.⁴

Figure 4 shows that GDP growth is noticeably more volatile among the three Midwestern states compared to other states; however, real GDP levels (in chained 2000 dollars) are roughly the same today as they were ten years ago. While GDP trends for the Midwest were largely similar to other

states through 2002, they differed markedly between 2002 and 2006 where other states experienced steady growth. This is hardly a surprise keeping in mind that nominal sales revenues for the Detroit Three were lower in 2008 as compared to ten years ago.⁵

Performance of American and Japanese Automakers

The automobile industry as a whole continues to be depressed as a result of the global economic recession, but foreign automakers Toyota and Honda continued to achieve record high revenue levels through 2008 as they increased their market share in the United States. This article examines the top-line revenue numbers from the U.S. Securities and Exchange Commission (SEC) filings of the six major automakers to track their performance for the period of 1998 to 2008. While many of these data were available through the SEC's official EDGAR database, some data

were only available via alternative databases and foreign corporate websites and required additional calculation.⁶ The companies under review are as follows:

General Motors (GM)

Founded in 1908, GM manufactures, sells and services a range of light and heavy automotive vehicles under the Buick, GMC, Chevrolet, Cadillac, and Opel umbrellas. Major models include LaCrosse, CTS, Cobalt, Malibu, Escalade, Tahoe, Suburban, Yukon, Yukon Denali, Hummer, Silverado, Sierra, Corvette, and Camaro.

Ford

Founded in 1903, Ford Motor Company manufactures, sells and finances cars and trucks under the Ford, Lincoln, Mercury, and Volvo umbrellas. Major models include the Focus, Fusion, Taurus, Mustang, Escape, Explorer, Ranger, F-150, MKS, Navigator, Town Car, Milan, Mountaineer, V70, S80, C70, and XC90.

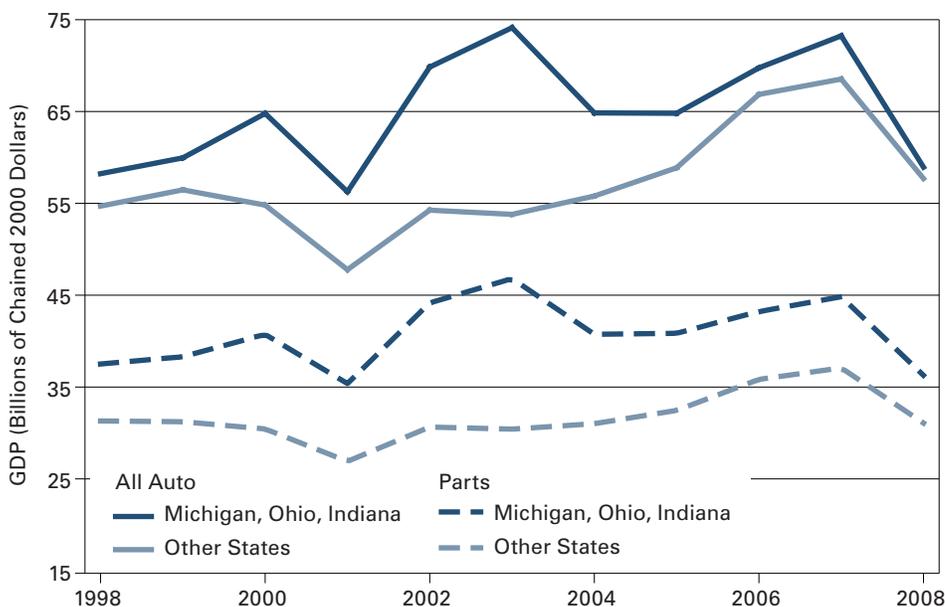
Chrysler⁷

Founded in 1925, Chrysler currently manufactures and sells automobiles under the Dodge, Chrysler, Jeep, RAM, and Global Electric Motorcar brands. Popular models include the PT Cruiser, Sebring, Chrysler 300, Wrangler, Grand Cherokee, Avenger, Charger, Grand Caravan, Viper, Dakota, and Ram.

Toyota

Founded in 1933, Toyota Motor Corporation designs, manufactures and sells sedans, mini-vans, compact cars, SUVs, trucks, and related parts and accessories worldwide. Major models under the Toyota umbrella include the Corolla, Camry, Lexus, 4Runner, Rav4, Sienna, and Prius.

■ FIGURE 4: Automotive Manufacturing GDP in the Midwest and Other States, 1998-2008



Note: "Other States" does not include Alaska and Hawaii and some employment is suppressed due to non-disclosure requirements. Auto refers to the sum of NAICS 3361, 3362, and 3363. Parts refers only to NAICS 3363.

Source: IBRC, using data from the U.S. Bureau of Economic Analysis and Moody's Economy.com

Honda

Founded in 1946, Honda Motor Corporation produces and sells motorcycles, automobiles, and power products (generators, engines, marine motors, etc.). Major models include the Accord, Civic, Acura, Pilot, CR-V, and Element.

Nissan

Founded in 1933, Nissan produces cars, trucks, buses, forklifts, and manufacturing parts for overseas production. Major models include the Versa, Sentra, Altima, Maxima, Xterra, Pathfinder, Quest, and the Z series.

Figure 5 shows a distinct downward trend in the top-line revenues for the Detroit Three between 2005 and 2008, especially when compared to the performance of major Japanese automobile manufacturers. As a result, revenues for the Detroit Three are all substantially lower in value (in chained 2000 dollars) in 2008 as they were ten years ago. Noticeably, GM moved from being the highest revenue earner at \$167 billion in 1998 and a high of \$184 billion in 2000 to drop down to \$122 billion in revenue in 2008—a distant second among automakers. In contrast, all three major Japanese automakers saw their revenues soar over this period with Toyota increasing its revenues from under \$100 billion in 1998—a distant third in ranking—to an astounding record \$214 billion in 2008 (chained 2000 dollars). Toyota is now the largest automaker in the world⁸ and their constant annual growth of 8 percent in this period seems to indicate that they were the biggest beneficiary of the decline of the American carmakers.

“Toyota is now the largest automaker in the world and their constant annual growth of 8 percent in this period seems to indicate that they were the biggest beneficiary of the decline of the American carmakers.”

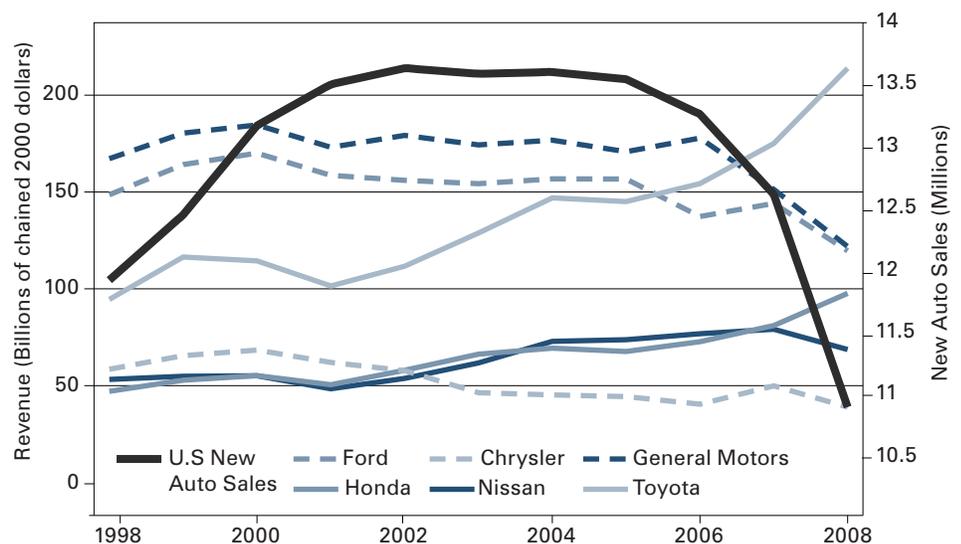
Assessing the Impact of Automaker Revenues on State Employment and GDP Growth

This study attempts to understand the relative effects that the performance of leading automakers can have on employment and GDP growth in the automotive manufacturing industry once we control for other important factors. We can recognize that economic growth and GDP are not themselves independent of each other with GDP growth known to be a major predictor of employment growth since it can “generate an increased derived demand for workers.”⁹ In particular, GDP growth in the automotive manufacturing

industry should play a major role in this sector’s employment growth. This research measures this impact using data from the U.S. Bureau of Economic Analysis and Moody’s Economy.com. The major demographic factor of population growth, reflected by U.S. Census data is also an important consideration since shifts in population size due to births, deaths and migration are often associated with the size of the workforce.¹⁰

The link between automaker revenues and automotive sales to state employment and GDP growth is a more complex relationship. Increasing sales and revenues of a

■ FIGURE 5: Revenue of the Top Six Automakers Compared to U.S. New Auto Sales



Source: IBRC, using data from the U.S. Securities and Exchange Commission (SEC) EDGAR database and SEC filings data obtained from LexisNexis Academic, Hoovers, Forbes, and automaker corporate websites. New auto sales data are from the U.S. Department of Transportation, Bureau of Transportation Statistics.

particular automaker would lead to states achieving higher employment and GDP levels only if the vehicles and components of that automaker are likely to have come from that state—a key premise for this article. Of course, the manufacture of each vehicle—even one “made in the USA”—is likely to involve a large network of body makers and parts suppliers located across the United States and even other countries. Ideally, this research would benefit from detailed information on the many manufacturer-supplier relationships, sales data between each of the major carmakers, and establishments located within each state. However, such data are typically only available through confidential company records and fee-based proprietary data sources such as the Auto Industry Portal offered by ELM International, Inc.

This research sheds light on which carmakers’ revenues have significant positive or negative impacts on state employment and GDP growth through longitudinal regression models of the full automotive sector

and the automotive parts sub-sector. Specifically, fixed-effects models are used that control for unique characteristics in each of the 48 contiguous states over this ten-year period, while also controlling for other important factors mentioned above.¹¹ While the results share interesting insights, these models should not be interpreted as predictive causal relationships and individual factors (such as the revenue of a particular carmaker) can only be interpreted in relation to other factors contained within each model.

Which Automakers Impact Employment Growth?

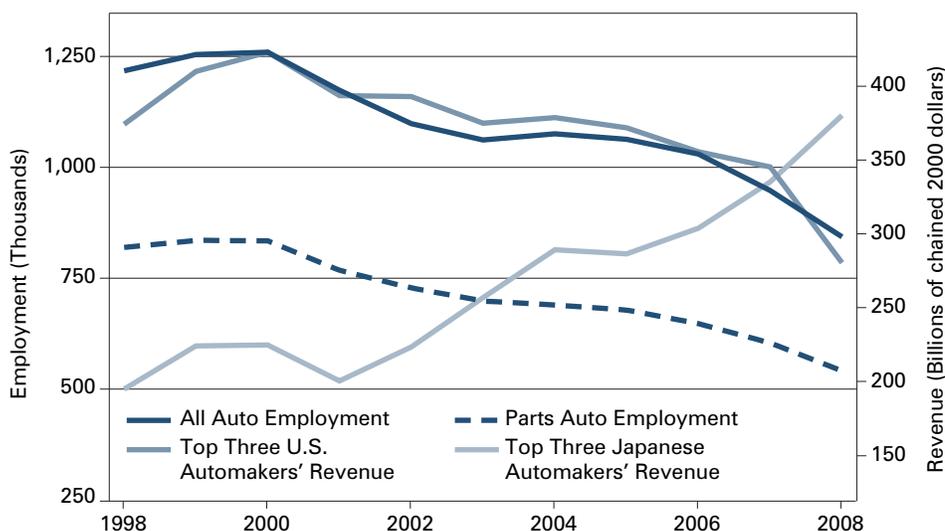
Figure 6 reveals that, over the 1998-2008 period, state automotive employment trends appear to closely mirror changes in the revenue patterns of the top three U.S. automakers—General Motors, Ford, and Chrysler. The revenues of these U.S. automakers increased to a high of \$423 billion in 2000, dropped to \$394 billion in 2001 and then slowly decreased through 2007

before a large drop to \$280 billion in 2008 (all figures are chained 2000 dollars). Meanwhile, employment in the automotive manufacturing sector followed a nearly identical trend to the revenues of the Detroit Three by rising to 1.25 million workers in 2000, dropping noticeably in 2001 then more slowly through 2006 before a large drop down to 843,000 workers respectively in 2008. Less dramatic yet similar, parts manufacturing employees peaked at 834,000 workers in 2000, dropped gradually through 2006 before a final dip to 541,000 workers by 2008. Remarkably, the total number of automotive manufacturing workers in 2008 was barely higher than the number of workers in the automotive parts manufacturing sub-sector alone a decade earlier.

Meanwhile, the performance of the top three Japanese automakers only appears positively associated with employment through 2001 when the revenues of these increased to \$225 billion and then dropped to \$200 billion. However, from 2001 onward, while employment levels dropped, the revenues of the Japanese companies grew rapidly through 2004 to \$289 billion and then again between 2005 and 2008 to \$380 billion.

The regression coefficients in Table 1 help to confirm whether there are in fact significant relationships between the growth in American and Japanese carmakers’ revenues and employment growth. Before we assess the influence of carmaker revenue growth, we see that in the simple model on automotive employment (column 1), other factors like automotive manufacturing GDP and the annual growth in auto sales have a significant impact on employment. Each percentage increase in automotive manufacturing GDP is associated with a 0.1 percent increase in employment in this sector ($p < 0.05$) and each percentage increase

■ FIGURE 6: Automotive Manufacturing Employment Compared to the Revenue of the Top Three U.S. and Top Three Japanese Automakers



Notes: Employment data are for the 48 contiguous states and some employment is suppressed due to non-disclosure requirements. Auto refers to the sum of NAICS 3361, 3362, and 3363. Parts refers only to NAICS 3363. Source: IBRC, using data from the U.S. Bureau of Labor Statistics, the U.S. Securities and Exchange Commission (SEC) EDGAR database, and SEC filings data obtained from LexisNexis Academic, Hoovers, Forbes, and automaker corporate websites.

in new car sales is associated with a 0.7 percent increase in employment ($p < 0.01$), controlling for population growth and the previous year's employment levels.

However, when we take into account carmaker revenues (column 2), only GDP growth, as well as the revenues for Honda and Nissan, have statistically significant impacts on automotive manufacturing employment. Each percentage increase in revenue for Honda and Nissan are associated with decreases in automotive employment of 0.5 percent and 0.2 percent, respectively, ($p < 0.05$) holding all other factors constant.

The observed impacts on employment for the automotive parts manufacturing sub-sector is noticeably different from the automotive manufacturing sector as a whole. While the simple automotive parts model (column 3) is quite similar to the "all automotive" model (column 1), there are striking differences when we examine the full model (column 4) when we account for revenues of the top six carmakers. Here, not only do both annual growth in automotive parts manufacturing GDP and new car sales have significant impacts on employment but each percentage increase in annual growth in new car sales is actually associated with a surprisingly negative impact of 1.1 percent ($p < 0.05$).¹² We also observe that there are significant impacts on automotive parts manufacturing employment associated with the revenue growth for all three U.S. carmakers and for Honda. Each percentage increase in revenues for General Motors and Ford led to increases in parts employment of 0.5 percent and 0.6 percent, respectively. A 1 percent increase in revenues for Chrysler and Honda lead to decreases in parts employment of 0.2 percent and 0.5 percent, respectively ($p < 0.01$).

Overall, the results suggest that state employment in the automotive employment sector—and the parts sub-sector in particular—largely increase in relation to the performance of U.S. carmakers and decrease in relation to the performance of Japanese carmakers with some notable exceptions. For example, Toyota's tremendous

growth over the 1998-2008 time period is not significantly linked to increases or decreases in U.S. automotive employment in relation to other carmakers. U.S. carmaker revenues—which mostly declined during this period—had no significant impact on automotive manufacturing employment as a whole but did correspond positively

TABLE 1: Impact of Automotive and Demographic Characteristics on Percentage Annual Employment Growth in the Contiguous U.S. States, 1998-2008

Variables	All Automotive		Automotive Parts	
	Column 1	Column 2	Column 3	Column 4
Automotive Manufacturing GDP, Annual Growth (%)	0.094*	0.094*		
	(2.35)	(2.35)		
Automotive Parts Manufacturing GDP, Annual Growth (%)			0.202**	0.202**
			(4.44)	(4.44)
New Car Sales, Annual Growth (%)	0.781**	0.004	0.435**	-1.091*
	(5.47)	(0.00)	(3.30)	(2.51)
Population, Annual Growth (%)	2.422	2.422	-1.234	-1.234
	(1.12)	(1.12)	(1.22)	(1.22)
All Automotive Manufacturing Employment in Previous Year	-0.000	-0.000		
	(1.25)	(1.25)		
Automotive Parts Manufacturing Employment in Previous Year			0.000	0.000
			(0.55)	(0.55)
General Motors Revenue, Annual Growth (%)		0.263		0.493**
		(0.90)		(3.11)
Ford Revenue, Annual Growth (%)		0.379		0.639**
		(1.04)		(3.35)
Chrysler Revenue, Annual Growth (%)		-0.152		-0.191**
		(1.66)		(3.07)
Toyota Revenue, Annual Growth (%)		0.362		0.276
		(1.35)		(1.64)
Honda Revenue, Annual Growth (%)		-0.520*		-0.518**
		(2.17)		(2.70)
Nissan Revenue, Annual Growth (%)		-0.201*		-0.121
		(2.28)		(1.62)
Constant	1.587	-0.678	1.449	0.118
	(0.58)	(0.29)	(0.85)	(0.07)
R-Squared	0.30	0.30	0.33	0.33

+ Significant at 10 percent; * Significant at 5 percent; ** Significant at 1 percent

Notes: Coefficients are for fixed effects regression models with robust t statistics in parentheses. All models control for each year of data. Each observation represents one record per state per one-year time period in which employment data were not suppressed by the U.S. Bureau of Labor Statistics: 259 records for the "All Automotive" models and 464 for the "Parts" models. Vermont was excluded due to suppression of data or zero employment in all time periods. Source: IBRC, using data from the U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis, Moody's Economy.com, U.S. Census Bureau, U.S. Bureau of Transportation Statistics, and Securities and Exchange Commission (SEC) filings.

“Results suggest that, despite global manufacturer-supplier relationships, the performance of U.S. automakers—particularly General Motors and Ford—does result in higher levels of employment in the U.S. automotive parts manufacturing sub-sector.”

with parts employment. The only U.S. carmaker for which there was a negative relationship between revenues and employment relative to other carmakers, was the impact of Chrysler’s annual growth on automotive parts employment.¹³

Which Automakers Impact GDP Growth?

Due to the volatile nature of automotive manufacturing GDP, **Figure 7** reveals no obvious trends that we can attribute to the revenues of major U.S. or Japanese automakers. Only through 2001 do we see some

similarity in the patterns of GDP and the Detroit Three’s revenue, but then GDP seems to increase as these carmakers’ revenue declines through 2007 before matching the precipitous drop between 2007 and 2008. Japanese carmakers’ revenues also seem to mirror GDP for the first four years of this period but then largely increase through 2008 regardless of changes of GDP in the following six years.

The regression models in **Table 2** confirm that there is little evidence of a direct relationship between most top six carmakers’ revenue growth

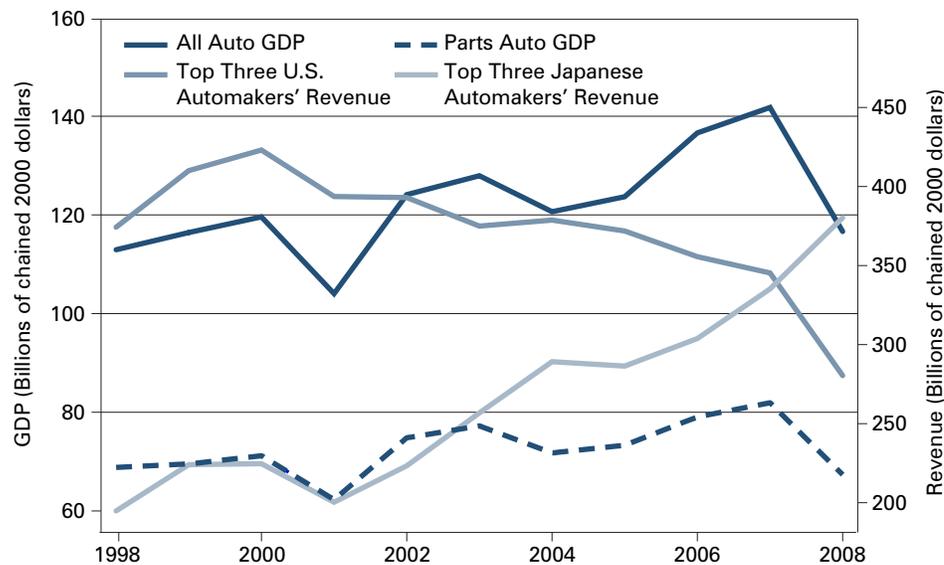
and GDP growth in the automotive manufacturing industry—with General Motors being the major exception. Beyond the expected though small negative impact of the previous year’s GDP on current GDP growth,¹⁴ the only other significant impact observed was that a 1 percent increase in General Motors’ revenue was associated with a 1.6 percent increase in GDP, holding all other factors constant.¹⁵ This substantial and positive relationship was observed not only for the automotive manufacturing industry as a whole but also for the automotive parts sub-sector.

Understanding Carmaker Performance and State Employment and GDP Growth Trends

This article sheds light on the relationship between carmaker performance and employment and economic trends within the contiguous United States for the highly discussed automotive manufacturing industry. Results suggest that, despite global manufacturer-supplier relationships, the performance of U.S. automakers—particularly General Motors and Ford—does result in higher levels of employment in the U.S. automotive parts manufacturing sub-sector. Additionally, the financial performance of General Motors—long the largest of American carmakers—has a strong effect on state automotive manufacturing GDP growth indicating that the company maintains strong ties within the U.S. economy.

Despite the relatively short time period of this study, these findings do provide some insight into understanding the consequences of carmakers’ performance on key factors of economic health in this industry. For starters, it would appear that government efforts to assist the major U.S. automakers—all of which

■ **FIGURE 7: Revenue of the Top 6 Automakers, Compared to U.S. New Auto Sales**



Notes: Employment data is for the 48 contiguous states and some employment is suppressed due to non-disclosure requirements. Auto refers to the sum of NAICS 3361, 3362, and 3363. Parts refers only to NAICS 3363. Source: IBRC, using data from the U.S. Bureau of Economic Analysis, Moody’s Economy.com, the U.S. Securities and Exchange Commission (SEC) EDGAR database, and SEC filings data obtained from LexisNexis Academic, Hoovers, Forbes, and automaker corporate websites.

have recently experienced economic turmoil—could lead to desired effects of increasing state automotive manufacturing employment. In particular, if General Motors were to improve their revenues, there could also be increases in state automotive manufacturing GDP. We can also posit that, as Japanese automakers’ revenues continue to improve relative to U.S. automakers, this would lead to lower levels of employment within this industry for the United States. However, it is important to stress that this is not the case for Toyota—despite tremendous growth in sales between 1998 and 2008, the company was not significantly likely to increase or decrease state employment or GDP.

Notes

1. The larger transportation equipment manufacturing classification includes the manufacture of rail, marine and air transport as well as motorcycles and military vehicles. See the official 2007 NAICS documentation at www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2007.
2. Thomas Klier and James Rubenstein, *Who Really Made Your Car? Restructuring and Geographic Change in the Auto Industry* (Kalamazoo, Michigan: Upjohn Institute for Employment Research, 2008).
3. *Ibid.*
4. For more information, please see: Benjamin Collins, Thomas McDonald, and Jay A. Mousa, “The Rise and Decline of Auto Parts Manufacturing in the Midwest,” *Monthly Labor Review* 130, no. 10 (2007): 14-20.
5. *Ibid.*
6. Japanese manufacturing firms report revenue in the Japanese Yen but use different conversion rates for evaluating dollar values. Therefore, an average annual spot rate for the fiscal year was used to compute dollar amounts. The ownership changes at GM and Chrysler may lead to some inconsistency in accounting methods.
7. Chrysler Group, LLC has recently conducted business under several names including Chrysler Corporation, Daimler Chrysler, and Daimler AG.
8. Kendra Marr, “Toyota Passes General Motors as World’s Largest Carmaker,” *Washington Post*, January 22, 2009.
9. This relationship is believed to be a lagged positive relationship with employment growth following GDP growth by an estimated one to three months. However, recent research by Sawtelle suggests that this relationship may not be significant (or even positive) for some industries once we control

- for other economic factors beyond the scope of this article (such as the employment cost index). For more information, please see Barbara Sawtelle, “Analyzing the Link between Real GDP and Employment: An Industry Sector Approach,” *Business Economics* 42, no. 4 (2007): 46-54.
10. For more information, please see: Matt Kinghorn, “Population and Employment Change in Indiana” *InContext*, July-August 2009, www.incontext.indiana.edu/2009/jul-aug/article1.asp.
 11. Tests proved that there was serial correlation within the panel data. A fixed-effects model was selected due to the larger number of observations (48 states) relative to time periods (t=10).
 12. This puzzling result may indicate that other factors may be at play beyond the performance of the top six carmakers, such as revenues associated with other carmakers that are beyond the scope of this article.
 13. While the reason behind this result is beyond the scope of this article, this finding

suggests that where Chrysler may have had larger revenue growth relative to the other carmakers (this was generally not the case), any related increases in parts employment may have occurred outside of the United States.

14. We can interpret this to mean that a high level of GDP in the previous year slightly reduces the likelihood of achieving high levels of GDP growth the following year, holding all other factors constant.
15. The negative impact associated with Toyota revenues is only significant at the $p < 0.1$ level and may be largely influenced by the spike in Toyota revenues during the final 2007-2008 period.

TABLE 2: Impact of Automotive Characteristics on Percentage Annual Automotive Manufacturing GDP Growth in the Contiguous U.S. States, 1998-2008

Variables	All Automotive		Automotive Parts	
	Column 1	Column 2	Column 3	Column 4
New Car Sales, Annual Growth (%)	0.897** (5.64)	-2.985+ (1.96)	0.926** (5.77)	-2.961+ (1.94)
All Automotive Manufacturing GDP in Previous Year	-0.004** (3.87)	-0.004** (3.87)		
Automotive Parts Manufacturing GDP in Previous Year			-0.007** (3.68)	-0.007** (3.68)
General Motors Revenue, Annual Growth (%)		1.636** (2.70)		1.639** (2.70)
Ford Revenue, Annual Growth (%)		0.606 (0.70)		0.609 (0.71)
Chrysler Revenue, Annual Growth (%)		0.297 (1.61)		0.290 (1.58)
Toyota Revenue, Annual Growth (%)		-1.225+ (1.79)		-1.212+ (1.77)
Honda Revenue, Annual Growth (%)		0.728 (1.08)		0.715 (1.05)
Nissan Revenue, Annual Growth (%)		0.299 (1.51)		0.301 (1.51)
Constant	8.251* (2.34)	20.998** (4.73)	8.704* (2.39)	21.343** (4.71)
R-Squared	0.18	0.18	0.18	0.18

+ Significant at 10 percent; * Significant at 5 percent; ** Significant at 1 percent

Notes: Coefficients are for fixed effects regression models with robust t statistics in parentheses. All models control for each year of data. Data represent 480 records: one per state per one-year time period. Sources: IBRC, using data from the U.S. Bureau of Economic Analysis, Moody’s Economy.com, U.S. Bureau of Transportation Statistics, and Securities and Exchange Commission (SEC) filings.