Auto industry jobs in the 1980's: a decade of transition

Employment in the industry fluctuated sharply during the decade as U.S. automakers contended with foreign competition, changing demand patterns, and the business cycle

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The U.S. automobile industry has undergone tremendous structural change in the past decade.[1] Once the world's dominant motor vehicle producers, U.S. automakers faced increasingly fierce competition from foreign manufacturers during the 1980's. This stiff competition, coupled with highly cyclical demand, has resulted in fluctuating output and employment growth for the U.S. motor vehicle industry. The industry's strong long-term productivity growth rate, in the context of moderate demand, has also depressed employment growth. Traditionally one of the U.S. economy's largest employers, the industry affects, both directly and indirectly, the job prospects of hundreds of thousands of workers. Its lack of sustained employment growth during the 1980's has therefore had a noticeable negative impact on the U.S. economy, particularly the manufacturing segment. (See appendix for a more inclusive definition and discussion of "automobile manufacturing" industries.)

This article provides a historical overview of the U.S. automobile market, focusing on factors that affected output and employment trends during the crucial decade of the 1980's. It describes the competitive pressures faced by American automakers and presents the primary issues affecting the industry's future economic vitality and employment requirements.

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History of the market

Until the late 1970's, the nature of the American automobile market had remained fairly consistent throughout most of the twentieth century. The "Big Three" automakers—General Motors, Ford, and Chrysler—dominated the market, with imports controlling a rising, but hardly destabilizing share. Huge capital requirements and economies of scale created barriers to entry and perpetuated a concentrated market structure.

Ford Motor Co. revolutionized the production process in the first part of the century with the mass production of the low-cost Model T. Henry Ford implemented an assembly line to enable a greater specialization of labor. In 1922, he estimated that 85 percent of his factory work force required less than 2 weeks of training and 40 percent required less than 1 day.[2] General Motors, meanwhile, revolutionized the industry's marketing approach. The company segmented its automobiles into a hierarchy of five divisions, each targeted to a different level of income. To induce consumers to purchase new autos more frequently, General Motors introduced the concept of an annual model change.

The production of automobiles accelerated sharply after World War II to meet pent-up demand, suppressed during the war. In 1946, worldwide output of automobiles amounted to 3.9 million units, with the United States accounting for 3.1 million, or 80 percent, of the total.[3] (See chart 1.) The United Kingdom ranked a distant second with 360,000 units, and Japan was not then a factor in the world automobile market, producing only 15,000 autos that year. Accounting for about 85 percent of the U.S. market measured by car registrations in 1946,

General Motors (38 percent), Ford (22 percent), and Chrysler (26 percent), had the highest share; the remaining portion of the market was divided among smaller domestic firms. [redacted] The United States attained its postwar peak in 1947 at 82 percent. But European economies soon began recovering from the war and expanded output.

The automobile gradually became a more standardized product, and numerous countries obtained the requisite technology to establish domestic industries. [redacted] until 1963, and were not a real force in the world market until the late 1960's to early 1970's. American automakers' longstanding success in the U.S. market, coupled with early Japanese failures, led to an underestimation of the potential competition.

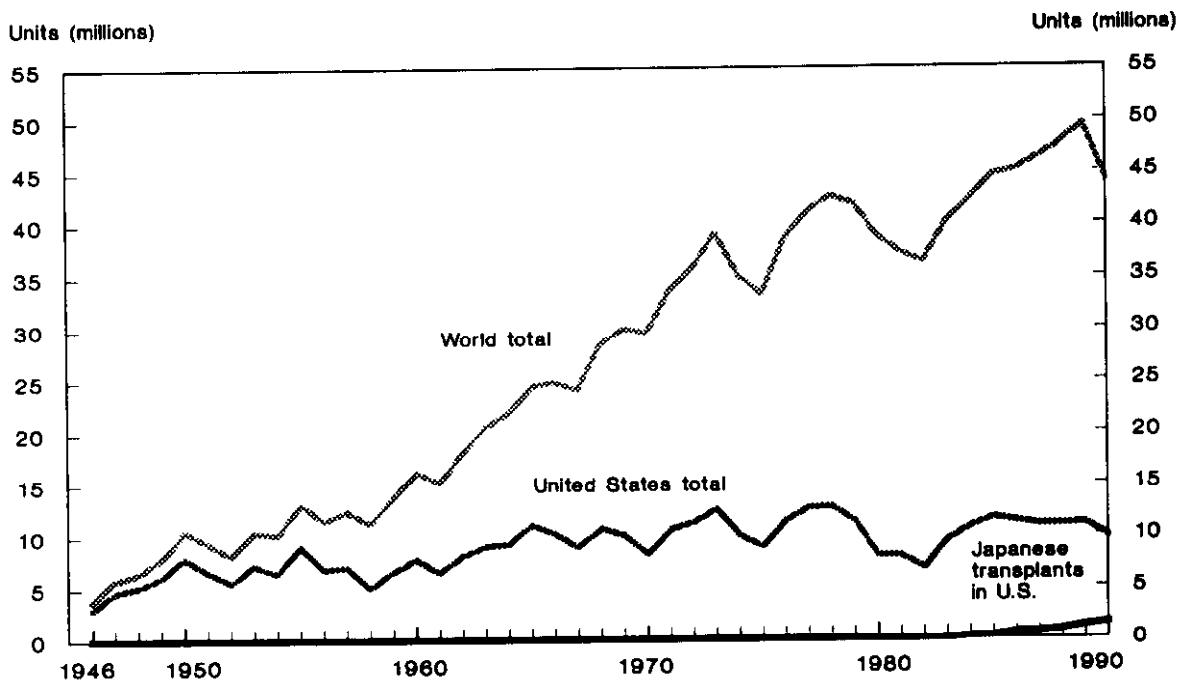
The 1970's represented a turning point for automobile design. [redacted] due to the low cost of gasoline in the United States as well as [redacted] extensive highway system and low population densities. In contrast, Japanese automakers' designs reflected the smaller car preferences of the Asian and European markets. [redacted] for more fuel-efficient cars, and the Japanese were well-positioned to capture an initial portion of the U.S. market. The ensuing growth during the 1980's of foreign competition in the domestic market marked several significant transformations of the domestic automobile industry. Japanese producers priced their automobiles very competitively and consumers placed increasing emphasis on product quality and value in their purchase decisions. [redacted] Japanese firms (both Japan- and U.S.-based) had captured 33 percent of all U.S. car sales; European firms, 5 percent; and Korean companies, 2 percent.

Employment analysis

The 1980's. [redacted] the motor vehicles and equipment industry experienced a net loss of 105,000 jobs. (See chart 2.) The level in December 1989 of 835,000 represented only 80 percent of the industry's January 1979 peak employment level (1.1 million). However, these figures mask the great fluctuations in employment that characterized the first half of the decade.[4]

The oil crisis that immediately preceded the decade adversely affected the automobile in-

Chart 1. **U.S. and worldwide annual motor vehicle production, 1946-90**



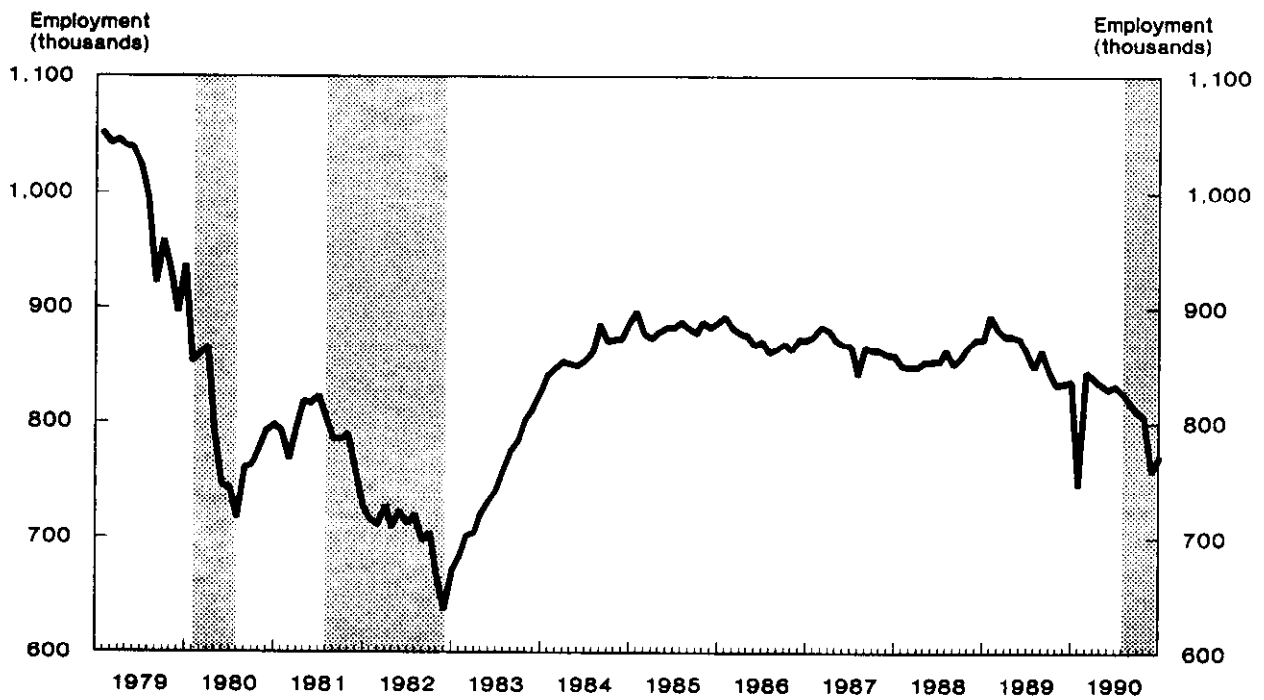
SOURCE: *Automotive News* (Detroit, MI, Crain Communications), various issues.

dustry on two levels. From a macroeconomic perspective, the oil price hikes retarded the economy's growth and, thus, the demand for big-ticket items such as autos. At the microeconomic level, the oil shock accelerated the trend away from larger cars towards those with smaller engines and greater fuel efficiency. As a result, foreign producers, particularly the Japanese, captured market share from American automakers because of the latter's emphasis on large models. (See chart 3.) The Americans subsequently reduced the engine size of many of their models: in 1978, 11 percent of all domestically produced cars contained four-cylinder engines, compared with 66 percent with eight-cylinder engines. Just 2 years later, 33 percent of U.S. cars were built with four-cylinder engines; those with eight-cylinder engines represented only 30 percent of the market.[5]

Despite this new emphasis on smaller engines by American car manufacturers, import penetration jumped 9 percentage points between 1978 and 1980, rising to 27 percent of the domestic market, as measured by share of U.S. new car sales. (See table 1.) In addition to greater fuel efficiency, this shift in consumer preferences for imports also stemmed from perceptions of imports' superior quality. The U.S. work force was sharply affected by the substitution of foreign-built automobiles for domestically produced ones. [redacted] The ensuing recovery lasted but 11 months and resulted in growth of only 110,000 jobs. The economic recession of 1981–82 severely affected the industry, and employment fell by 185,000 jobs between June 1981 and November 1982, stemming from a 14-percent drop in production.

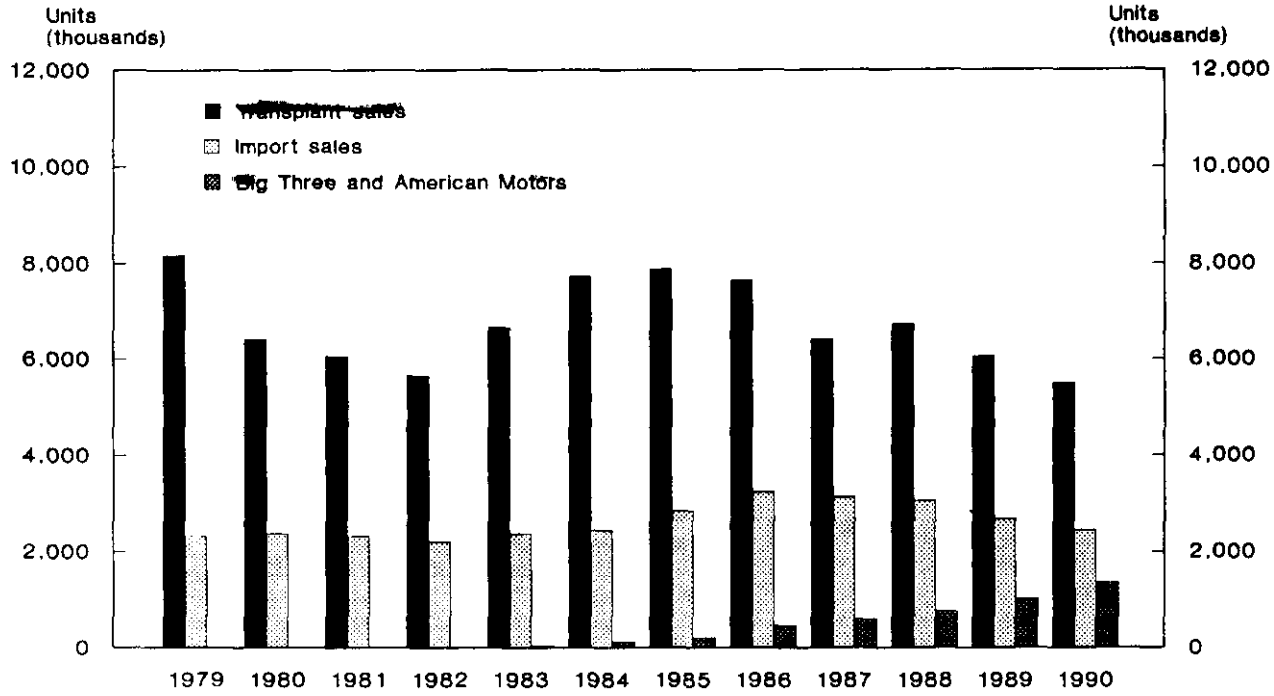
The general economic expansion after November 1982, coupled with U.S. automakers' increasing emphasis on quality control and cost reduction, improved their competitive position. The voluntary restraint agreements between the United States and Japan, first negotiated in 1981, also aided the industry. These pacts limited Japanese exports, enabling domestic manufacturers to improve their efficiency and quality. U.S. motor vehicle employment rose in the mid-1980's as production and sales rebounded. [redacted] with more rapid growth occurring at the beginning of the upturn—typical of cyclical expansion phases. However, the employment level remained below that of the late 1970's. This period also

Chart 2. **Employment in motor vehicles and equipment, seasonally adjusted, 1979–90**



NOTE: Shaded areas denote recessions as designated by the National Bureau of Economic Research.

Chart 3. **U.S. car sales by American automakers, imports, and Japanese transplants, 1979-90**



NOTE: The first Japanese transplant began operations in the United States in 1982.

SOURCE: *Automotive News* (Detroit, MI, Crain Communications), various issues.

marked the beginning of Japanese assembly production in the United States, and a portion of domestic employment became directly tied to their operations.

Employment fell by 45,000 during the 1986–87 period, as sales of domestically produced cars declined in 1987—the first such drop since 1982. Import sales fell as well, although at a slower rate, causing import penetration to reach a record level of 31 percent in 1987. In contrast, light-duty truck sales continued their healthy gains; apparently, some U.S. consumers switched from car to truck purchases. Truck sales is an area where U.S. automakers maintained a significant lead over the competition.

Motor vehicle employment experienced moderate growth in 1988, reversing the losses of the previous 2 years. Unfortunately, these job gains reflected volume swings rather than long-term growth; they were short-lived, lasting only until January 1989. By the end of the decade, there was a huge number of automobiles on American roads. Meanwhile, rising interest rates dampened demand. Even vigorous price rebates could not advance sales sufficiently. The automakers were forced to trim their production plans to reduce high inventories, and this resulted in the temporary idling of numerous plants. Sixty thousand jobs were lost between January and December of 1989. Production during the last 3 months of 1989 was the lowest for any fourth quarter since the recession year of 1982, and the new decade thus began on a negative note.

In 1990. The weakness that was evident at the end of the decade continued, with automakers reducing their work force by 65,000 jobs in 1990. The year began with a loss of 90,000 jobs in January, reflecting the temporary closure of many factories for inventory adjustment; most resumed production soon thereafter, and the industry reversed these losses the following month. However, as in 1989, the year was characterized by numerous production cutbacks. On a quarterly basis, the job declines accelerated through the end of 1990. This coincided with the recession that began in July—18 months after the industry's employment began falling—as well as with the Persian Gulf crisis and the resulting surge in oil prices and the sharp decline in consumer confidence.

Auto transplants

The increasing competition in the 1980's for U.S. market share was typified by Japanese

Table 1. **U.S. new car sales of American automakers, Japanese transplants and imports, and total imports, 1979-90**

[Numbers in thousands of units]

Year	American automakers		Japanese transplants		Japanese imports		Total imports	
	Sales	Percent of total	Sales	Percent of total	Sales	Percent of total	imports	Percent of total
1979	8,163	76.7	0	0.0	1,848	17.4	2,328	21.9
1980	6,401	71.3	0	.0	1,977	22.0	2,397	26.7
1981	6,044	70.8	0	.0	1,892	22.2	2,326	27.3
1982	5,665	71.0	0	.0	1,801	22.6	2,222	27.9
1983	6,660	72.5	50	.5	1,916	20.9	2,386	26.0
1984	7,744	74.5	134	1.3	1,906	18.3	2,442	23.5
1985	7,906	71.6	221	2.0	2,218	20.1	2,841	25.7
1986	7,675	67.0	466	4.1	2,386	20.8	3,249	28.3
1987	6,402	62.6	618	6.0	2,173	21.3	3,144	30.7
1988	6,735	63.6	766	7.2	2,103	19.8	3,067	28.9
1989	6,064	62.4	1,009	10.4	1,911	19.7	2,698	27.8
1990	5,500	59.2	1,343	14.4	1,721	18.5	2,453	26.4

NOTE: For the purposes of this table, the term, "American automakers," denotes General Motors, Ford, Chrysler, and American Motors.

SOURCE: *Automotive News* (Detroit, MI, Crain Communications), various issues.

automakers' establishment of U.S.-based production facilities. While this had been a traditional approach for U.S. automakers (that is, establishing plants in other countries), until the early 1980's, there had only been one major foreign-owned assembly plant in the United States—Germany's Volkswagen. Honda Motors became the first Japanese "transplant," beginning operations in 1982 at its Marysville, OH, assembly plant.

Several factors prompted the Japanese to transfer production to the United States. First of all, doing so would reduce shipping costs markedly and accelerate the distribution process. However, this did not by itself represent sufficient reason for the transfer. The voluntary restraint agreements which were continued throughout the decade—and the fear of additional barriers—were the primary influences on the Japanese decision. These restraint agreements limited only the domestic sale of automobiles produced in Japan; those Japanese vehicles built in the United States would be exempt. Additionally, the relative disparity between American and Japanese wage rates narrowed during the 1980's, attributable largely to the decline in the value of the dollar. In 1980, for example, hourly compensation for Japanese automobile workers amounted to only 45 percent of that of their American counterparts, in U.S. dollars; by 1988, the Japanese received 75 percent of compensation earned by Americans.[6]

By 1990, seven Japanese automakers were building vehicles domestically (at eight factories), and Volkswagen, previously the only foreign manufacturer stationed in the United States, had ceased U.S. production. (See table 2.) Some of these companies have formed joint ventures with members of the Big Three—Toyota with General Motors, and Mitsubishi with Chrysler—and produce automobiles under both labels. Others, such as Honda and Nissan, have established independent factories.

The transplants' share of domestic production has increased steadily since the early 1980's. By 1990, their output amounted to 1.5 million units, or 15 percent of all cars and trucks produced in the United States. (See table 3.) In contrast, U.S. automakers' share of total automobile production fell from 97 percent in 1979 to 82 percent in 1990. The share of new car sales from transplants and imports combined rose from 22 percent in 1979 to 41 percent in 1990.

Between 1987 and 1990, American companies closed seven assembly plants—five General Motors and two Chrysler—because of persistent overcapacity. Only one new plant opened, the General Motors Saturn factory, a multi-billion dollar project designed to win back purchasers of Japanese automobiles.

The movement of Japanese assembly plants into this country has also induced many Japanese motor vehicle parts manufacturers to expand to the United States, although most major components continue to be imported. The transplants' apparent reluctance to utilize components made by U.S. manufacturers provided an extra incentive for Japanese parts companies to move their production base.[7] Moreover, the fall

in the value of the dollar erased much of the price advantage of importing parts from Japan. The chance of domestic content legislation mandating that U.S.-made autos contain certain proportions of U.S.-made parts was another factor in the production transfer.

The competition that characterized the 1980's can be expected to intensify in the 1990's, as foreign producers attempt to continue to increase their U.S. productive capacity in a market that already has too much industry capacity. Nissan, for instance, plans to expand the capacity of its Tennessee assembly plant 75 percent to 465,000 units, annually, by 1992. Toyota will increase the capacity of its Kentucky plant from 200,000 to 240,000 units by 1992 and plans to build an additional factory at a nearby site, with production beginning in late 1993. With their growing capacity and production levels, the transplants are also adding jobs and raising their share of employment in the industry. It should be noted, however, that much of this employment growth is a *replacement* for jobs that were lost from traditional U.S. auto plants, rather than net growth.

Influences on job trends, prognosis

Although the structure of the automobile industry has changed significantly since the late 1970's, the employment level continues to be determined by a number of basic factors.

Foreign competition. The definitive issue affecting motor vehicle employment is the intense competition for sales in the domestic market. Because of the transplants, the issue is no longer simply one of U.S. automakers versus foreign automakers; as far as U.S. employment is concerned, a distinction must be made between auto assembly plants in the United States and those located in other countries. The Japanese remain the focus of this competition.

In 1990, Japanese companies produced 1.5 million automobiles in the United States and exported another 2.5 million from Japan-based assembly plants. The Japanese initially entered the U.S. market with small, inexpensive, fuel-efficient cars. Gradually, however, they have expanded their range of products to include larger, more powerful and more expensive vehicles. Japanese automakers currently offer compact cars and sports cars, as well as light trucks and minivans. Three Japanese automakers—Honda, Toyota, and Nissan—began competing in the luxury car market in the late 1980's; competition that was not widely anticipated a decade earlier.

Although the impact of imports on employment is not precisely known, it is clear that it reduces the number of U.S. motor vehicle jobs because imported vehicles compete directly against domestic automobiles. The case of transplants is less clear. To the extent that cars sold by transplants displace imported sales, transplants would have a direct positive effect on U.S. employment in the motor vehicle industry. To the extent that they displace sales of American automakers, the transplants would reduce

Table 2. **Japanese automobile assembly plants based in the United States, 1982–90**

Company	Location	Production began	1989 production	1990 production	Current capacity	Unionized
Total	.....	.....	1,262,876	1,493,884	1,815,000	.....
Honda	Marysville, OH	1982	[1]362,274	[1]435,437	360,000	No
Nissan	Smyrna, TN	1983	238,641	235,248	265,000	No
New United Motor Manufacturing (Toyota and General Motors)	Fremont, CA	1984	192,471	205,287	240,000	Yes
Mazda (with Ford)	Flat Rock, MI	1987	216,501	184,428	240,000	Yes
Diamond-Star (Mitsubishi and Chrysler)	Normal, IL	1988	90,741	148,379	240,000	Yes
Toyota	Georgetown, KY	1988	151,088	218,155	200,000	No
Subaru-Isuzu	Lafayette, IN	1989	11,160	66,950	120,000	No
Honda	East Liberty, OH	1989	([1])	([1])	150,000	No

[1] Honda Marysville production level includes Honda East Liberty production as well.

SOURCES: Motor Vehicle Manufacturers Association and *Automotive News* (Detroit, MI, Crain Communications), various issues.

Table 3. **U.S.-based motor vehicle production by American automakers and Japanese transplants, 1979–90**

[Numbers in thousands of units]

Year	Japanese transplants			American automakers		
	Production	Percent change	Percent of total	Production	Percent change	Percent of total
1979	0	.....	0.0	11,098	.....	97.4
1980	0	.....	.0	7,667	–30.9	95.7
1981	0	.....	.0	7,614	–0.7	95.4
1982	2	.....	.0	6,785	–10.9	98.7
1983	75	4,920.9	.8	8,900	31.2	93.6
1984	239	217.5	2.2	10,462	17.6	95.8
1985	361	51.1	3.1	11,095	6.1	95.1
1986	617	70.9	5.4	10,688	–3.7	94.0
1987	736	19.2	6.7	10,097	–5.5	92.0
1988	882	19.9	8.0	10,122	.2	91.9
1989	1,263	43.1	11.4	9,615	–5.0	86.4
1990	1,494	18.3	15.1	8,152	–15.2	82.4

NOTE: For the purposes of this table, the term, "American automakers," denotes General Motors, Ford, Chrysler, and American Motors.

SOURCES: Motor Vehicle Manufacturers Association and *Automotive News* (Detroit, MI, Crain Communications, Inc.), various issues.

overall employment in the United States, because the transplants would have obtained more of their component parts from overseas.

The U.S. General Accounting Office (GAO) estimated the net job effects stemming from the operations of Japanese transplants in 1987.[8] The study assumed that the transplant automobiles had a domestic sourcing ratio (the proportion of parts and components made in the United States) of 30 percent, versus that of American automakers of 90 percent; these ratios affect the number of jobs devoted to motor vehicle parts manufacturing. The GAO estimated the transplants' effect under several different displacement scenarios: if transplant production displaced American production at a one-for-one rate, then the net employment effect would be a loss of 52,000 jobs; if at a 70-percent rate, the loss would be 27,000 jobs. At the other extreme, if the transplants' displacement ratio were zero, that is, if their production only displaced imports, the net effect would be a gain of 33,000 jobs.

While the GAO report noted that the transplants have fewer job classifications than do traditional manufacturers, data from the BLS Occupational Employment Statistics (OES) survey do not indicate any significant shift in the industry's occupational mix during the 1980's. It may well be that the transplants, assuming that their occupational patterns differ from domestic automakers, are too small to affect the industry averages.

Exports. The success of U.S. automotive exports also influences the employment level. Although the bulk of U.S.-made motor vehicles and parts are purchased for domestic consumption, nearly 10 percent of the industry's output, in dollar terms, was destined for direct export in 1989.[9] This implies that approximately 10 percent of motor vehicle employment is attributable to export demand.[10] In 1989, 1 million motor vehicles were exported; three-fourths of them to Canada.[11] The ability of U.S. automakers to compete in overseas markets depends not only on the nature of their product offerings, but also on the relative prices of the goods. Economic growth by foreign countries remains a major factor as well.

Business cycle. Competition in the domestic and export markets is of critical concern to U.S. automakers, especially given the slack demand that has characterized the industry recently. Because automobiles are big-ticket items, sales are heavily influenced by the business cycle. Production and employment sometimes experience wide swings because sales are so cyclical, as evidenced during the early 1980's. Higher interest rates discouraged consumer spending on big-ticket items at the end of the decade. New car sales dropped sharply in 1989 and 1990, and the industry's employment level reflected this weakness.

Employment is generally considered a coincident indicator; that is, employment cycles tend to closely correspond to aggregate economic cycles. However, motor vehicles employment typically reaches a high point and begins dropping prior to a recession.[12] Over the last four recessions, motor vehicles employment reached

a high point 10 months before the economy did, on average. In contrast, motor vehicles employment coincides with, rather than leads, the economy at low points.

Current stock. Another factor affecting demand involves the nature of the existing stock of automobiles. Due to improved quality and relatively high new car prices—especially when compared with used cars—the average age of the stock was historically high at the end of the 1980's. Normally, an aging stock of autos would portend rising demand from replacement purchases. But the typical consumer's buying frequency has diminished as a result of the increased quality of automobiles, coupled with the sharp price increases over the decade. The latter factor is especially important, given only modest income growth: average new domestic car prices as a share of median family income increased from 35 percent to 46 percent during the 1979–89 period.[13] Moreover, the average maturity of automobile loans rose from 45 months to 54 months between 1980 and 1989, which has also served to reduce consumers' willingness to buy new automobiles.[14]

Demographics. The size and characteristics of the U.S. population also underlie the demand for autos in the domestic market and will influence demand in the 1990's. With the postwar "baby boom" being replaced by the "baby-bust" generation, population growth moderated in the 1980's; the civilian noninstitutional population (aged 16 and older) increased by 12 percent between 1980 and 1990, compared with 22 percent for the prior 10 years.[15] (See table 4.) The Bureau of Labor Statistics projects continued moderation in the 1990's, during which the population is projected to rise 11 percent.[16] Slower growth by the population of driving age negatively influences demand, reducing the need for increased capacity and thus additional jobs in the automobile industry.

Sharp growth during the 1970's and 1980's by the 25 to 44 age group—the prime car buying ages—was a positive influence on automobile demand. The growth rate was 32 percent for the 1970–80 period and 29 percent during the 1980's. This segment accounted for 43 percent of the civilian noninstitutional population in 1990. However, in contrast to the sharp increases of the 1970's and 1980's, the 25 to 44 age group is projected to rise by only 2 percent during the 1990's.

The mix—as opposed to the quantity—of automobiles demanded is affected by such factors as income, educational attainment, marital status, and age. Marketing studies have shown, for example, that older buyers purchase a disproportionate number of larger and more luxurious cars, because income tends to be positively correlated with age.[17] Demographic trends such as the aging of the U.S. population, thus present certain implications for the nature of future demand, and challenges to producers supplying that demand.

Productivity. Additionally, there are important supply-side considerations which affect motor vehicle employment. First of all, the industry has historically benefited from high rates of labor productivity. Output per hour grew at average annual rates of 4.3 percent for all employees and 3.7 percent for production workers during the 1979–89 period.[18] Such productivity growth reflects efficiencies gained from improved or better utilized inputs, allowing automakers—both suppliers and assembly plants—to produce more output from a given amount of labor. Due to productivity gains over this 10-year period, the vehicles produced in 1979 could be produced with 25 percent fewer workers in 1989. Increased productivity, by

Table 4. **Index of civilian noninstitutional population by age, 1970,1980, and 1990, and projected for 2000**

[1970=100]

Year	Aged 16 and older		Aged 16 to 24		Aged 25 to 44		Aged 45 and older	
	Index	Percent change from previous decade	Index	Percent change from previous decade	Index	Percent change from previous decade	Index	Percent change from previous decade
1970	100.0	.....	100.0	.....	100.0	.....	100.0	.....
1980	122 4	22.4	124.6	24.6	132.4	32.4	113.5	13.5
1990	137 2	12.1	105.9	−15.0	170.7	28.9	126.6	11.6
2000	151.7	10.6	108.8	2.7	173.3	1.5	156.2	23.4

NOTE: Index values for the year 2000 were calculated from projections made by the BLS Office of Employment Projections.

definition, means that employment growth lags increases in output. But continued productivity growth is necessary for U.S.-based automakers to compete effectively with imports and to take advantage of future export markets.

Outsourcing. The purchase of foreign-built automotive components by American companies and Japanese transplants has remained a contentious issue for U.S. autoworkers. The use of such parts displaces domestic employment—real and potential—by transferring demand abroad. Between 1982 and 1986, imports of automotive parts by the Big Three automakers rose from $2.7 billion to $5.6 billion; between 1984 and 1986, those by Japanese transplants increased from $0.5 billion to $1.6 billion.[19]

Captive imports. The prevalence of captive imports—vehicles that are imported by U.S. companies from foreign automakers and sold under domestic labels—also affects employment. The domestic-sponsored imports are largely subcompact models, intended to bolster American automakers' sales in one of the more competitive market segments. Sales of captive imports exceeded 330,000 units, accounting for about 6 percent of Big Three car sales in 1990.

THE AUTO INDUSTRY'S EMPLOYMENT LEVEL is derived from the demand for new automobiles. Because the industry traditionally experiences high labor productivity growth, future employment growth is dependent on healthy consumer demand. Short-term demand for autos will always be highly cyclical, because cars and trucks are big-ticket items, making sales subject to the economy's overall health. Government fiscal and monetary policies, with their influence on interest rates and disposable income, are important determinants of the economy's vitality. Longer term demand is largely a function of the size and income of the population, as well as the nature of the existing stock of automobiles. Population projections indicate that the industry's pool of potential consumers should grow more slowly in the 1990's than in the prior two decades. As for the stock of automobiles, by the end of the 1980's, there were a large number of cars in use, and the average age was historically high. However, strong demand for replacement vehicle purchases depends on the relation between future income growth and price changes; in the 1980's, income growth proved fairly sluggish. And price changes depend on the prevalence of government regulation, to the extent that it affects industry costs, which will also affect demand, if automakers choose to pass increased costs to consumers.

The 1980's marked a transitional period for the auto industry, reflecting increased competition for domestic sales. The next few years will also represent a challenging period for American automakers and autoworkers, because they must continue to maintain their quality and productivity gains while also adjusting to new market conditions and uncertain demand. □

Footnotes

[1] The automobile industry is classified as SIC 371, motor vehicles and equipment, in the *Standard Industrial Classification Manual.*

[2] Douglas Dyer, Malcolm S. Seltzer, and Alan M. Webber, *Changing Alliances* (Boston, Harvard Business School Press, 1987), p. 35.

[3] Production and sales statistics were obtained from various issues of *Automotive News* (Detroit, MI, Crain Communications, Inc.).

[4] Employment data are from the Current Employment Statistics survey and appear in *Employment, Hours, and Earnings, United States, 1909–90,* Volume II, Bulletin 2370 (Bureau of Labor Statistics, March 1991).

[5] *Automotive News*, May 1, 1989, p. 22.

[6] Based on unpublished data from the Office of Productivity and Technology, Bureau of Labor Statistics, August 1989.

[7] *U.S. Global Competitiveness: The U.S. Automotive Parts Industry*, USITC Publication 2037 (U.S. International Trade Commission, December 1987), p. 5–1.

[8] *Foreign Investment: Growing Japanese Presence in the U.S. Auto Industry*, GAO/NSIAD-88-111 (U.S. General Accounting Office, March 1988), pp. 22–23.

[9] Shipments data are from the M3-1 release (U.S. Department of Commerce, Bureau of the Census, 1990); export data are from *Trade and Employment*, various issues (U.S. Department of Commerce, Bureau of the Census, 1990).

[10] Of course, if American transplants are taken into account, the "exported" percentage would be greater than 10 percent.

[11] *World Motor Vehicle Data* (Detroit, Motor Vehicle Manufacturers Association of the United States, Inc., 1991), p. 329.

[12] Recessions are designated by the National Bureau of Economic Research, Inc., Cambridge, MA.

[13] U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data, and Bureau of Labor Statistics, *Employment and Earnings,* various issues. It should be noted that much of the rise in average prices reflects quality improvements and increased options.

[14] *1991 U.S. Industrial Outlook* (U.S. Department of Commerce, International Trade Administration, January 1991), p. 37–5.

[15] Historical data in this section are from the Current Population Survey. See Bureau of Labor Statistics, *Employment and Earnings,* various issues.

[16] Projections were made by the Office of Employment Projections, Bureau of Labor Statistics, unpublished data.

[17] Jim Schwartz and Jim Stone, "New Car Buyers," *American Demographics*, April 1987, p. 36.

[18] Bureau of Labor Statistics, Office of Productivity and Technology, unpublished data.

[19] *Global Competitiveness*, p. 2–5.

APPENDIX: Related industries

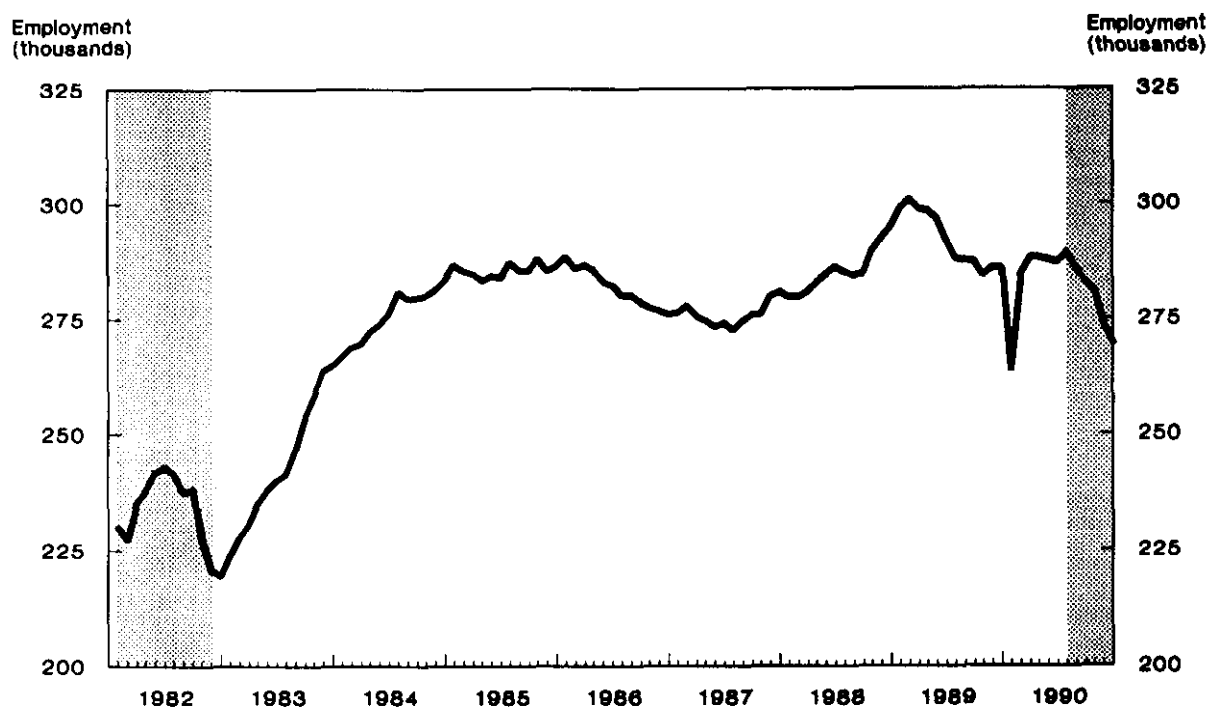
This article focuses on the motor vehicles and equipment industry (SIC 371) because the bulk of automotive manufacturing jobs are classified in that industry. However, in addition to the 800,000 jobs that comprise SIC 371, there are jobs devoted to the manufacture of automotive parts that are classified in several other industries.

Industries which primarily produce motor vehicle parts and components include: automotive and apparel trimmings (SIC 2396); flat glass (SIC 3211); automotive stampings (SIC 3465); steel springs, except wire (SIC 3493); carburetors, pistons, rings, valves (SIC 3592); vehicular lighting equipment (SIC 3647); and engine electrical equipment (SIC 3694). These industries had a combined employment level of 280,000 in 1990. It should be noted, however, that not all of these jobs necessarily involve the production of parts for automobiles—but a large proportion do. Furthermore, there are additional parts manufacturing jobs in industries outside of this list.

Chart A depicts the composite series formed from summing the employment in these seven industries; the aggregate series has been adjusted for seasonal variations. A comparison with chart 1 shows that total employment in these "auto-related" industries closely followed the trends in SIC 371 during the decade. Employment in both series improved sharply after the recession of 1981–82, leveled off during the mid-1980's and experienced small cyclical fluctuations, and then peaked in early 1989, well before the beginning of the 1990–91 recession.

However, the breadth to the U.S. auto industry extends well beyond these industries. Hundreds of thousands of jobs are also indirectly tied to the production of automobiles. For example, other manufacturing industries supply automakers with raw materials such as steel and plastics. Many jobs in the service-producing sector are also attributable to the auto industry. Some of these services are inputs to the production process while others, notably wholesale and retail, deal with the finished product.

Chart A. **Employment in auto-related industries, seasonally adjusted, 1982–90**



NOTE: Shaded areas denote recessions as designated by the National Bureau of Economic Research