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THE IMPACT OF AIRLINE SIZE UPON EFFICIENCY AND PROFITABILITY

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INTRODUCTION

With the enactment of the Airline Deregulation Act of 1978, deregulation of the nation's airlines officially began in 1979.[1] Deregulation of the airlines was accompanied by a series of setbacks: fuel prices more than doubled between 1978 and 1981, and the surge in costs, coupled with the 1981-1982 recession, inflicted huge losses on the industry. The 1981 air-traffic controller strike and the aftermath of firing of more than 11,000 air-traffic controllers sharply restricted the number of flights at the large U.S. airports. Airlines stretched out or cancelled plane orders and even grounded part of their fleets.[2] Also adding to the chaos was the entrance of new airlines such as Peoples Express.[3]

Following the 1978 banner sear of $1.365 billion in operating profits, the U.S. airline industry lost nearly $1.4 billion from 1980 through 1982.[4] Profits reached $310 million in 1983, about $2.1 billion in 1984, around $1.4 billion in 1985, $1.3 in 1986, and a record $2.46 billion in 1987.[5, 6, 7, 8]

The overall airline recovery since 1983 is attributed to a number of factors. Among them, fuel prices which account for one quarter of an airline's operating expenses, have remained more stable. Many airlines have received concessions from their labor forces. Tough cost cutting measures have been implemented. The wiser use of new routes has been a contributor, and a strong economy

during this period has also had a very positive effect on the airlines.[9] This recovery follows on the heels of a post-deregulation transition which saw competitive forces challenge the market dominance of established carriers.

Even with the good profits of recent years for air carriers as a group, certain individual airlines such as Eastern have not shared in the gains. Also on the negative side, statistics show that 21 of 36 airlines certified before deregulation are no longer operating, 84 of all new entrant airlines since deregulation no longer exist. These changes have resulted from merger, liquidation, and decertification.[10, 11, 12, 13, 14]

The effect of size or scale on economic performance is a key aspect of the economies of business enterprise and industrial organization. The trend with the passage of time for companies to become larger through mergers as well as growth makes it of particular interest to obtain objective measures of the economies or diseconomies and other effects of increasing scale.

The key question to be answered in this paper is whether size has been associated with improved efficiency and profitability. This paper attempts to analyze efficiency and profitability difference of U.S. airlines according to firm size within a segment of the U.S. airline industry. This is a topic of current importance because of the great structural changes, particularly mergers, that have occurred in the airline industry since deregulation and the implications for future optimum airline size that would best serve the public interest and the nation's need for a dependable and efficient airline industry.

AIRLINE TRENDS

An examination of several airline operating characteristics is an appropriate beginning for the analysis. Table 1 shows relevant airline operating statistics from 1978 through 1988.[15, 16, 17]

Graphically, it can be seen in Figure 1 and Figure 2 that both revenue-passenger miles and available seat miles have each risen around 60 percent since the slump of 1981. The trend for both since 1981 has been a relatively smooth upward movement. Due to the nature of the airline industry, high fixed costs made marginal revenue/additional revenue contribution an important aspect of operating income. Thus, advantage of increasing demand by the traveling public.

In Figure 3, the load factor which is a result of available seat miles being divided by revenue-passenger miles, has been erratic over the time period. After climbing to a high of 63% in 1979, just when deregulation was to take effect, it fell sharply in 1980 to 59%. Since 1981, although the individual years have been inconsistent, the trend has been upward. A post-deregulation higher level of 62.7% was reached in 1988.

The operating ratio, the amount of operating revenue used for operating expenses, has varied considerably since 1978. It has ranged from a low of 97% in pre-deregulation 1978 to a high of 102% in 1982. Since 1982 the airlines have succeeded in returning the ratio to a more profitable level. Figure 4 shows the ratio.

From Figure 5, operating income dropped drastically after 1978 to a deficit of minus $733,435,000 in 1982. This drop was probably due to a combination of factors ranging from price competition on competing routes among the carriers in a deregulated environment to the economic climate. After 1982, operating income returned to profitable levels. In 1987, the carriers as a whole realized their highest operating income on record.

In addition to collective airline operating statistics, individual airline operating characteristics such as market share, merger trends, and the interface between these two elements are germane to this analysis. Market shares of enplanements for all of the major U.S. airlines from 1978 through 1987 are shown in Table 2.[18]

TABLE 1

AIRLINE INDUSTRY OPERATING STATISTICS 1978-1988

YEAR	REVENUE PASSENGER MILES (000)	AVAILABLE SEAT MILES (000)	LOAD FACTOR %	OPERATING REVENUE (000)	OPERATING EXPENSES (000)	OPERATING RATIO	OPERATING INCOME (000)
1978	226,781,368	368,750,530	61.50%	22,883,955	21,519,092	0.940	1,364,863
1979	262,023,375	416,126,429	63.00%	27,226,665	27,026,610	0.993	200,055
1980	255,192,114	432,535,103	59.00%	36,662,555	33,949,421	1.007	(221,615)
1981	248,887,801	424,897,230	58.60%	36,662,555	37,117,325	1.012	(454,770)
1982	259,643,870	440,119,206	59.00%	36,407,635	37,141,070	1.020	(733,435)
1983	281,829,148	464,537,979	60.70%	38,953,672	38,643,262	0.992	310,410
1984	304,458,727	514,010,029	59.20%	43,825,047	41,673,536	0.951	2,151,511
1985	336,403,021	547,788,432	61.40%	46,664,414	45,238,150	0.969	1,426,264
1986	366,283,158	606,847,601	60.40%	50,524,933	49,201,832	0.974	1,323,101
1987	404,307,784	648,414,398	62.40%	57,020,400	54,561,111	0.957	2,459,289
1988	411,628,429	656,866,299	62.70%	N/A	N/A	N/A	N/A

FIGURE 1
YEAR VS. REVENUE PASSENGER MILES
1978-1988

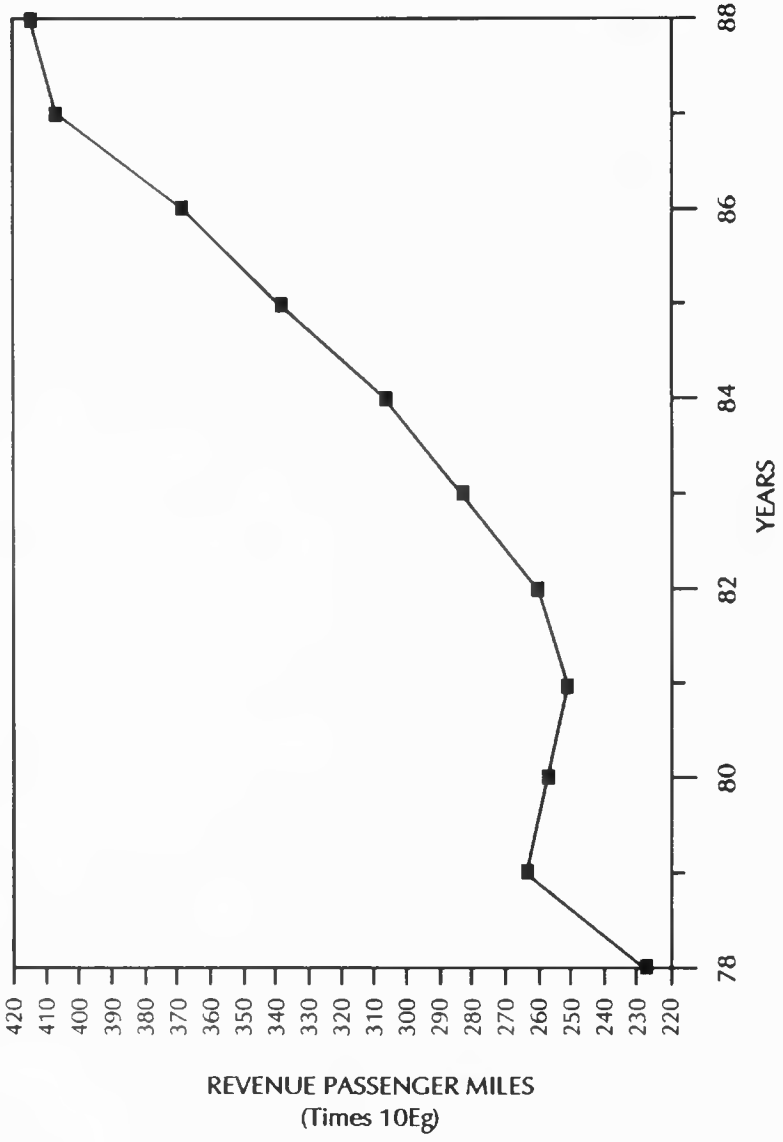


FIGURE 2
YEAR VS. AVAILABLE SEAT MILES
1978-1988

FIGURE 3
YEAR VS. LOAD FACTOR (%)
1978-1988

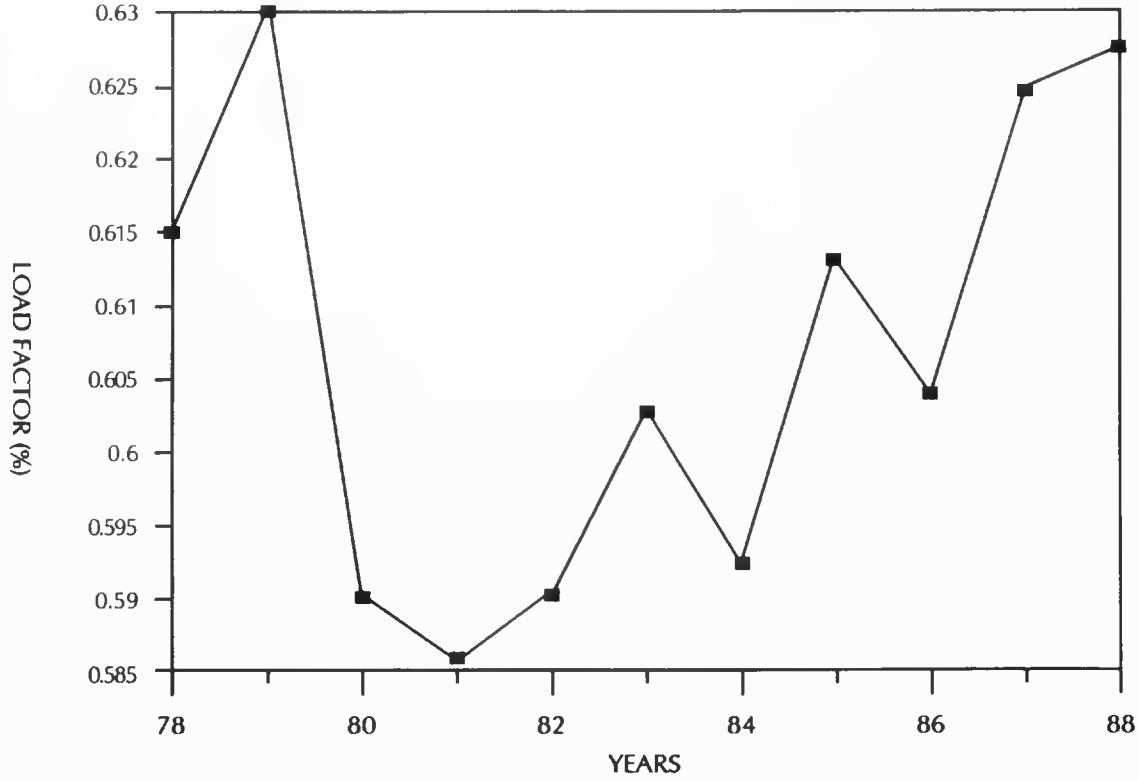


FIGURE 4
YEAR VS. OPERATING RATIO
1978-1987

FIGURE 5
YEAR VS. OPERATING INCOME
1978-1987

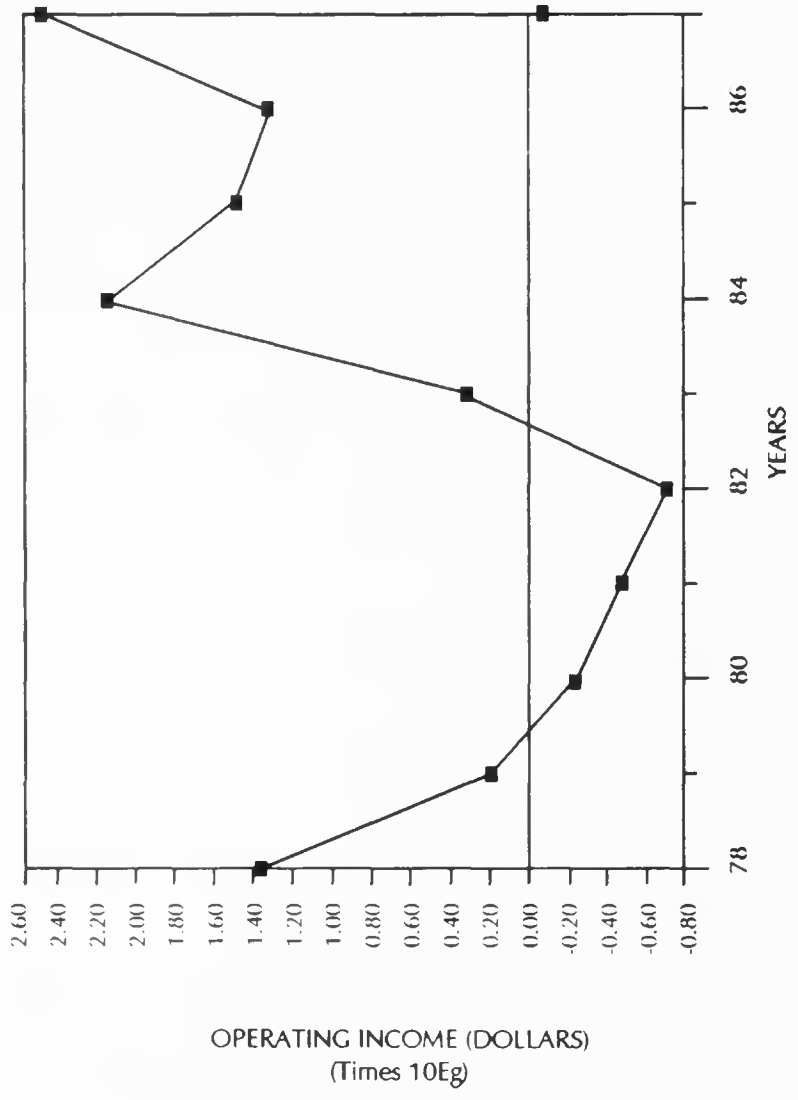


TABLE 2

U.S. AIRLINES PERCENT MARKET SHARE OF ENPLANEMENTS 1978-1987

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
United	14.95	11.38	11.27	10.03	11.84	12.57	12.82	10.87	12.96	13.21
American	10.20	9.98	9.00	9.10	9.99	10.43	10.67	11.56	11.83	11.63
Eastern	13.91	13.75	13.77	13.22	12.66	12.99	11.91	11.70	10.84	11.60
Delta	13.32	12.96	13.44	12.89	12.16	12.22	11.68	11.15	13.67	13.46
Piedmont	1.66	1.76	1.99	2.60	3.07	3.69	4.46	5.06	5.85	5.77
U.S. Air	4.72	4.62	4.95	4.89	5.29	5.36	5.33	5.40	5.57	5.44
Northwest	3.42	3.74	4.01	4.13	4.10	4.22	4.13	4.09	5.24	9.29
Continental	3.40	3.18	2.83	3.11	3.63	3.40	3.48	4.52	5.23	9.56
Transworld	7.25	7.26	7.10	6.67	6.30	6.19	5.78	3.84	6.14	5.62
Republic	---	1.82	4.14	6.21	6.51	6.30	4.75	4.80	3.77	---
People Express	---	---	---	0.30	1.02	2.23	3.07	4.14	3.38	---
Southwest	---	1.70	2.58	2.85	3.26	3.58	3.77	3.70	3.33	2.83
Pan Am	3.19	2.88	5.30	5.62	4.43	4.69	4.05	3.65	3.20	3.19
Western	4.09	3.85	3.44	3.41	3.61	3.73	3.33	3.39	---	---
Pacific Southwest	---	2.76	2.09	2.26	2.56	2.69	2.45	2.53	2.73	2.66

TABLE 2 CONTINUED

U.S. AIRLINES PERCENT MARKET SHARE OF ENPLANEMENTS 1978-1987

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
American West	---	---	---	---	---	0.10	0.75	1.44	1.83	2.39
Air Cal	0.92	0.92	1.03	1.29	1.23	1.18	1.25	1.25	1.29	1.31
Frontier	2.10	2.10	2.10	2.33	2.11	2.10	2.20	1.92	1.18	---
Ozark	1.69	1.30	1.26	1.54	1.66	1.61	1.55	1.56	1.06	---
Hawaiian	1.39	1.22	1.16	1.08	1.14	0.86	0.94	0.94	1.06	1.15
Aloha	1.02	0.96	0.94	0.97	0.98	0.72	0.74	0.70	0.73	0.78
Braniff	4.25	4.62	4.23	3.87	1.41	---	---	---	---	---
National	2.57	2.12	---	---	---	---	---	---	---	---
Hughes Airwest	2.30	1.62	1.31	---	---	---	---	---	---	---
North Central	2.48	1.26	---	---	---	---	---	---	---	---
Southern	1.51	0.71	---	---	---	---	---	---	---	---
Texas Intl.	1.47	1.49	1.51	1.38	1.19	---	---	---	---	---

Source: Air Transport World, Jan. 1, 1988, p. 11.

It is clear that most of the large carriers already operating before 1978, lost traffic share after deregulation, especially during the initial years of deregulation. United Airlines has to yet regain the share enjoyed before deregulations. American's share was below 1978 levels until 1985. The 1985-1986 increase was due partly to the strikes at United and TWA in those years. But the fact remains that it did not surpass its 1978 share level until 1985, six years after deregulation. Eastern has seen a fairly steady erosion of its market share since 1978. In addition to the problems encountered by all airlines in the deregulated environment, Eastern has encountered a multitude of other problems, not the least being labor and its interface with non-union sister Continental. Delta has also experienced a steady decline of market share since deregulation. Only because of the merger with Western does Delta's share show a significant increase beginning with 1986. Piedmont and U.S. Air are two smaller carriers that have been able to gain market share during this era of deregulation. Northwest Airlines was able to increase market share during the initial years of deregulation even before it merged with Republic. Much of this increase was due to its international operations, where deregulation did not apply. In fact, during the period from 1979 to 1985 its domestic traffic actually declined. Continental's share has increased since deregulation; a significant share was gained at the expense of Eastern. TWA even after the merger with Ozark in 1986 has continued to show an erosion in market share. Pan American merged with National in January 1980. Following their merger, their combined traffic share has declined in every subsequent year. For the airlines formed since deregulation the results have been mixed. Peoples Express was merged into Texas Air. American West has steadily increased its share since inception. The case is similar for Air Cal.

Market share can also be viewed from the perspective of individual airports. Before deregulation, C.A.B. studies showed that the ideal competitive balance at major airports was three carriers with full flight schedules. Today, however, more than half of the flights in an increasing number of cities are provided by a single car-

rier. For example, Northwest controls over 80% of the gates at Minneapolis; U.S. Air has more than an 80% share at Pittsburgh; Piedmont 80% at Charlotte; and United and Continental share most of the gates at Denver.

Market share whether from the perspective of air carrier Enplanement or individual airport gate dominance has been significantly impacted by the wave of airline mergers since deregulation. Between May 1985 and December 1987 alone, twenty-four acquisitions and mergers involving U.S. airlines operating jet aircraft in scheduled passenger service occurred. Among the more significant mergers or acquisitions during this period were American and Air California; Delta and Western; Eastern, Continental, Peoples Express, Frontier, New York Air, and Butt; Northwest and Republic; Trans World and Ozark. Seven major carriers are all that remain today of the eleven trunk carriers that existed in 1978. These seven carriers account for over 86% of the total market share of all U.S. airlines.[19]

METHODOLOGY

The study examined 13 domestic airlines.[20, 21, 22, 23, 24, 25, 26] All of the majors were included except pan Am and Continental. Alaskan and Hawaiian airlines were also included in the data. The years 1978 through 1987 were analyzed. Because deregulation took effect in 1979, 1978 was chosen as a starting point for a pre-deregulation comparison with the deregulated years since.

In an attempt to obtain a measure of firm size, three different representations were used: total assets, available seat miles, and number of employees. It was hoped that if a significant relationship was masked by a weakness in one indicator of size, analysis of one or more of the other standard would lead to more meaningful results. Profitability in this study was measured by operating income which is the operating revenue less operating expenses. Efficiency

was measured by the operating ratio. The operating ratio is the proportion of operating revenues consumed by operating expenses. This is a good statistic for a firm's relative performance on the question of cost versus revenue. It is generally thought to be one of the best indicators of operating efficiency.

Correlation and regression analysis of firm size in relation to various profitability measures were the prime analytical tools used. The major question examined in this paper is quite simple. As the size of an airline increases, does operating efficiency increase or decrease and does profitability increase or decrease more than proportionately with adjustments in airline size?

FINDINGS OF THE ANALYSIS

Results of the correlation analysis of the 13 airlines examined from 1978 through 1987 are presented in Table 3. Looking at the airline profitability in terms of operating income and the influence size has on this profitability, the three representative measures of airline size generally tended to follow the same pattern. When total assets are used as predictor of operating income, significant correlations are found for the pre-deregulation year of 1978 and for the years of 1984-1987. For the years 1979-1983 correlations are very weak or nonexistent. Figure 6 shows the regression of this relationship for 1987.

The relationship of available seat miles to operating income produces mixed results over the years. Available seat miles provides predictability of operating income for 1978, 1984, 1985, and 1987. No significant correlations were found for the intervening years. Figure 7 reflects this relationship for 1987.

Using number of employees to predict operating income was not conclusive. The years 1978, 1984 and 1985 showed good relationships. In 1987 some relationship existed, but the other years were very weak. Figure 8 shows the weak relationship in 1987.

TABLE 3

CORRELATION COEFFICIENTS (R^2) 13 INDIVIDUAL AIRLINES

	Operating Income									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Total Assets	75.5 S.	7.4 N.S	22.6 N.S.	4.1 N.S.	28.2 N.S	5.5 N.S.	80.5 S.	70.2 S.	35.9 S.	61.3 S.
Available Seat Miles	76.7 S.	2.2 N.S.	22.6 N.S.	2.2 N.S.	32.5 N.S.	32.5 N.S	2.3 N.S.	52.9 S.	13.6 S.	40.3 S.
Employees	73.1 S.	3.2 N.S.	9.5 N.S.	1.1 N.S.	25.4 N.S.	0 N.S.	71.1 S.	52.7 S.	14.8 N.S.	37.0 S.

S = The correlation is statistically significant.
N.S. = The correlation is not statistically significant.

TABLE 3 CONTINUED

CORRELATION COEFFICIENTS (R^2) 13 INDIVIDUAL AIRLINES

	Operating Ratio									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Total Assets	31.4 S.	10.3 N.S	0 N.S.	0.1 N.S.	0.1 N.S	0.9 N.S.	12.4 N.S.	0 N.S.	2.3 N.S.	2.1 N.S.
Available Seat Miles	29.3 S.	1.7 N.S.	.1 N.S.	0 N.S.	0.2 N.S.	0 N.S	10.1 N.S.	0.4 N.S.	0.1 N.S.	0 N.S.
Employees	28.6 S.	6.9 N.S.	0.4 N.S.	1.3 N.S.	0.1 N.S.	0 N.S.	6.7 N.S.	3.5 N.S.	12.2 N.S.	0 N.S.

S = The correlation is statistically significant.
N.S. = The correlation is not statistically significant.

FIGURE 6
TOTAL ASSESTS VS. OPERATING INCOME
1987

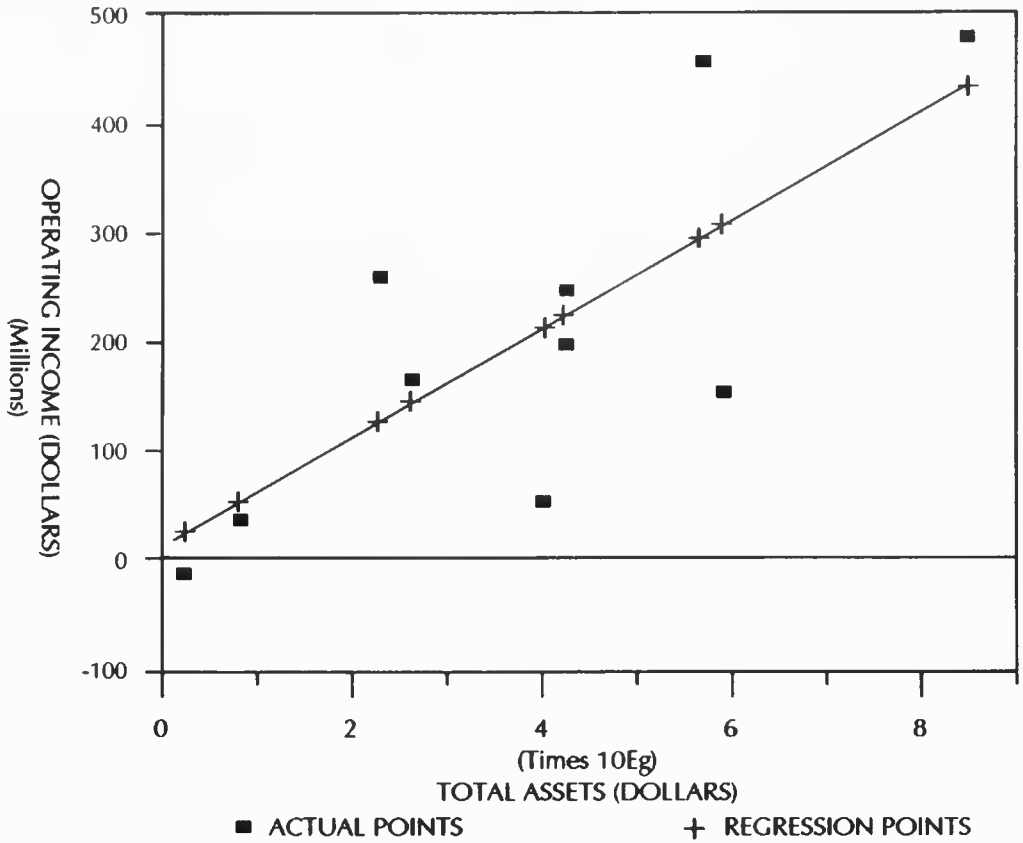
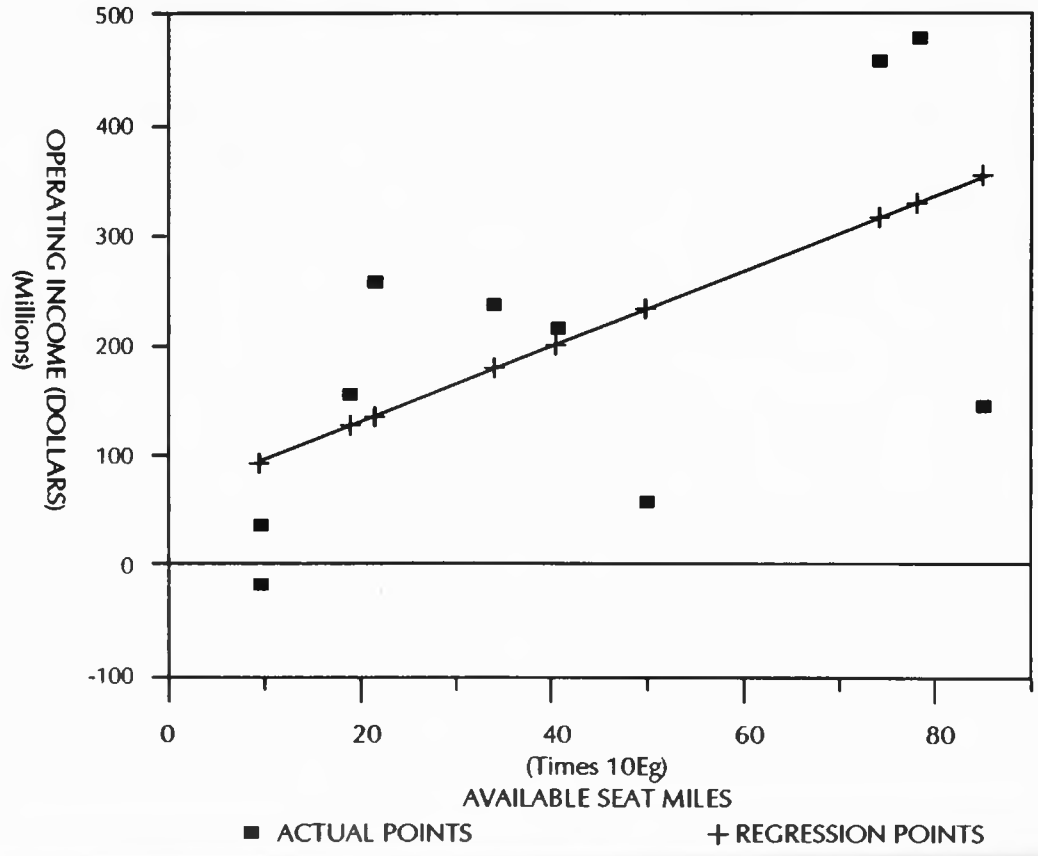


FIGURE 7
AVAILABLE SEAT MILES VS. OPERATING INCOME
1987



Generally, the lower the operating ratio, the better the chance for operating efficiency. When using the three representations of firm size to predict efficiency in operations as indicated by the operating ratio, virtually none of the measures, total assets, available seat miles, or number of employees, indicated any significant relationships for any of the years except 1978. In 1978 a somewhat weak relationship between the three size measures and operating ratio was found. Figure 9 shows an example of the "scatter" of available seat miles for 1987

Some general observations concerning the individual airlines in recent years, namely 1985, 1986 and 1987, should be noted. The largest airline in terms of assets, American, has consistently shown the highest operating income during this period. The airline with the smallest assets, Hawaiian, has had the lowest or next to lowest operating income during the period. The airlines with the highest available seat miles during these years have not had the highest operating income, but the airlines with the fewest available seat miles have generally had the lowest operating income. The airlines with the largest number of employees have not had the highest operating income, but the airlines with the fewest number of employees have had the lowest operating income.

As far as the relationship of size to operating ratio is concerned during 1985, 1986 and 1987, American airlines with the most assets in 1985 had one of the lowest operating ratios, but that subsequently rose in 1986 and 1987. It might also be noted that in 1987 the airline with the smallest assets had the highest operating ratio. The airline with the highest number of available seat miles in 1985, United, also had the highest operating ratio of 1.06. In 1987, the airline with the lowest available seat miles, Hawaiian, had the highest operating ratio. In 1985, the airline with the largest number of employees had the highest operating ratio. In 1987 the airline with the fewest number of employees, Hawaiian, had the highest operating ratio.

In an attempt to gain additional insight, the 13 airlines were broken down into two groups for comparison in 1985 and again into two groups in 1987, as shown in Table 4. For the 1985 grouping, airlines with less than $4 billion in assets were grouped together and those with assets in excess of $2 billion were grouped together. The 1987 groupings were based on airlines with assets in excess of $4 billion and those with less than $4 billion in assets. The year 1986 was excluded for comparison because of the numerous consolidations that occurred during the year.

For 1985 both size categories showed significant relationships between "the three measures of size; total assets, available seat miles, and employees; and operating income. A dichotomy appears when the size measures are correlated with the efficiency measure of operating ratio. The smaller sized carriers showed a significant correlation between size measures and the operation ratio, but the largest airlines reflected no relationship.

The differences become even more visible when a 1987 comparison is made. Generally, these two groupings are cases where the larger carriers have become larger in 1987, primarily as a result of mergers such as Delta and Western, and the smaller carriers have shrunk in number. But the smaller carriers continue to show a significant correlation between the of size and operating income. However, the larger carriers do not even show how a relationship between size and operating income as they did in 1985. As in 1985 when it comes to a comparison between the two groups for size measure and the relationship to operating ratio, the small carriers have a positive relationship while the larger carriers have little or none.

When the above groupings were compared on a basis of averages, significant differences were even more apparent. According to the computed Figures in Table 5, the smaller sized carriers were more profitable in relation to their size measure than the larger carriers in 1985. The small airlines had operating income equal to

FIGURE 8
NUMBER OF EMPLOYEES VS. OPERATING INCOME
1987

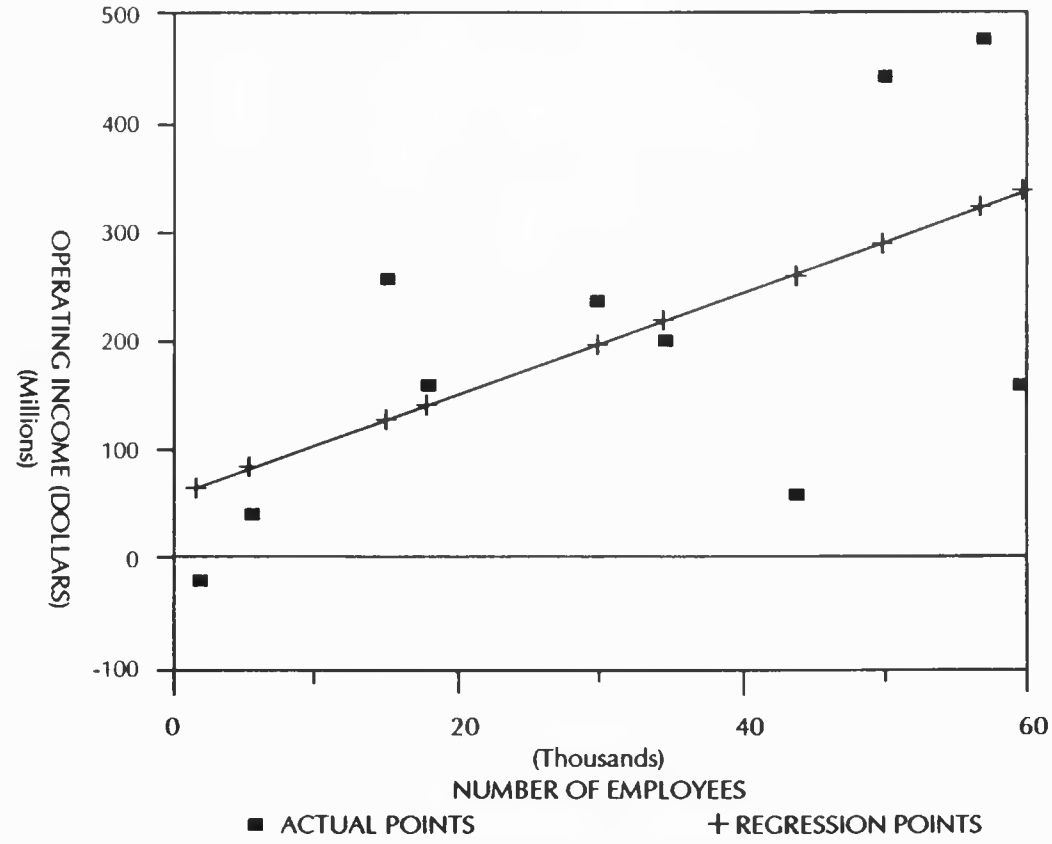


FIGURE 9
AVAILABLE SEAT MILES VS. OPERATING RATIO
1987

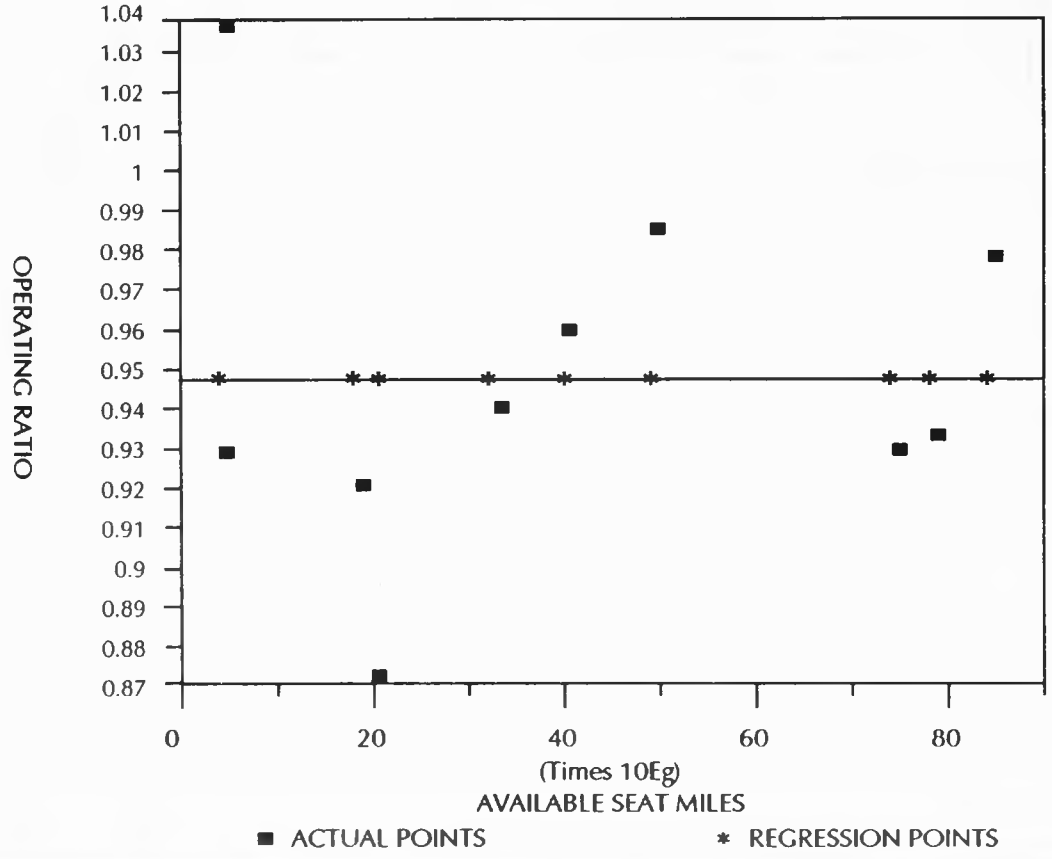


TABLE 4

CORRELATION COEFFICIENTS (R^2) 13 INDIVIDUAL AIRLINES - GROUPED

	1985			
	Operating Income		Operating Ratio	
	Group I	Group II	Group I	Group II
Total Assets	78.6 S.	86.6 S.	72.9 S.	5.1 N.S
Available Seat Miles	69.3 S.	53.2 S.	51.4 S.	0 N.S.
Employees	90.4 S.	48.6 S.	76.0 S.	0 N.S.

Group I: Assets less than $2 Billion--Alaskan, Hawaiian, U.S. Air, Piedmont, Republic, Western, Ozark.
Group II: Assets more than $2 Billion--Eastern, TWA, Northwest, Delta, United, American.

TABLE 4 CONTINUED

CORRELATION COEFFICIENTS (R^2) 13 INDIVIDUAL AIRLINES - GROUPED

	1987			
	Operating Income		Operating Ratio	
	Group III	Group IV	Group III	Group IV
Total Assets	79.5 S.	9.5 N.S.	64.3 S.	20.2 N.S
Available Seat Miles	90 S.	17.5 N.S.	57.1 S.	0 N.S.
Employees	78.8 S.	9.5 N.S.	56.7 S.	0 N.S.

Group III: Assets less than $4 Billion--Alaskan, Hawaiian, U.S. Air, Piedmont.
Group IV: Assets more than $4 Billion--Eastern, TWA, Northwest, Delta, United, American.

TABLE 5

COMPARATIVE OPERATING INCOME RATIOS OF STUDY GROUP

	1985 Group I	1985 Group II
Average Operating Income	$52,991,00	$213,102,660
Average Assests	$926,578,420	$4,060,905,500
Average Available Seat Miles	11,520,540,000	47,785,756,000
Average Number of Employees	8,336	35,174

	1987 Group III	1987 Group IV
Average Operating Income	$111,019,500	$260,515,830
Average Assets	$1,412,606,500	$5,454,687,300
Average Available Seat Miles	12,371,715,000	61,168,176,600
Average Number of Employees	10,071	46,970

	1985 Group I	1985 Group II
Operating Income as % of Total Assests	5,7%	5.2%
Available Seat Miles Per $1 of Operating Income Generated	217,405	224,238
Operating Income Generated Per Employee	$6,356.89	$6,059.20

	1987 Group III	1987 Group IV
Operating Income as % of Total Assests	7.85%	4.85%
Available Miles Per $1 of Operating Income Generated	111,437	234,797
Operating Income Generated Per Employee	$11,025	$5,540

5.7% of their total assets compared to 5.2% for the larger carriers. The smaller carriers had available 217,405 seat miles for every dollar of operating income generated while the larger carriers made available 224,238 seat miles for every dollar of operating income derived. The smaller carriers did a little better than larger ones when operating income generated per employee was compared; $6356.89 for smaller carriers vs. $6,059,20 for the larger airlines.

After significant growth of some large carriers in 1986 via mergers and consolidations, the 1987 comparison gap for the two groups widens even more. Smaller carriers show a 7.85% figure for operating income as a percent of total assets while the larger carriers drop to 4.8%. The available seat miles per $1 of operating income generated drops to 111,437 for smaller carriers while it rises to 234,797 for the larger airlines. Operating income generated per employee reflects an ever widening difference; up to $11,025 for smaller airlines and down to $5,546 for larger carriers.

SUMMARY AND CONCLUSIONS

Since the enactment of the Airline Deregulation Act of 1978, the road to profitability for the airlines, both large and small, has been a rough one. In recent years it seems to have smoothed out for most of the carriers but with a strong economy as has been experienced during recent years, it remains to be seen how the carriers will fare once the economy takes on a downward trend. The fact remains that up through 1987 the trend is positive for revenue passenger miles, load factor, operating revenues, and operating income. And the desired trend of down for the operating ratio seems to be in place.

Airline market shares have taken significant turns since deregulation. Most of the larger carriers operating before deregulation lost significant emplacement market share in the initial years after

deregulation. Many of these carriers have not yet regained the level they enjoyed before deregulation. Market share as far as gate control is concerned has increased for most of these larger carriers.

Mergers and acquisitions since deregulation had a significant impact on the airline industry structure. Seven major carriers exist today in place of the eleven trunk carriers operating in 1978. Many reasons can be cited for the recent wave of mergers - ranging from competitive reasons to the need to obtain additional aircraft. Whatever the reason, this consolidation of large carriers into even larger carriers has had a significant impact on carrier profitability and operating efficiency.

The major question asked in this paper is quite simple. As an air carrier becomes larger, does it become more efficient, does it become more profitable and do these increases occur more than proportionally? Operating income was used as the profitability measure. Operating ratio was the measure of efficiency. Total assets, available seat miles, and number of employees were utilized as indicators of airline size.

The analysis of profitability and efficiency according to the three size measures of the 13 U.S. airlines studies revealed some interesting facts, but no simple answers. When examining the profitability factor of operating income, all three size measures indicated a significant correlation for 1978 and recent years. For the years 1979 through 1983, the three measures confirmed no correlation. The reason for the sharp differences could be due to a number of factors. Factors such as the initial chaos caused by deregulation, the economy, statistical fluke, and others cannot be discounted. Based on this data, the three measures of firm size are not reliable predictors of a firm's operating efficiency. The fact that there is little or no correlation seems to indicate that firms of all sizes can operate efficiently or inefficiently. Larger firms do not necessarily have an advantage.

When the 13 carriers were broken down into two groups based on size for 1985 and 1987, the differences between large and small carriers became more apparent. In 1985 both size categories showed significant correlation between size and operating profitability, but only the smaller sized carriers showed a significant relation between size and operating efficiency. For 1987 the large carriers failed to show any relationship between size and either operating profitability or operating efficiency.

Examining differences between the two groups based on averages confirmed the correlations. For 1985 the smaller carriers fared better than larger carriers in terms of profitability and efficiency. In 1987 the gap was even wider between the two group sizes, showing that the smaller carriers were both more profitable and efficient based on all three measures of size.

It would appear from this analysis that the question of larger airlines being more profitable and efficient is answered by a no. No statistical evidence of constant returns to scale, much less economies of scale exists. The correlation numbers generated for the larger airlines are generally statistically insignificant.

Analysis of the data indicated that the larger firms had more assets in relation to operating income than the smaller firms. That the assets are proportionately above the small carriers when operating profits are considered may imply that asset creation is being financed by heavy borrowing. The bulge in assets coupled with a higher operating ratio could also indicate that facilities are not being effectively utilized. The larger carriers could possibly handle new business with relatively little additional investment. That is to say, as they grow larger, they are becoming less efficient.

By whatever means carriers grow, internal expansion, acquisition, or merger, a number of major adjustments are inherent. The expansion is usually financed through increased debt which increases interest expense. In the case of acquisition/merger there are

expenses of rationalizing the combined fleet, consolidating maintenance activities, merging reservation systems, combining management, and dealing with union contracts. The additional non-operating expenses often cause total costs to go up more than total revenues after intensive expansion, merger, or consolidation. All of these adjustments take time and resources. It remains to be seen if these "costs" will be rationalized in the long term.

The trend of airline consolidation forming larger and fewer carriers should not come as a total surprise. The airlines are fulfilling earlier predictions that only a handful of major carriers together with some healthy regional and commuter airlines would ultimately survive in the competitive intensity of a deregulated industry.

Airline industry officials have contended that competition will be preserved even at airports controlled by a single carrier because of the ample freedom for new airlines to enter the business. In such an environment, they say, any airline that charges monopoly prices will invite invasions of other carriers. But the major carriers are getting better at using their vast resources, such as computerized reservation systems, expansive flight schedules, and marketing resources to dominate smaller competitors. The price of entry is going up! Carriers are probably building barriers that competitors won't be able to penetrate. They are trying to achieve the market dominance that will give them better control of prices.

It would appear from this analysis that larger airlines are less efficient and profitable in proportion to their size than the smaller carriers. Because of the small sample in this analysis, further study is needed on this issue to arrive at any definitive answers. Answers are needed because of the important consequences for the future structure of the airline industry and the resulting impact on fares and service to the public if deregulation continues in its present form.

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