

Chicago Fed Letter

Transitions: The State of the Automotive Industry—A summary

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The United States automotive industry has been undergoing tremendous changes in recent years. Speakers at a recent Chicago Fed conference explored these changes and considered the road to the future for the auto industry.

In order to better understand the changes taking place in the production of automobiles and to gain some insight into what the future holds for the industry in the U.S., the

Federal Reserve Bank of Chicago held a conference on Monday,

June 11, *Transitions: The State of the Automotive Industry*.¹ More than 100 economists and analysts from business, academia, and government attended the conference and industry experts were invited to share their perspectives on this topic.

The changing face of automotive production

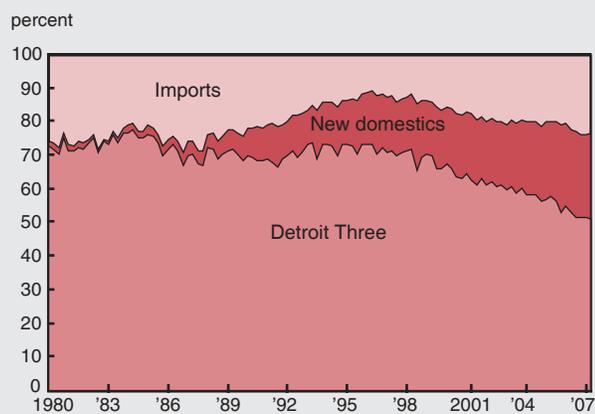
The United States automotive industry has been undergoing tremendous changes in recent years. Some of these changes include significant reductions in employment, factory closings, bankruptcies among the supplier base, downgrades on corporate bond issuances, and consolidations. One needs to merely pick up any daily newspaper to also see the market share losses by the group formerly known as the Big Three (now more appropriately called the Detroit Three—Daimler Chrysler, Ford Motor Company, and General Motors).

While the Detroit Three have been dealing with mostly bad news, foreign nameplate producers are enjoying a very different environment. Rather than closing plants, there are several automotive production facilities being planned by these “new domestics” over the coming years.

If we look back to 1980, when there was very little production by foreign nameplate firms in the U.S., the Detroit Three made up nearly 73% of all the light vehicles sold, while foreign-nameplated production in the U.S. was less than 2%, and imports represented just over a quarter of the market (see figure 1). Beginning in the 1980s, an ever-increasing number of foreign-nameplated vehicles began to be produced in the U.S. at factories that were referred to as transplants. Through the early to mid-1990s, the popularity of the sport utility vehicle (SUV) supported the Detroit Three’s market share. In 1996, the Detroit Three’s market share stood at 72.5%, virtually the same as 16 years earlier. However, imports’ share had declined by 14 percentage points to just over 11%, and new domestics market share had risen to more than 16% of the market. The gains of the new domestics came at the expense of imports.

Over the next ten years, however, the Detroit Three would not be as fortunate. Challenged by the growing number of foreign SUVs, rising energy prices, and

1. Share of light vehicle sales



SOURCE: Wards Automotive.

a flat overall sales market, the Detroit Three's market share began to suffer. By 2006, their market share plunged nearly twenty percentage points to 53%. New domestics sales had risen to nearly a quarter of the market, and imports sales rose to over 22%. So unlike the previous 16-year period, the loss over the past ten years of 20 percentage points of market share by the Detroit Three is the direct result of gains by both new domestics and imports.

However, the market share of vehicles being produced in the U.S. in 2006 was still over 77%, several percentage points higher than in 1980, but by a greater number of firms than in the past. So, what has happened over the past ten years is less a concern about the loss of vehicle production in the United States, but more about the transition from the domestic industry being comprised of the Detroit Three to an industry that has more producers. Consequently, the Detroit Three are playing a less dominant role in the industry.

While it is true that the new domestics vehicles had been made with less domestic content than Detroit Three vehicles, this pattern has been changing. Over the last ten years, new domestics have been increasing the amount of domestic content, while the Detroit Three have been lowering their domestic content, as they outsource more components. For example, 70% of the 2007 Ford Mustang's parts were made in the United States and Canada, while over 85% of the 2007 Toyota Sienna's parts were sourced in the United States and Canada.

Expanding on the role of foreign manufacturers and markets in the auto industry, Loren Brandt, professor, University of Toronto, presented his findings on China's auto production. Brandt emphasized the importance of the Chinese market because of its recent economic growth. For all the countries producing more than a million vehicles per year, China's production growth outstripped all the others in the market: from 2000 to 2005, coming in at 181.3%. During the same time period, the results for other countries in that group were quite mixed: U.S., -5.9%; Germany,

4.2%; France, 5.8%; Spain, -9.2%; South Korea, 29.4%; Italy, -40.3%; and the UK, -0.4%. The growth in the automotive industry, in fact, has been so large in China that it has begun to cut back on its production of trucks, which are used for business, and to focus more on passenger vehicles for its consumer market.

The four main factors that Brandt believes are fueling China's auto sector are: 1) greater competition, which is in part due to tax cuts and China's economic expansion; 2) a decrease in car prices due to an increase in efficiency, which contributed to lowering of costs; 3) the improving quality of Chinese producers compared to the Western producers, which is causing a quality convergence among top tier suppliers; and 4) a substantial increase in the export of parts and components, especially for the automotive aftermarket industry. These factors leave North American suppliers with the thought that Chinese firms should be viewed as a serious competitor, as original equipment manufacturers (OEMs) in North America continue to increase their global supply base.

Finding the best production methods

Frits Pil, associate professor, University of Pittsburgh, discussed value and profitability in the auto sector. His presentation highlighted how manufacturers are building vehicles to optimize production at factories rather than to match consumer desires. He started his presentation by noting that inventory needs to be viewed at three stages of the market—parts suppliers, assembly plants, and the distribution channels (e.g., dealerships). He highlighted that OEMs have a strong financial motive to ship vehicles from factories, since they book the sale at that point, even if doing so builds inventories at dealers' lots. With higher inventories than desired, the industry is then forced to offer large sales incentives (e.g., money back, or special finance and lease rates) in order to sell this excess inventory. Without these sales incentives, dealers would find it difficult to sell the inventories on their lot, particularly those with less desirable colors or amenities.

Pil pointed out that there are two basic options available for automobile companies to produce vehicles: 1) build-to-forecast, or 2) build-to-order. These two philosophies differ in aim, key measurements, and risk. Build-to-forecast tries to predict demand and consequently minimize unit costs. It is based mostly on market share, labor productivity, and capacity utilization (how much of a factory's total output potential is being used). However, this approach often leads to both overproduction and a slow rate of feedback from consumers. Pil said that when people buy vehicles because of the large financial incentives being offered, the OEM regards this as a successful transaction and therefore believes that the color and amenity combination must have been a good fit. The OEM does not get feedback that the consumer would have preferred a differently configured vehicle. Additionally, the OEM does not know that the consumer would not have accepted the vehicle on the lot had it not been for the incentives.

Build-to-order tries to maximize profit by matching demand. In order to successfully implement build-to-order, the OEM needs to receive actual customer information. There are fundamentally different ways of thinking about customers' needs. Pil gave an analogy from the athletic shoe industry—NIKEiD shoes versus mi adidas. With the NIKEiD shoes, the customer can choose their color combination, shoe model, and have a word printed on the shoe. However, the mi adidas shoe is actually created from the ground up for your feet, with your personal measurements. In other words, your shoe is built exclusively for you. Similarly, the automotive OEM needs to receive actual information from dealerships to create an automobile that a customer would actually want regardless of incentives. One possibility is to allow customers to customize their cars online. As Pil observed, "The auto sector is just starting on the path toward customer responsiveness." The build-to-order approach could also increase the profit margin per unit, because there would be fewer discounts, and the supply chain would be more

efficient, because of the leaner stocks. There is a larger cost for providing this flexibility, and the main risk is demand variability. On the other hand, Pil believes that build-to-order would be the superior approach for the market because the companies would be focusing both on unit profitability and on customers' needs.

Susan Helper, professor, Case Western Reserve University, observed that "United States automotive manufacturing is not dead yet," but that there are challenges that the auto industry is facing. Currently, there are nearly 900,000 jobs that are directly related to automotive manufacturing plants located in the U.S. Additionally, there are approximately 4.5 million indirect jobs that are linked to the automotive industry. Recently, there has been more offshoring to lower-wage countries, but this had a wide range of results, both beneficial and not so beneficial. According to a Center for Automotive Research (CAR) report, large suppliers gained most from the offshoring of information technology, and engineering was reported to have the next highest benefit. On the other hand, offshoring of human resources and sales positions was considered not to be advantageous to the company.

With so many U.S. jobs invested in the automotive industry, it becomes important to consider the best ways to utilize those workers. Helper tackled this topic with her discussion of lean performance (achieving lower waste standards in factories). There are two types of lean models—learning lean and lean standardization. The first model focuses on organizational flexibility and quality while also combining lower waste practices within manufacturing. It promotes changes in training practices, which results in a work force with higher skills. The latter model, lean standardization, focuses on the technical aspects of reducing waste while it provides performance improvements; Helper believes it does not produce better performance than the learning lean model.

In addition to promoting efficiency at plants, Helper also touched on fuel efficiency in vehicles. Since 1985, there

has been little progress in the fuel economy of vehicles. There are innovations that are in development—the use of fuel cells or hydrogen—but the capabilities to produce and/or develop these advances will require a large effort on the part of the automakers. Not only do improvements need to be made on the existing technology, but there is also a shortage of skilled workers to make these improvements. A National Association of Manufacturers' study found that 90% of manufacturers report a shortage of skilled production help, and 65% of manufacturers have a shortage of scientists and engineers. Without the increase in technology and skilled workers, the needed improvements will continue to be slow moving.

Learning from the past and moving forward

Jerry York, CEO, Harwinton Capital, spoke on the automotive industry challenges from the past, present, and the future. York identified these respective periods as three wars: 1) the rise of the Asians; 2) value and variety; and 3) the developing markets and green technology. York believes yesterday's war was manufacturing productivity (total hours per unit produced). The Detroit Three's manufacturing productivity did not come close to the numbers of the Japanese Three (Toyota, Honda, and Nissan). In 1988, the simple average of the Detroit Three's productivity was 44 (the total hours per unit produced); by 2005 it had dropped to 34. However, the simple average of the Japanese Three in 1998 was 31, already below the 2005 simple average of the Detroit Three. For the Japanese Three, the simple average of their manufacturing productivity edged down to 30 in 2005.

While the Detroit Three have come closer to the manufacturing productivity of the Japanese Three, there is still a large window for improvement. The Detroit Three's fall might have happened ten years sooner, had it not been for the development of mini-vans, pick-ups, and SUVs. Despite the success of their light vehicles, problems with the quality of Detroit Three vehicles became an even bigger issue. A.J. D. Power 2006

initial quality study (identifying problems from the owners' perspective in the first 90 days of purchase or lease³) showed that the Japanese Three have fewer problems per vehicle than the Detroit Three. Lastly, the "rise of the Asians" was the result of differences in the time to market from development to delivery of vehicles. The time to market for the Japanese automobiles was in the range of three years, whereas the Detroit Three hovered around five years, which is a large advantage because the Japanese automakers are closer in time to the marketplace when they create their automobiles. This has led the market to find Asian cars to be more stylish and have an increased number of technological gadgets.

In addition, because the new domestics' plants are more up to date, they have a higher range of variability in their manufacturing. For example, the new plants are producing more than one type of vehicle; therefore, these new plants can respond to changes in market demands more quickly. The older plants that are being closed by the Detroit Three typically made only one type of vehicle. In addition, the Detroit Three produce a wide variety of cars with greatly divergent profit margins. The Japanese Three are producing a more limited number of vehicle types,

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with fewer trucks and luxury cars, which helps keep their profit margins and productivity more consistent.

York believes tomorrow's war will focus on political factors, low-priced cars in the developing markets, and the greener technology that will be available. The political factors will include national policy, currency exchange rates, automaker objectives, and local preferences. The low-priced car will be affected by deteriorating profit margins (the dealers need to take a percentage, as well as the outbound transportation costs, leaving the manufacturers with a small amount of money to build the automobile). The greener technology that currently exists is both turbo-diesel engines, which exists in Europe, and ethanol fueled (E85) vehicles, which is available in the U.S., but at few gas stations. The automakers are well underway to creating gas-electric hybrid powertrains. In the future, there may be an all-electric plug-in vehicle, which will require a better battery technology than currently exists, or there is a small possibility for fuel-celled vehicles.

Kristin Dziczek, senior project manager, Center for Automotive Research spoke about the importance of labor relations in the automotive sector. Currently, the unionization rate in the U.S. automotive industry is below 23%. Additionally, the Detroit Three are losing market share to the foreign nameplate manufacturers whose workers are primarily nonunion. Both the United Auto Workers (UAW) and the Detroit Three are working toward an agreement that will allow the companies to be more flexible in this very competitive environment. While the UAW understands that the Detroit Three are struggling, it also is still striving to maintain its basic principles for its employees: a middle-class standard of living, equal representation, the best health care for the workers and their families, and an accessible way for the workers to contribute to social progress and justice. At this time, the union wants to "seek to raise the standard of living for its members." Meanwhile, the Detroit Three want to further cut health care costs, shut down plants that are not being fully utilized, and restructure other plants in order to help them become profitable again.

Conclusion

The presenters at the conference helped explain why the U.S. automotive industry has been undergoing major transitions over the past 25 years. The keyword that seems to address the difference between the companies gaining share and those that are losing share is flexibility. Flexibility allows firms to build-to-order, satisfying market demands more accurately and to modify production lines quickly in order to respond to changing preferences. Fuel-efficiency has played a more important role over the last several years, and our presenters seemed to believe that it will continue to influence the industry in the future as technology allows vehicles to be powered in new ways. The Detroit Three are striving hard to match the flexibility of the new domestics and, with agreements from their unions, they hope to be a more competitive force going forward in order to stem the loss of market share over the past ten years.

¹ For details on the conference, please visit the web site at www.chicagofed.org/news_and_conferences/conferences_and_events/2007_auto_transitions.cfm

² See www.jdpower.com/corporate/news/releases/pressrelease.aspx?ID=2006082.