

Productivity trends for intercity bus carriers

During 1954–79, modest advances in technology, and more package and charter service, were offset by declining passenger demand and reduced bus speeds, resulting in a 0.4-percent rise in productivity

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During 1954–1979, output per employee-hour in the class I bus industry rose an average of 0.4 percent a year, a rate significantly below those of other segments of the transportation industry.¹ Class I bus carriers provide intercity service and may also provide local or charter service. Not included are those public and private transit systems that provide urban mass transportation service and do not come under Interstate Commerce Commission (ICC) reporting requirements.²

The 0.4-percent growth in productivity resulted from a small average annual increase in industry output of 0.1 percent combined with an average annual decline in employee hours of 0.3 percent. (See table 1.) By comparison, other transportation industries for which measures are available showed productivity increases over the same period that equaled or exceeded overall productivity growth for the private nonfarm business sector of the economy. For example, productivity in air transportation, an industry which competes for public passenger traffic, rose 6.3 percent, compared with 2.1 percent for the private nonfarm business sector. (See table 2.)

Bus operations have suffered from the recent energy shortages. Longer running times between cities have resulted from the 55-mile-per-hour national speed limit.³

Lower speeds have increased the labor time needed to drive a given distance, and have reduced productivity. However, lower speeds have also cut fuel costs. Although total transportation travel might be expected to decline because of higher fuel costs, the relative fuel efficiency of buses enhance future demand for this mode of transportation, especially for shorter distance travel.

Productivity movements were uneven over the 1954–79 period, ranging from a 9.4 percent increase in 1962 to a decline of 11.9 percent in 1975. Generally, these changes have been in response to cyclical swings in industry output. There were three distinct trend periods. During 1954–60, output per hour rose at a 1.2-percent average annual rate. Output declined at an average yearly rate of 1.3 percent and hours dropped more sharply, by 2.6 percent. From 1960 to 1966, demand for bus service increased 4.7 percent annually, but employee hours increased at only a 1.3 percent average annual rate. The more efficient utilization of equipment and facilities, which resulted from this higher demand, raised productivity at a 3.6 percent annual rate during those 6 years. Load factors and average length of haul both increased appreciably. Load factor is the percentage of capacity actually utilized.

In the third period, 1966–79, all of the measures turned down. Productivity and output fell at an annual rate of 1.4 and 2.5 percent, respectively, while employee hours dropped 1.1 percent. Output fell in all years ex-

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cept 1967, 1974, and 1979. Since 1974, the beginning of the energy crisis and the year of the 55-mile-per-hour speed limit, productivity trends have been mixed, as table 1 indicates. There were sharp rises in 1974 and 1977, and a small gain in 1979. These were offset by a serious drop in 1975, and smaller declines in 1976 and 1978. More travelers rode buses in 1974 when fuel for private passenger cars became scarce. But when gasoline once again became plentiful in 1975, even at higher prices, bus travel declined drastically. Again in 1979, gas shortages in the second quarter helped boost industry output by 6.1 percent for the year and productivity by 0.4 percent.

Industry profile

The class I regulated bus industry comprises 43 intercity and 13 local carriers certified by the ICC. In 1978, these companies operated about 9,700 buses and had 34,000 employees. During that year, they moved 237 million passengers, and generated \$961 million in passenger revenue and \$175 million in freight revenue.

For most of the 15,000 communities served by intercity bus carriers, there is no other form of public transportation. Despite this, the bus passenger market has declined during the period of this study. Automob-

Table 1. Productivity and related indexes for class I bus carriers
[1967 = 100]

Year	Output per employee-hour	Output	Employee-hours
1954	77.4	80.5	104.0
1955	80.4	79.0	98.3
1956	81.2	78.0	96.1
1957	81.6	78.3	96.0
1958	81.9	74.0	90.3
1959	84.6	74.0	87.5
1960	83.7	75.4	90.1
1961	85.3	77.1	90.4
1962	93.3	86.2	92.4
1963	94.6	86.6	91.5
1964	95.7	90.2	94.3
1965	101.2	95.0	93.9
1966	103.4	99.2	95.9
1967	100.0	100.0	100.0
1968	98.6	97.5	98.9
1969	95.7	94.2	98.4
1970	93.4	92.5	99.0
1971	91.3	86.9	95.2
1972	93.0	83.3	89.6
1973	92.5	79.8	86.3
1974	95.9	86.5	90.2
1975	84.5	78.0	92.3
1976	81.7	75.2	92.1
1977	87.1	74.7	85.8
1978	86.8	73.7	84.9
1979 ¹	87.2	78.2	89.7
Average annual rates of change			
1954-79	0.4	0.1	-0.3
1974-79	-9	-1.9	-1.0

¹ Preliminary.

Table 2. Productivity comparison, private nonfarm business and selected transportation industries, 1954-79

Industry	Average annual rate of change		
	Output per employee-hour	Output	Employee-hours
Private nonfarm business	1.9	3.7	1.7
Transportation sector	2.7	2.9	.2
Petroleum pipelines ¹	7.5	5.6	-1.8
Air transportation ¹	6.3	11.0	4.5
Class I railroads	4.9	1.2	-3.5
Intercity trucking ¹	2.4	5.6	3.1
Class I bus carriers ¹	.4	.1	-.3

¹ Output per employee.

bile travel represents the primary source of competition to the industry, followed by air and then train service. Expansion of charter bus and package express service has helped to offset passenger declines. (See table 3.)

Intercity bus operations have the potential to provide service over a wide area because of the national highway network. Nonstop intercity buses can operate at speeds similar to those of an automobile. And, over shorter distances buses generally provide lower cost service than air or rail travel.⁴ Most demand comes from short-haul passengers even though the average length of trip for intercity service has more than doubled from 62 miles in 1954 to 130 miles in 1979.⁵

When intercity bus service began in the early 1900's it was characterized by a large number of local and regional carriers. Startup costs were modest and there was rapid growth. By the 1930's, the industry had evolved into its present form, with fewer bus companies and with national systems operating over longer distances. These national networks were thought to facilitate through-service for passengers and improve bus and terminal utilization. During World War II, industry output increased rapidly due to rationing of auto parts and gasoline. Load factors during this period reached nearly 80 percent. Passenger-miles peaked in 1952 and did not reach that level again until 1967. Since 1954, few new intercity bus carrier operations have been authorized by the ICC. Presently, Greyhound and Trailways dominate the market.⁶

The bus industry is subject to both Federal and State regulation. There are restrictions on the entry of new firms, fares, route requirements, and service levels. Competition along routes is limited. Federal regulation has encouraged merger activity of carriers into larger national companies. Recently there has been an effort on the part of the ICC to liberalize entry controls and to provide greater carrier rate making autonomy. General deregulation of the industry, however, has not been formally introduced.

The sources of revenue for bus carriers have changed substantially since 1954 as table 3 indicates. Intercity and local passenger revenue has declined in relative

terms while charter and package express services have shown significant growth. Charter service has expanded due to the increase in group travel and tourism, while package express service has benefited from the large distribution network provided by intercity buses.

The private automobile has been a major factor in the slow growth of intercity bus travel. The doubling of new car registrations since 1955 and the use of these cars for both personal and business trips impacted bus travel, and is expected to be the primary source of bus industry competition in the foreseeable future. Autos accounted for 89 percent of all intercity passenger-miles in 1954, and for 83 percent in 1979. Passenger-miles flown during this period increased their relative share of the market from 3 to 15 percent while both bus and rail passenger-miles declined.⁷

Employment and influences on productivity

Employment in the class I regulated bus industry declined from 39,000 in 1954 to an estimated 35,300 in 1979. Employment dropped steadily in the 1950's, then advanced irregularly through 1967, and thereafter generally declined again to the present level. Recent exceptions to the downward trend were in 1974-75 and again in 1979. Energy shortages resulting from the Organization of Petroleum Exporting Countries oil embargo boosted both employment and passenger service in 1974, the year that also marked the introduction of the 55-mile-per-hour national speed limit. Employment needs increased partially as a result of the decline in the number of bus miles per driver. Again in 1979, fuel shortages reversed the downward trends in both employment and passenger service.

Since 1954, there has been a change in the composition of employment. The number of equipment maintenance and garage personnel has declined from 22 to 17 percent of the work force because of reduced service requirements. Station workers, however, have increased from 11 to 19 percent of total employment, reflecting the greater demand for package express traffic. Drivers have accounted for about half of industry employment since 1954. However, more fully utilized and larger capacity buses may, in the future, reduce the percentage

of drivers in the industry, by increasing the proportion of administrative and service workers. Since 1954, workers paid on a daily basis, mostly supervisory personnel, as opposed to hourly wage employees, have increased from 8 percent of total employment to 10 percent. In the intercity portion of the regulated bus industry, women represent 12 percent of the work force, up from 10 percent in 1960. By contrast, women make up 40 percent of the work force in the total private nonfarm sector.

Changes in technology associated with the bus industry have been characterized by a gradual trend toward innovation, fuel efficiency, and greater passenger comfort. Diesel-powered buses, in primary use since the early 1950's, have undergone steady advances in performance and reductions in maintenance requirements. Current-model intercity buses have a seating capacity of 47 passengers and have space for large amounts of baggage and cargo. Typically, buses are 8 feet wide and 40 feet long, and weigh 13 tons. Including resale after use by class I carriers, useful bus life is over 20 years and mileage may exceed 3 million.⁸ The average number of seats for the bus fleet in 1955 was 39.1 and increased 10 percent to 43.1 by 1978. However, the seating capacity utilized during this period has remained at about 47 percent, and load factors have changed little since 1954, which helps explain the low rise in productivity in the industry.

From 1950 to 1973, average bus speeds increased from 50 to 60 miles per hour because of improved highways and urban beltways. But the introduction of the national speed limit in 1974 reduced average speeds to less than 55 miles per hour,⁹ and has also slowed productivity growth.

The growth in package express and charter services, however, has aided productivity. Delivering package express while engaging in regularly scheduled passenger service has resulted in more efficient use of vehicle and driver time. Charter services have also offered significant economies of scale for bus companies. Charters typically have a 50-percent greater load factor and 100-percent longer average trip length than regular route carriers. This form of passenger service also provides economies in baggage handling, ticketing, and scheduling terminal facilities.

Reduced investment has hurt industry productivity. Since 1954, investment in plant and equipment by intercity bus carriers has declined. Buses, which presently cost about \$135,000 each, account for about 80 percent of industry capital expenditures. Annual constant dollar investment dropped from \$78 million in 1954 to \$56 million in 1974, the latest year for which data are available. Similarly, the constant dollar stock of plant and equipment fell 18 percent, while capital investment per worker declined more than 20 percent. In contrast, gross constant dollar investment in the transportation

Table 3. Revenue distribution for class I bus carriers and percent of total service, 1954 and 1978

Service	1954		1978	
	Revenue in millions	Percent	Revenue in millions	Percent
Total	\$467	100	\$1137	100
Passenger:				
Intercity	306	66	678	60
Local	112	24	73	6
Charter	33	7	211	19
Freight	16	3	175	15

sector as a whole increased more than 150 percent, while gross stocks of capital increased 35 percent.¹⁰

Outlook

Factors are emerging which are both favorable and unfavorable to demand and productivity growth in the bus industry. Energy and demographic variables are likely to be positive factors while negative public image and low capital investment may retard growth. Restructuring the industry has been suggested as a way to increase capacity utilization and spur productivity.

With current low rates of bus utilization, increased demand would likely result in higher load factors and enhance productivity. Several projections of growth in the bus industry for the next decade have been made. The Federal Energy Administration (now part of the Department of Energy) estimates a 25 percent growth in passenger-miles over the next decade. This projection is not altered substantially even when based on different fuel availability assumptions. The Department of Transportation (DOT) makes a similar growth projection but notes the negative effect of rising income levels and shift from longer-haul bus travel. DOT sees potential for greater demand through improved service and regulatory reform. A third projection estimates a more optimistic 40-percent growth based on assumptions of fuel shortages and restricted auto use. In contrast to these three optimistic scenarios the ICC concludes that regular route traffic will continue to experience flattened demand and market share loss.¹¹

In a period of energy shortage, bus operations are likely to increase because of the comparative fuel efficiency of this mode of transportation. This was demonstrated both during World War II and in 1974 when fuel shortages existed. Given energy priorities, buses would make inroads into the use of the private automobile. Presently, diesel turbocharged engines are being introduced into service because of their potential for fuel savings and reduced emissions. Gas turbine buses now being used experimentally are able to run on non-petroleum based fuels and may aid future productivity

growth because of their increased reliability.¹²

Fuel shortages would likely create more reliance on the use of buses for lower density routes to and from small towns and rural areas. Higher utilization of existing capacity in the industry would boost labor productivity. However, a recent DOT study projects that over the next two or three decades the passenger automobile will continue in its dominant transportation role because of its flexibility and tailored service.¹³

Demographic changes may also help to increase the demand for bus service, raising both load factors and productivity. The trends toward population dispersion, smaller households, and an older population are all factors which favor increased use of intercity bus service. Population dispersion reduces the availability of other forms of transportation; private cars are more cost efficient for larger families; and many older persons prefer the relative comfort and safety of bus travel.

However, a history of low productivity growth, lack of demand, and reduced profits may impair the ability of the industry to attract needed capital and enhance future performance. The ICC sees a need for changes in policy to insure a balanced transportation network. Such changes would include bus and engine design studies, similar to those conducted for air transportation and other forms of mass transit, to find ways to increase productivity. Improvements in the quality and location of bus terminals and facilities have also been recommended.¹⁴ Because the price differential between long distance air fares and bus fares has narrowed over the years, some analysts argue that bus carriers should drop coast-to-coast service and concentrate in short-haul markets of 100 to 200 miles. Such a system could enlarge the number of daily departures and increase bus utilization from its current average of 7 hours a day to 16 hours.¹⁵ Further advances in productivity are possible through improvements in intermodal linkages. Construction of municipal transportation terminals to serve as connectors for bus, train, and plane service could improve productivity for all of these forms of transportation. □

FOOTNOTES

¹ This study is based on statistics reported to the Interstate Commerce Commission for all class I motor carriers of passengers. Class I carriers are those that have 3-year average annual revenues of more than \$3 million. This portion of the bus industry, as defined in the 1972 Standard Industrial Classification (SIC) manual, makes up a small part of SIC 4111 (local and suburban transit), and a more substantial part of both SIC 4131 (intercity and rural highway passenger transportation) and SIC 414 (passenger transportation charter service). Based on their major source of revenue, class I carriers have been divided by the ICC into local or intercity service. Local service is defined as transportation performed within a city or town, including service for the contiguous suburban area. Intercity service includes all transportation performed beyond the limits set for local service. Either of these carrier types may also engage in intercity, local, or charter operations.

² The output measure underlying the productivity series for the bus industry has been constructed using data on passenger-miles, passengers, and express freight service, combined with appropriate weights relating to labor importance. A technical note describing the methods used in the construction of the index is available upon request.

³ Lawrence Leist, *Intercity Bus Service: Frequency and Running Time*, Report No. WP-220-04-20 (Washington, U.S. Department of Transportation, 1975).

⁴ *Transportation and the Future* (Washington, U.S. Department of Transportation, 1975), p. 35.

⁵ Derived by dividing revenue passenger miles by revenue passengers.

⁶ *The Intercity Bus Industry: A Preliminary Study* (Washington, Interstate Commerce Commission, 1978), pp. 2-3.

⁷ *Transportation Facts and Trends* (Washington, Transportation

Association of America, 1980), p. 18.

⁷ *America's Most Fuel Efficient Passenger Transportation Service* (Washington, American Bus Association, 1979), p. 5.

⁸ *The Intercity Bus Industry*, p. 26.

¹⁰ See *Capital Stock Estimates for Input-Output Industries: Methods and Data*, Bulletin 2034 (Bureau of Labor Statistics, 1979).

¹¹ *The Intercity Bus Industry*, pp. 106–08.

¹² *America's Most Fuel Efficient*, p. 5.

¹³ *Transportation and the Future*, p. 111.

¹⁴ *The Intercity Bus Industry*, pp. 121–27.

¹⁵ Rush Loving, Jr., "The Bus Lines are on the Road to Nowhere," *Fortune*, Dec. 31, 1978, pp. 58–64.

APPENDIX: Measurement techniques and limitations

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

The preferred output index for transportation 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 employee-hours required to provide one unit of each type of service in some specified base period. Thus, those services that require more labor time would be given more importance in the output index.

Annual indexes of output for the bus industry were derived from both quantity and revenue data. In passenger service, quantity data is available for intercity

passenger-miles, local passengers, and charter passengers. In freight service, output was estimated by removing the effects of changing price levels from the current dollar value of sales. Total industry output was developed by combining passenger and freight outputs, using appropriate revenue and employee-hour weights. These procedures result in a final output index that is conceptually close to the preferred output measure.

The indexes of output per employee-hour relate total output to one input—labor time. The indexes do not measure the specific contribution of labor, capital, or any other single factor. Rather, they reflect the joint effect of factors such as changes in technology, capital investment, capacity utilization, plant design and layout, skill and effort of the work force, managerial ability, and labor-management relations.