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# Airline Productivity under Deregulation

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**O**NE OF THE PRINCIPAL arguments for airline deregulation was that it would make the airlines more efficient. Passenger service, it was claimed, could be produced more cheaply under competition than under heavy regulation—and the resulting lower costs and fares would benefit the airline traveler.

The deregulation of the U.S. airline industry is not yet fully complete. The Civil Aeronautics Board (CAB) retains some control over prices through December 31, 1982. Of more concern, the Federal Aviation Administration continues to regulate entry as a result of the 1981 air traffic controllers' strike. Even when that problem is cleared up, it will be years before the airlines will have fully adjusted to their newly competitive environment. Some of them, for example, have more jumbo jets than are desirable for flexible competitive behavior.

Nevertheless, it is not too early to assess whether the airlines are more efficient now than they were before deregulation. Admittedly, only four years have passed since President Carter signed the Airline Deregulation Act in November 1978. But that act itself ratified administrative changes started by CAB Chairman John Robson and accelerated by his successor Alfred

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Kahn. As early as 1976 the CAB had begun to allow the airlines to engage in competitive pricing, and by 1978 it had shifted toward flexibility in awarding new routes. Thus, elements of deregulation have now been in effect not for four years, but for nearly seven.

## What Do We Mean by Productivity?

To determine whether deregulation has led to improved efficiency, we need a consistent measure to compare productivity under deregulation with productivity under regulation. The measure we have chosen is technically known as total factor productivity growth. Elsewhere we have called it overall productivity growth, but here we call it simply productivity growth or, even more simply, performance. It is the increase in the ratio of all airline outputs (passenger-miles on first-class, coach, and charter, and ton-miles of freight and airmail) to all airline inputs (labor, aircraft, fuel, terminal equipment, and such purchased "materials" as food, contract maintenance, advertising, and ticket commissions). Productivity growth can thus occur in several ways—by increasing outputs with inputs unchanged, decreasing inputs with outputs unchanged, increasing outputs faster than inputs, increasing outputs and reducing inputs, and so on. Note that, unlike some measures of productivity, we are talking about *all* inputs, not just labor or materials, and *all* outputs. Nar-

rower measures of productivity do not give an accurate picture of changes in performance.

In our comparison we do not attempt the sticky task of guessing what would have happened in the environment of the last few years if deregulation had not occurred, and then comparing that with what actually happened. Instead, we simply compare airline performance before and after deregulation—that is, before and after the start of the reforms in 1976. Specifically, we use the years 1970–75 and 1976–80.

**Comparative Performance**

Table 1 shows the growth in productivity for 1970–75 and 1976–80 first for the trunk airlines (the large national carriers), next for the local-service carriers, and finally for the trunks and locals combined. The order in which the airlines are listed is determined by their relative size (total output) in 1977—United being the largest trunk carrier and Braniff the smallest.

The productivity of all the trunk airlines grew by 1 or 2 percent a year from 1970 to 1975, except that of Northwest and Western. Northwest’s robust 6 percent rate can be traced to a poor year in 1970 when the company suffered a

prolonged strike. Seven of the ten trunks had greater productivity growth in the second period, while three (including Northwest) had lower growth. Taking a weighted average (using airline shares in total industry cost as the weights), productivity growth was 2.6 percent for 1970–75 and 4.9 percent for 1976–80.

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For the local-service carriers the comparable figures were much higher for both periods, 4.0 percent in the first and 6.3 percent in the second. These figures were raised substantially by the performance of Airwest in 1970–75 (8 percent productivity increase) and Texas International in 1976–80 (14 percent, reflecting partly a comeback from a 1975 strike and partly growth of 12 percent a year after 1976). All local-service carriers except Airwest did better in the later period. Despite the fact that the local-service carriers outperformed the trunks by a substantial margin in both periods, the weighted averages of productivity growth for the industry as a whole were much like those of the trunks alone (because the trunks make up about 90 percent of the industry). Thus the combined rates for the trunks and locals were 2.8 percent for 1970–75 and 5.1 percent for 1976–80.

These results indicate that the growth in airline productivity improved by roughly 80 percent with the advent of deregulation. This prodigious gain, compounded through 1980, implies cumulative cost savings of nearly \$10 billion.

**Reasons for Improvement**

It would be hasty to attribute the entire improvement to deregulation before looking at relative business conditions and equipment trends in the two periods. Improved productivity performance tends to coincide with upturns in the business cycle in almost all industries, and changes in equipment can sometimes lead to greatly improved performance. But there were no major changes in aircraft or other

**Table 1**  
AVERAGE GROWTH IN AIRLINE PRODUCTIVITY  
(percent per year)

	1970–75	1976–80
<i>TRUNKS</i>		
United	1	6
American	2	3
TWA	2	6
Pan American	2	7
Eastern	2	5
Delta	2	4
Northwest	6	4
Western	4	3
Continental	2	1
Braniff	1	5
Total Trunks*	2.6	4.9
<i>LOCALS</i>		
Allegheny	4	6
Airwest	8	8
Frontier	4	5
Ozark	2	5
Piedmont	2	7
Texas International	1	14
Total Locals**	4.0	6.3
<i>COMBINED TRUNKS AND LOCALS</i>		
	2.8	5.1

\*Includes Northeast for 1970–71 and National for 1970–79.  
\*\*Includes Mohawk for 1970–71, North Central and Southern for 1970–78, and Republic for 1978–80.

equipment in the late 1970s, so the latter factor, at least, may be safely dismissed.

The effect of the business cycle is of concern mainly if base points are selected from different stages in the cycle. But in fact 1970, 1975, and 1980 were all recessionary years for the U.S. economy. Therefore the observed improvements in productivity growth are unlikely to reflect only changes in business conditions, and we are driven back to changes within the airline industry itself in our effort to find causes for the improvements.

In that search, we examined the implications for productivity growth of four aspects of airline operations—total output, load factor (the percentage of carrying capacity actually filled), capacity, and average stage length (counting each airport stop as the end of one stage). All of these factors have been found by earlier studies to be significantly related to productivity. As Table 2 shows, the trunks had faster growth after 1975 than before in output, load factors, and stage length, but much slower growth in capacity. For the local-service carriers, on the other hand, growth in load factors fell as growth in capacity accelerated. In other words, the locals were filling a slowly growing portion of rapidly growing capacity, while the trunks were filling a rapidly growing portion of slowly growing capacity.

We used statistical techniques to find out how much of the productivity growth before and after deregulation could be explained by changes in these four factors. That is, we tried to assess the extent to which performance is related to changes in output, load factors, capacity, and stage length.

The results are shown in Table 3. For both trunks and locals, performance in both periods turned out to be approximately 60 percent “explained” by output growth (for example, 1.6 divided by 2.6 for the trunks in the 1970–75 period). In the first period, high capacity growth offset most of the gains attributable to output growth, but the offset was much lower in 1976–

**Table 2**  
AVERAGE GROWTH IN AIRLINE  
OUTPUT, LOAD FACTOR, CAPACITY, AND STAGE LENGTH  
(percent per year)

	Trunks		Locals		Trunks and Locals Combined	
	1970–75	1976–80	1970–75	1976–80	1970–75	1976–80
	Output	3.6	6.2	8.1	13.4	4.0
Load factor	1.1	1.8	3.7	1.2	1.3	1.7
Capacity	3.1	1.2	6.2	9.4	3.4	2.0
Average stage length	.3	3.5	3.9	8.3	.6	4.0

**Table 3**  
STATISTICAL ANALYSIS OF GROWTH RATES IN  
AIRLINE PRODUCTIVITY  
(percent per year)

	Trunks		Locals		Trunks and Locals Combined	
	1970–75	1976–80	1970–75	1976–80	1970–75	1976–80
	Productivity growth	2.6	4.9	4.0	6.3	2.8
Productivity growth explained by:						
Growth of:						
Output	1.6	2.8	2.4	4.0	1.6	2.9
Load factor	.2	.4	1.0	.4	.3	.4
Capacity	–1.2	–.5	–1.1	–1.7	–1.2	–.6
Average stage length	—	—	.6	1.3	0	.1
Unexplained productivity growth	2.1	2.2	1.1	2.4	2.0	2.3

80. Capacity growth was also a drag on performance for the local-service carriers, but less of one than for the trunks in 1970–75 and more of one in 1976–80. Growth in average stage length contributed to improved performance only for the locals.

For the airline industry as a whole, the improvement from the pre-deregulation period to the post-deregulation period can be explained for the most part by increased output (revenue passenger and freight miles) and slowed capacity growth (available passenger and freight hauling capability). Much of this increased output was the result of discount pricing to discretionary travelers, which led to a rise in passenger traffic—especially at off-peak hours and seasons. The slowdown in the purchase of new aircraft was possible because existing aircraft were being used more efficiently—putting in more hours of actual flight time and, in some cases, carrying more passengers per flight through denser seating. These are predictable outcomes of the competitive pressures result-

ing from freer pricing and entry. In all, these events make a persuasive case that deregulation brought about a substantial improvement in airline performance.

Although output and capacity play important roles in explaining productivity growth, a considerable portion of that growth is unexplained (bottom row of Table 3). Moreover, this "unexplained" portion increased after deregulation, especially for the locals. Since labor accounts for the bulk of airline operating costs, the "unexplained" productivity growth most likely reflects a reduction in personnel. Widespread layoffs among the trunks since 1980 may presage more substantial gains of this sort, but the data are not yet available to confirm this.

It is worth noting that the local-service carriers improved their performance more than the larger trunk airlines throughout the 1970s and, at the same time, increased their share of the market relative to the trunks. This is precisely the kind of development one would predict in a competitive environment. It is also the case that once entry was permitted, new low-cost airlines began taking market share away from both the trunks and the locals—presumably because they enjoy a cost or productivity advantage. Since we have not included new air-

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lines in our analysis, we are surely understating, to some extent, improvements in the performance of the industry as a whole.

It should also be noted that our analysis has been concerned only with the quantity of output, not its quality. Thus we must acknowledge that the improvements we have identified do not necessarily translate directly into increases in consumer welfare. Competition has given air travelers a greater variety of price-service options. But if the average quality of service has declined, then the observed improvements in performance will overstate improvements in welfare. We do not yet have enough information to make such a case and

merely note here that there is some evidence each way. Denser seating lowers quality by taking away leg-room. Increases in nonstop serv-

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ice improve quality by reducing travel times. More frequent flights lead to better connections and more convenience for passengers, but tighter scheduling may result in more frequent delays and less convenience for passengers. Balancing such changes is complicated by the fact that some travelers undoubtedly have encountered net quality improvements, while others have faced declines.

#### **What Will Happen?**

As deregulation proceeds, lower-cost carriers will either force efficiency on the others or, eventually, drive them out of business. The competitive pressures applied by People Express, Pacific Southwest, and the other low-cost carriers, along with efficient commuters and the expanding locals (and even such efficient trunks as Delta), will be a spur to productivity improvement under deregulation. Ultimately all carriers will be low-cost carriers and all of us, as consumers of airline services, will benefit. Our findings show that the benefits are already substantial. ■

NOTE: For further detail on the results presented here, see two longer papers by the authors: "Productivity Performance of U.S. Trunk and Local Service Airlines in the Era of Deregulation," Workshop Series 8229, Social Systems Research Institute, University of Wisconsin at Madison (forthcoming in *Economic Inquiry*); and "U.S. Trunk Air Carriers, 1972-1977: A Multilateral Comparison of Total Factor Productivity," in T. Cowing and R. Stevenson, eds., *Productivity Measurement in Regulated Industries*, Academic Press, 1981. The authors' work on the U.S. airline industry has been undertaken with the support of the National Science Foundation.