

Productivity shows a decline in automotive repair shops

Output per hour of persons employed in these shops fell at an annual rate of 1.2 percent between 1972 and 1986, reflecting a larger increase in employee hours than in output

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Output per hour of all persons¹ in the automotive repair shop industry² decreased at an average annual rate of 1.2 percent between 1972 and 1986. During this period, productivity in the private nonfarm business sector rose at an annual rate of 0.8 percent. The overall productivity decline reflects a 3.0-percent average annual increase in output and a corresponding larger growth in all person hours of 4.3 percent. (See table 1.)

Despite increased efficiency in some specialty repair shops, overall productivity for the automotive repair shop industry has declined since 1972. Factors contributing to this decline include a large influx of new establishments and workers in the industry, a shortage of adequately trained mechanics, the introduction of more complex cars and trucks, as well as the effect of several recessions in the U.S. economy during the 1972-86 period.

The output per hour rates for automotive repair shops varied substantially from year to year. Since 1972, annual increases in productivity have occurred in 6 years, ranging from 0.5 to 8.7 percent. Declines in productivity occurred in 8 years, the largest in 1982 when output per hour dropped 6.3 percent.

The auto repair shop industry is affected by cyclical changes in the economy. During periods of economic contraction, output in the automotive repair shop industry slows

or falls, and productivity tends to decline. During an economic downturn, industry output may grow because of maintenance and repair expenditures on older motor vehicles, but be offset by declines in disposable income and new motor vehicle sales. This would slow the rate of growth in industry output or lead to a decline in output. Cyclical influences on the automotive repair shop industry can be seen by examining subperiod trends.

From 1972 to 1974, productivity in the automotive repair shop industry increased at an annual rate of 2.1 percent, as output rose 5.8 percent and all employee hours grew 3.7 percent. Reflecting a general downturn in the economy, productivity declined 5.6 percent in 1975, as output dropped 0.2 percent. Between 1975 and 1979, output per hour fell slightly, 0.6 percent per year, as hours (5.3 percent) grew faster than output (4.6 percent). The recession of 1980 and 1981-82 had a more adverse effect on the industry than the previous recession. From 1979 to 1982, productivity experienced its largest decline, dropping 4.2 percent per year, as output fell at an annual rate of 3.1 percent. Automotive repair shops shared in the economic recovery that began in 1983. Productivity grew 2.5 percent per year between 1982 and 1986, as output rebounded at a 9.0-percent annual rate and hours increased 6.3 percent per year.

Industry structure

The automotive repair shop industry consists of establishments primarily engaged in the repair of automotive tops,

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bodies, and interiors; repairing and retreading automotive tires; automotive painting and refinishing; general automotive repair; and specialized automotive repair, not elsewhere classified, such as fuel service (carburetor repair), brake relining, front-end and wheel alignment, exhaust system (muffler) repair, radiator repair, and glass replacement and repair. Automotive repair shops compete in a broad service and parts market. The automotive service market is heterogeneous in its structure, ranging from new car and truck dealers and self-service fleets to gasoline service stations and independent repair shops. In addition, a large number of motor vehicle owners perform some or all of their own repairs. Automotive repair departments maintained by establishments engaged in the sale of new automobiles are classified in retail trade, as are gasoline service stations (where sales of merchandise, including fuel, exceed repair receipts).

The automotive repair shop industry is characterized by a large number of small firms. In 1972, there were an estimated 127,203 establishments operating in the industry. By 1982, the industry had grown to 179,093 establishments. Almost half of these establishments had payroll in 1982. The number of paid employees in establishments with payrolls averaged 3.6 in 1972, 3.9 in 1977, and 4.1 in 1982. Many of these establishments are owned or operated by partners or sole proprietors. In 1982, partners and proprietors made up almost 80 percent of the ownership of all establishments and accounted for more than 60 percent of all persons in the industry.

In 1986, the industry generated \$32.0 billion in receipts with a work force of about 780,000. Small establishments accounted for the majority of industry receipts. More than 75 percent of all automotive repair shops with payrolls had sales of less than \$250,000 in 1982.

Output and demand

In spite of several economic downturns, overall output of the automotive repair shop industry increased 3.0 percent per year between 1972 and 1986. In comparison, over the same period, output for the private nonfarm business sector increased an average of 2.5 percent per year.

Industry output growth reflects, in part, increases in the number of motor vehicles in operation. Passenger cars in operation increased at an average annual rate of 2.0 percent between 1972 and 1986. The number of trucks in operation also increased over this period, growing 5.8 percent per year.³ An increase in the average age of cars and trucks also has contributed to the growth in output. The median age of passenger cars has grown steadily from 5.1 years in 1972 to 6.9 years in 1985. The median age of trucks grew from 6.0 years in 1972 to 7.6 years in 1985.⁴

The industry's output growth generally paralleled the trend for the overall economy. Between 1972 and 1979, the industry's output rose at an average annual rate of 3.9 percent. Output increased in 6 of the 7 years over this period,

Table 1. Indexes of output per hour of all persons and related data, automotive repair shops, 1972-86
[1977=100]

Year	Output per hour of all persons	Output per person	Output	Hours of all persons	All persons
1972	103.5	104.7	83.1	80.3	79.4
1973	104.0	107.5	86.6	85.2	82.4
1974	107.9	111.0	93.1	86.3	83.9
1975	101.9	103.0	92.9	91.2	90.2
1976	104.3	105.4	98.0	94.0	93.0
1977	100.0	100.0	100.0	100.0	100.0
1978	100.9	100.5	106.0	100.1	105.5
1979	100.4	101.2	111.9	111.4	110.6
1980	96.0	96.1	106.8	111.2	111.1
1981	93.6	92.2	103.0	110.0	111.7
1982	87.7	86.6	102.0	116.3	117.8
1983	86.2	85.8	108.4	125.8	126.4
1984	88.5	87.6	119.5	135.1	136.4
1985	96.2	95.1	138.6	144.1	145.7
1986	94.1	93.3	139.1	147.8	149.1
Average annual rates of change (in percent)					
1972-86	-1.2	-1.5	3.0	4.3	4.6
1981-86	0.9	1.0	7.5	6.5	6.4

falling only in 1975 with the downturn in the economy. In 1979-82, output declined an average of 3.1 percent per year. Recessionary conditions in 1980 and 1981-82 contributed to the weak demand experienced during this period. Reflecting the general economic recovery since 1982, output experienced a sharp turnaround, rising at a 9.0-percent annual rate from 1982 to 1986.

Auto repair shops have boosted their share of the automotive service and parts market during the last 10 years, increasing from 25 percent in 1976 to nearly 28 percent in 1985.⁵ New car dealers, who have enjoyed the largest share of the service and parts market, and gasoline service stations declined during this period. The percentage of sales of the automotive service and parts market (including tire sales) during 1985 was as follows: franchised new car dealers, 33 percent; automotive repair shops, 28 percent; gasoline service stations, 8 percent; tire, battery, and accessory dealers, 22 percent; mass merchandisers, 7 percent; and all others, 3 percent.

Between 1972 and 1986, the number of full service gasoline stations fell from 226,459 to 120,150, a 47-percent decline.⁶ Self-service stations have taken their place. Large corporations, chain organizations, and franchise operations are claiming some of the business that the full-service stations are giving up. Specialized auto repair shops have taken a large part of the muffler and brake repair businesses. In addition, "quick lube" shops are increasing their share of the oil change market.

The distribution of industry receipts by type of automotive repair shop showed little change between 1972 and 1982. In 1982, about 44 percent of all industry receipts were generated by general automotive repair shops, more than 26 percent by top and body repair shops, and almost 30 percent by other automotive repair shops. The distribution of establishments by type of operation, however, experienced a

slight change over this period. General automotive repair shops accounted for 61 percent of all establishments in the industry in 1982, compared with 56 percent in 1972. However, this group's share of total industry receipts declined slightly over this period, falling from 45 percent in 1972 to 44 percent in 1982. This trend reflects the continuing entry of small establishments into general automotive repair. Although top and body repair shops and all other automotive repair shops' share of total industry establishments dropped between 1972 and 1982, their proportion of total industry receipts increased slightly over this period. These trends reflect the growth of franchised operations among specialized auto repair shops.

Employment

Total employment in the automotive repair shop industry grew steadily from 415,700 in 1972 to 780,300 in 1986, at an average annual rate of 4.6 percent. In comparison, the private nonfarm business sector experienced a 2.1-percent rise in employment over the same period. The hours of all persons in the industry increased at a slightly lower annual rate of 4.3 percent because of a small drop in average weekly hours. The hours of nonsupervisory workers, for example, declined slightly from 39.9 in 1972 to 38.6 per week in 1986. Hourly earnings of nonsupervisory workers in automotive repair shops averaged \$8.17 in 1986, compared with \$8.76 for the total private economy and \$8.16 for the total service sector.

While the number of self-employed workers remains very high, establishments with paid employees have increased since 1972. Employees accounted for almost 60 percent of all persons in the industry in 1982, compared with 59 percent in 1977 and 56 percent in 1972. Self-employed workers dropped slightly, from more than 40 percent of all persons in 1972 to less than 38 percent in 1982. There was little change in the number of unpaid family workers; they accounted for about 3 percent of all persons in 1972, 1977, and 1982.

The decline in the number of full service gasoline stations has contributed to the large growth of employment in the industry between 1972 and 1986. Since the early 1970's, full service stations have declined in number, as oil companies have consolidated small stations into larger self-service facilities. As a result, the number of automotive repair shops has increased to absorb the former service station operators and repair services.

The industry's work force is dominated by persons in mechanic, installer, and repairer occupations, who made up almost 51 percent of total employment in 1984 (the latest year for which data are available).⁷ Within this occupational group, automotive and motorcycle mechanics represented the largest category, accounting for 27 percent of employment in the industry. Automotive body and related repairers, the next largest category, accounted for more than 16 percent of the industry work force. Bus and truck mechanics

and diesel engine specialists made up another 3 percent of employment.

Factors affecting productivity

One factor affecting productivity growth in the automotive repair shop industry is the small size of many of the shops. Small firms have limited resources in capital, personnel, and materials. Although there are little data on capital investment for this industry, it is clear that the small average size of establishments in the industry makes it difficult for the average firm to invest in new capital equipment, such as computerized diagnostic equipment. Automotive repair shops also have limited access to manufacturers training programs and data services.

The addition of more than 50,000 establishments and 200,000 workers to the industry between 1972 and 1982 has also influenced the movement of productivity over the period studied. The apparent ease of entry and exit from the industry has led to increases in the number of establishments and workers in the industry, even during periods of general economic recession. The large growth in employment, together with high separation rates for some occupations, has affected the overall experience level of workers in the industry. Garage- and service station-related occupations, which include some workers in the automotive repair shop industry, had high separation rates, as measured by the percent of workers leaving these jobs in 1981 and 1983.⁸ This influx of new firms and less experienced workers has contributed to the small, average size of industry establishments and the decline in output per hour during this period.

Another factor affecting productivity between 1972 and 1986 has been the introduction of more complex engineering in the design of cars and trucks. Automotive technology has changed significantly since the early 1970's. During the 1970's, advances in automotive engineering were concentrated in the areas of safety, emissions, and fuel economy. Although these changes included some improvements in serviceability, such as longer intervals between oil changes and ignition system tuneups, they have increased the complexity of many repair jobs. The downsizing of cars to reduce fuel consumption, along with the addition of numerous electronic components, has turned some routine maintenance jobs into major operations.

In the 1980's, the general trend has been toward the introduction of more subsystems of increasing sophistication and complexity. The increasing use of computer microprocessors in newer vehicles to control engine performance, transmission, and the suspension systems has also changed the complexity of repair work. According to a recent industry study, 83 percent of the mechanics surveyed indicated that newer cars are more difficult to repair than 10 years ago because their complexity makes it more difficult to pinpoint problems.⁹ The skill and equipment mix generally found in small automotive repair shops often are ill suited for such sophisticated diagnosis and repair work.

According to some automotive service industry analysts, a shortage of adequately trained mechanics also has affected industry productivity. Technological innovations have occurred so rapidly, particularly in automotive electronics, that it is difficult or impossible for many small repair shops to keep up with these changes. Small and medium sized repair shops often cannot afford to let mechanics take time off to learn the latest technology. As a result, worker skills are not keeping pace with new automotive technology.

Outlook for productivity

Long term prospects for demand in the overall automotive service industry should be good, as the automobile continues to play a key role in transportation. Future output growth will reflect further increases in the number of vehicles in operation and a modest rise in vehicle miles traveled. It is unclear, however, what share of the market will belong to the automotive repair shop industry. A smaller market share will reduce any opportunity for future productivity gain, especially for smaller operations unable to purchase needed capital equipment.

New automobiles are expected to continue to incorporate even more complex technology. Auto manufacturers, for example, plan to use onboard computers to chemically analyze oil, fuel, and radiator coolant, detect wear and tear in mechanical parts, and electronically readjust the engine to compensate. With the growth of computerized and fuel injected motor vehicles, new cars will require more sophisticated electronic diagnostic service.

Because of the shortage of mechanics with advanced training and the need to keep up with rapid technological innovations, some industry analysts foresee a decline in the

percentage of service work performed by auto repair shops and a growth in business for new car dealers and large chain stores. Some new computerized diagnostic equipment developed by auto manufacturers, for example, will only be available to authorized dealers. Another trend affecting industry output has been the lengthening of service contracts by new car dealers on new cars and trucks. These extended warranties may lower demand for some specialized auto repair shops, such as engine rebuilders. To improve productivity and to remain competitive, automotive repair shops need to invest in new equipment, and provide advanced training.

The occupational composition of the work force for the automotive repair shop industry is not expected to change significantly during the next decade. Based on projections by the Bureau of Labor Statistics, the proportion of mechanics, installers, and repairers is expected to increase from almost 51 percent of industry employment in 1984 to about 52 percent of industry employment in 1995. Within this occupational group, automotive and motorcycle mechanics are expected to grow from about 27 percent of industry employment in 1984 to nearly 29 percent in 1995. The share of employment among automotive body and related repairers is expected to fall slightly during this period. Administrative support occupations, including clerical, are projected to decline from 10 percent of industry employment in 1984, to about 9 percent of industry employment in 1995. This trend reflects, in part, a greater use of computers in the industry in the future. The availability of more affordable and more powerful personal computers has made the technology feasible for small shopowners. Among other functions, computers will be used to perform recordkeeping and administrative functions formerly done manually. □

FOOTNOTES

¹ All average rates of change are based on the linear least squares trends of the logarithms of the index numbers.

² The automotive repair shop industry is classified as SIC 753 in the 1972 Standard Industrial Classification Manual and its 1977 supplement issued by the U.S. Office of Management and Budget.

³ Based on statistics published in *Ward's Automotive Yearbook* (Detroit, MI, Ward's Communications, Inc., 1987).

⁴ *Motor Vehicle Facts and Figures, 1986* (Detroit, MI, Motor Vehicle Manufacturers Association, 1986).

⁵ *NADA Data for 1986* (McLean, VA, National Automobile Dealers Association, 1986), p. 10.

⁶ Based on statistics published in *National Petroleum News Factbook, 1987*, p. 123.

⁷ Bureau of Labor Statistics, data for 1984-95, National Industry Occupational Matrix.

⁸ *Occupational Projections and Training Data*, Bulletin 2206 (Bureau of Labor Statistics, 1984), p. 10; and *Occupational Projections and Training Data*, Bulletin 2251 (Bureau of Labor Statistics, 1986), p. 18.

⁹ "Mechanics Struggle to Keep Up With Engineering Advances," *The Washington Post*, June 14, 1987, p. D7.

APPENDIX: Measurement techniques and limitations

Indexes of output per hour of all persons measure the change in the relation between the output of an industry and the hours expended on that output. An index of output per hour is derived by dividing an index of output by an index of hours.

The preferred output index for personal service industries would be obtained from data on the quantities of services provided by the industry. The quantity of each type of service provided would be weighted (multiplied) by the time required to provide one unit of each type of service in some

specified base period. Thus, services that require more labor time would be given more importance in the output index than services that require less.

Such data, however, are not available for the automotive repair shop industry. Real output was estimated by removing the effects of changing prices from the current-dollar value of industry receipts. Because an adjustment for price changes usually lowers the dollar value, such a series is referred to as a deflated value measure.

The index of hours for automotive repair shops is for all persons—that is, the index represents hours for paid employees, partners and proprietors, and unpaid family workers. As in all of the output-per-hour measures published by the Bureau of Labor Statistics, hours and employment are considered homogeneous and additive. Adequate informa-

tion for weighting the various types of labor separately are not available.

The indexes of output per hour do not measure the specific contribution of labor, capital, or any other single factor. Rather, they reflect many interrelated influences such as changes in technology, capital investment, design and layout of workplaces, skill and effort of the work force, and managerial ability.

The output measure is derived from data on annual receipts published by the Bureau of the Census. The all-persons-hour measures are derived from data on employment and hours originated by the Bureau of Labor Statistics and supplemented by data reported by the Internal Revenue Service, and from special tabulations compiled for the Bureau of Labor Statistics by the Bureau of the Census.

Exploding a myth

The first specialized works on occupational disease based on the methods of modern science and medicine appeared in the 1500s, written by Philippus Aureolus Theophrastus Bombastus von Hohenheim, called Paracelsus, and Georg Bauer, known as Agricola. Paracelsus, the Basel town physician, wrote a treatise on miners' diseases, published 27 years after his death, in which he described cases of job-related tuberculosis and the effects of "choke damp," excessive amounts of carbon dioxide. He was one of the first to recognize clearly that certain maladies were associated with certain occupations. He should have. His own life was shortened by the heavy metal poisoning he sustained while investigating mines and metal refineries.

Agricola was a town doctor in the heart of the mining center of Central Europe. He knew of mining communities in the Carpathian Mountains where women expected to be widowed half-a-dozen times during their lifetimes. Immersed in the everyday problem of staying alive in the mines, he advised workers to wear protective clothing and devised a practical ventilation system that many mines adopted. His contribution is best appreciated by remembering that at the time, death from mine gases was still generally attributed to "a blast of breath from a subterranean demon."

—U.S. DEPARTMENT OF LABOR
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 Reader in Occupational Safety and Health*
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 1980), pp. 18-19.