

Chicago Fed Letter

Caution ahead—Challenges to the Midwest's role in the auto industry

by Thomas Klier, senior economist

This article examines the recent break in the relationship between motor vehicle production and the auto region's employment, particularly the impact of the decline in Big Three market share.

U.S. light vehicle sales have continued at very solid levels over the past several years, averaging 16.7 million units since 2001.¹ Yet the unemployment rate in Michigan—the most auto intensive

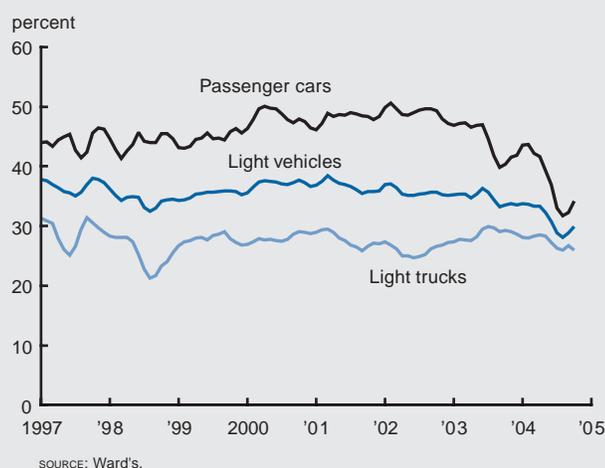
state in the U.S.—has stayed above the national and the Midwest average for over four years.² Like most durable goods, motor vehicle production exhibits stronger cyclical swings than the rest of economic activity. When things are going well, the auto region's employment conditions tend to be good. So how do we explain the recent break in the relationship between motor vehicle production and the auto

region's employment?

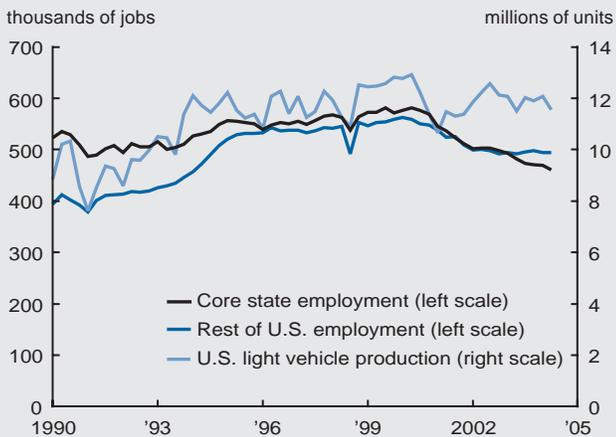
One possible explanation is an increase in U.S. vehicle sales produced outside the country. But the import share of light vehicle sales has increased only moderately, from 17% in 2000 to 20% at the end of 2004, and domestic production of light vehicles has averaged around 12 million units since 2001. A more plausible explanation for

Michigan's elevated unemployment rate is a shift in the regional distribution of production. Although the number of light vehicles produced in the U.S. has held fairly steady during the last two years, auto production in the Seventh District, which includes the key auto sector states Michigan and Indiana, has performed quite differently (see figure 1). Indeed, the District's share of passenger car production has declined significantly vis à vis the rest of the country. That share fluctuated between 45% and 50% between 1997 and 2003, but has since fallen rapidly, reaching 31.7% in August 2004, its lowest level in over a decade. That development is also reflected in the District's share of auto industry employment (see figure 2). Until the end of 1996, the core of the auto region, the states of Michigan, Indiana, and Ohio, was home to the majority of auto industry jobs. And while the region's leadership gap over the rest of the country was shrinking during the first half of the 1990s, auto sector jobs grew in both the region and the nation during these years. From 1996 until the second half of 2002, auto industry employment was pretty evenly divided between the three core auto states and the rest of the country. Since then, however, auto industry employment in the core states has fallen off noticeably at a time of

1. Seventh District production share



2. U.S. light vehicle production and employment



SOURCE: Federal Reserve Board's Industrial Production Index and BLS.

rather stable levels of light vehicle production. At the same time, industry employment outside the three core auto states has remained stable.

What seems to be driving this development is a continued market share loss for domestic producers to foreign nameplates, an increasing share of which is being produced within the U.S. (see figure 3).³ For example, Chrysler, GM, and Ford have lost over 6 percentage points of domestic sales to foreign producers since 2000, resulting in an all-time low market share for the Big Three of 58.7% in December 2004. In the context of the geography of the U.S. car industry that is an important trend, because the production facilities of foreign assemblers tend to be located outside the traditional auto-producing states of Michigan, Indiana, and Ohio.⁴

The economic importance of this geographic shift is magnified by the tight linkages between auto assembly and production of parts and components. On average, for every auto assembly job in the U.S. there are six in related parts production, as well as ancillary jobs in services and transportation.⁵ More importantly, supplier plant locations tend to remain proximate to assembly plants because of just-in-time production requirements. Accordingly, the majority of an assembly plant's suppliers are typically located within one day's driving distance, which corresponds to about

450 miles.⁶ All of this suggests that the erosion of Michigan's role in the auto industry—both assembly and related parts—is being driven by the ongoing loss of market share rather than by cyclical factors.

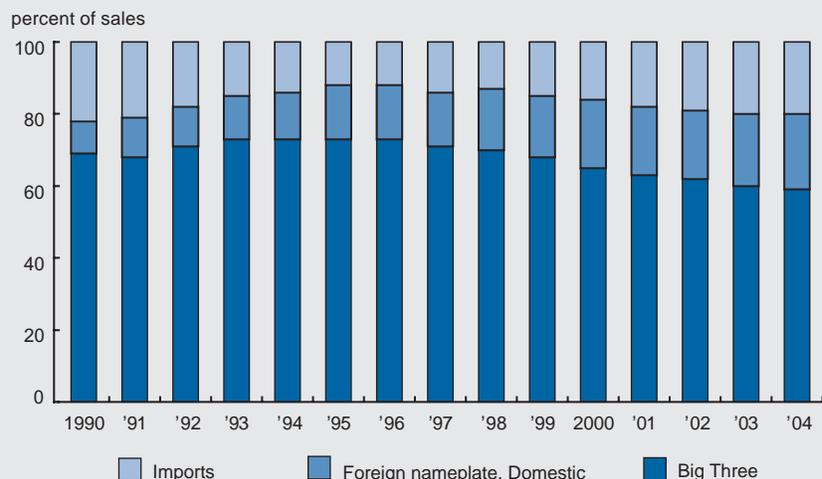
How has this recent adjustment played out in terms of employment? Figure 4 shows that the industry shed over 155,000 jobs between 2000 and 2003.⁷ The vast majority of these are

concentrated in the auto supplier segment of the industry rather than in assembly operations. Michigan, Indiana, and Ohio as a group fared worse than the rest of the country, losing 17.8% of their parts industry jobs compared with 13.5% for the remaining states. Among these three states, Michigan has fared the worst during the past three years, losing over 20% of its auto supplier employment. This performance gap is magnified by Michigan's strong reliance on the auto industry. The state is home to one-quarter of auto supplier employment, with the three core states jointly accounting for half.

Plant-level data allows us to trace the job losses for auto assembly plants and their "captive" suppliers (facilities owned and operated by the assembly companies, such as stamping or engine plants). Figure 5 shows that assembly plant employment fell by just over 2% overall between 2000 and 2003. That loss of jobs can be entirely accounted for by employment losses at domestic assembly facilities. The assembly plants of foreign companies added employment, most of it, however, outside the core auto region. A much bigger employment adjustment took place among the so-called captive parts plants, which are almost exclusively domestic captives of the Big Three. According to figure 5, these plants shed 35,000 jobs between 2000 and 2003, more than one-quarter of their employment. Once I adjust for plants that were sold to independent supplier companies and therefore dropped out of the captive category (but probably continued to operate), the tally of job losses falls to 19%.⁸

There are two main factors behind that rather dramatic number: Plant closures (including plants for which closings have been announced but not yet implemented) account for 28% of these job losses. The remaining 72% is attributable to job reductions at existing and continuing plants, representing productivity improvements as well as

3. U.S. light vehicle sales: 1990–2004



SOURCE: Automotive News Data Center.

4. Motor vehicle manufacturing employment decline

		2000	2003	% change
Assembly	U.S.	291.4	267.5	-8.2
	MI, IN, OH	143.3	124.3	-13.3
	Michigan	94.3	80.0	-15.2
	Other states	148.1	143.2	-3.3
Parts	U.S.	839.4	707.5	-15.7
	MI, IN, OH	432.6	355.5	-17.8
	Michigan	226.2	180.1	-20.4
	Other states	406.8	352.0	-13.5
Combined	U.S.	1,130.8	975.0	-13.8
	MI, IN, OH	575.9	479.8	-16.7
	Michigan	320.5	260.1	-18.8
	Other states	554.9	495.2	-10.7

NOTE: Assembly jobs are measured at NAICS 33611; that is, they include medium and heavy duty trucks. Employment is measured in thousands.

SOURCE: BLS.

5. Plant-level detail

		2000	2003	% change
Assembly plants	U.S.	160.16	156.8	-2.10
	MI, IN, OH	71.59	67.94	-5.11
	Michigan	42.31	38.02	-10.13
	Other states	88.57	88.87	0.34
Captive suppliers	U.S.	137.07	102.14	-25.49
	MI, IN, OH	112.91	85.97	-23.86
	Michigan	58.22	44.87	-22.93
	Other states	24.17	16.17	-33.10
Combined	U.S.	297.23	258.94	-12.88
	MI, IN, OH	184.5	153.91	-16.58
	Michigan	100.53	82.89	-17.55
	Other states	112.74	105.04	-6.83

NOTE: Jobs are measured in thousands.

SOURCE: Harbour Consulting, *Harbour Report*, 2004, 2001 and company websites.

the effects of greater outsourcing of parts production to non-captive suppliers, many of which are operating production facilities outside the United States. At the same time, a small number of U.S.-based foreign captives grew, but off of a very small base.

Unfortunately, there are no reliable time-series data available on plant-level employment in the independent auto supplier sector that would allow one to perform a similar analysis for that piece of the industry. But the aggregate numbers for independent suppliers presented in figure 4 show a relatively smaller loss of jobs in the non-traditional auto

states as well. So the changing fortunes of domestic and foreign assembly plant customers appear to be profoundly reshaping the regional distribution of supplier employment.

At the same time, the globalization of parts production has been slowing output growth from the U.S. overall. U.S. auto parts production grew by 12.8% between 1997 and 2002, but during the same time imports of auto parts grew by 52.1%.⁹ In 2003, the largest source countries for auto parts remained Canada and Mexico. Together these two countries accounted for 55.7% of all parts imports. Imported parts from

Asia represented 29%. Within that group, Japan's share has dropped by 6% to 18.2% in the past ten years. Imports from China have more than tripled, but off of a very small base. China now accounts for 4.1% of all auto parts imports.

Conclusion

Since the geography of production of light vehicles is different for domestic and foreign producers and suppliers, the continued decline of Big Three market share is having a noticeable impact on the core auto region, especially Michigan. Between 1995 and December 2004, the domestic share of the U.S. light vehicle market dropped from 73.2% to 58.7%. Assuming a minimum efficient scale of about 200,000 units for a modern assembly plant, that corresponds to the capacity of about ten assembly plants.¹⁰ In fact, four Big Three assembly plants have been closed in the U.S. and Canada since then and another four are set to close within a year.

The data presented here clearly show that the larger impact of a retrenchment of domestic producers plays out in the supplier sector. Michigan stands out as the heart of the supplier industry. While it is performing only slightly worse than Indiana and Ohio in terms of the share

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of auto industry jobs lost, the auto sector plays a much more important role in Michigan's economy than it does in any other state.¹¹

Still, while the old-line auto states have been losing production to the southern end of the auto corridor,

Michigan has strengthened its role as the center of headquarters, research, and design (R&D) functions in this industry during the past 15 years. About half of the largest 150 auto supplier companies are headquartered in the Detroit area, and virtually every global

automotive company retains a significant R&D presence there. Furthermore, the fortunes of individual companies are historically volatile. The Big Three and their suppliers may yet mount a concerted comeback in the marketplace.

¹ The term light vehicles refers to passenger cars and light trucks, which include minivans and sport utility vehicles.

² Midwest here refers to the Seventh District states of Wisconsin, Iowa, Illinois, Michigan, and Indiana; Ohio is not included.

³ While foreign producers entered the market for cars first, they have since added a growing number of light truck models, both imported and produced in North America.

⁴ See Thomas Klier, Paul Ma, and Daniel McMillen, 2004, "Comparing location decisions of domestic and foreign auto suppliers," Federal Reserve Bank of Chicago, working paper, No. 27, and Thomas Klier, 2004, "Challenges to the U.S. auto industry," *Chicago Fed Letter*, Federal Reserve Bank of Chicago, March, No. 200a. Michigan, Indiana, and Ohio are home to 44% of all light vehicle assembly plants in the U.S. Of these, 80% are Big Three facilities. However, six of the 13 U.S. foreign-owned light vehicle assembly plants are located south of Indiana and Ohio.

⁵ To arrive at that factor I relate the number of light vehicle assembly jobs from figure 5 to the sum of parts jobs from figure 4 and captive supplier jobs from figure 5. We adjust the parts jobs from figure 4 to allow for an undercount (see endnote 7). For a detailed analysis of ancillary jobs related to the auto sector see Sean McAlinden, Kim Hill, and Bernard Swiecki, 2003, *Economic Contribution of the Automotive Industry to the U.S.—An Update*, Ann Arbor, MI: Center for Automotive Research.

⁶ See Thomas Klier, 2000, "Spatial concentration in the U.S. auto supplier industry," *The Review of Regional Studies*, Vol. 29, No. 3.

⁷ In fact, that number probably undercounts the level of job losses, because the size of the auto supplier industry is notoriously hard to gauge with aggregate data. Ongoing research with data on auto parts imports suggests that the undercount in the auto parts sector is on the order of 15%.

⁸ That is a lower bound, because it is not known to what extent the new owners of the former captive supplier plants reduced employment.

⁹ Motor vehicle parts imports grew from 18.4% of U.S. production in 1997 to 34.1% in 2002.

¹⁰ See Joseph F. Francois and Dean Spinanger, 2004, "Regulated efficiency, world trade accession, and the motor vehicle sector in China," Tinbergen Institute, discussion paper, No. 2004-049/2. The authors note that for assembly plants producing a single model, the efficient scale is just over 200,000 cars per year. The size of the market for light vehicles in the U.S. was around 15 million units during the second half of the 1990s and has averaged 16.5 million units since then. Applying these numbers to calibrate the impact of a 14 percentage point market share loss corresponds to the capacity of ten to 11 assembly plants (at 200,000 units per plant).

¹¹ This issue is receiving great attention in Michigan. See, for example, Governor Granholm's speech given at the Traverse City Management Briefing Seminar last August at http://www.michigan.gov/gov/0,1607,7-168-23442_21974-98324-M_2004_8,00.html and Terry Kosdrosky, 2004, "Economic downshift," in *Crain's Detroit Business*, November 19, p. 1.

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