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ECONOMIC AND MANAGERIAL FACTORS UNDERLYING SUBSIDY NEEDS OF DOMESTIC TRUNK LINE AIR CARRIERS

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AFTER a postwar period of difficulties and losses, culminating in an industry net operating loss of almost \$21,000,000 in 1947, the domestic trunk line air carriers have apparently rounded the corner. With an industry net operating income for 1949 of nearly \$25,000,000 and with double that amount earned in 1950, the airline industry has glowed in a feeling of well being. Dividends are again being declared, new equipment is being ordered in increasing quantities, and the optimism reminiscent of the closing days of World War II is returning to the industry. Moreover, this change from the pessimistic days of 1947 is an industry phenomenon. In 1949, only two of the sixteen domestic trunkline carriers showed net operating losses and one of these had a profit when its international operations were taken into account. Reports for the first eleven months of 1950 show an even rosier prospect, with industry profits well up over 1949, although two of the sixteen domestic trunk airlines recorded net operating losses.

The extraordinarily good traffic in 1950, particularly in the summer and fall months, has, of course, been largely due to the defense program. During August of 1950, for example, every one of the domestic carriers was in the black, including even those carriers in the southeastern portion of the country for whom this month is ordinarily a low traffic and high loss month. Regardless of the effects of the high level of activity in 1950, brought on by the national emergency, the satisfactory level of more normal 1949 may seem to indicate that the domestic

airline industry has at long last crossed over into the ranks of American businesses characterized by financial stability, normal growth, and reasonable profits.

But can this conclusion be drawn from the apparent prosperity of the past two years? Is this prosperity real or does it rest in considerable part upon public subsidy? Without attempting to deal with any possible subsidy element involved in the provision of airways or in the financing of airports by public authorities,¹ it is interesting to ascertain what the results are with considerable or all of the air mail subsidy stripped away. While not determining what the air mail subsidy *should* be and whether the subsidy elements are community subsidies, or subsidies to the carriers, or to the air mail service, it is proposed to examine the financial and economic position of the domestic trunk line air carriers, after an adjustment for subsidies, the extent to which they have reached commercial maturity, and the factors which account for their situation. Suggestions will also be made as to the direction which public policy might take to meet the problems posed.

Under the Civil Aeronautics Act of 1938, the policy of the government with respect to mail pay is based upon underwriting revenue needs to enable carriers under honest, economical, and efficient management to contribute their part to the development of an air transport system adequate for the needs of commerce, the mail service, and defense of the nation. It is thus a policy of financial need, but a need dependent upon factors of economy and adequacy.

In approaching the problem of economic factors underlying subsidy needs of domestic trunk carriers, it must be assumed that the Civil Aeronautics Board, as the government agency charged with the development of a sound and economic air transportation system, is interested in (1) a domestic trunk airline system eventually self-supporting or (2) if that is not possible, a clear understanding as to how much of this industry is or can be self-supporting so that the remainder of the industry can be recognized as necessarily and economically subject to subsidy. The present program of the Senate Interstate and Foreign Commerce Committee to study means for separating subsidy elements in air mail payments and to draft legislation requiring separation, is a step in the direction of clarifying this problem. Proper separation of subsidy from service pay and the allocation of subsidies to communities will also serve to focus attention on the weakness of the domestic airline structure. But the separation of subsidy has no definite implications for the development of a governmental policy which will make possible the growth of a strong and economical airline system.

HOW MAIL PAYMENTS AFFECT AIRLINE PROFITS

For the purposes of analysis, it is assumed here that a compensatory (*i.e.*, non-subsidy) air mail rate would be one equivalent on the basis of

¹ These subsidies are often exaggerated by airline critics. Provision of airways is so necessary for national defense that the total expenditure involved probably would not be much less if there were no commercial airlines. Airlines are also paying a far greater share than is generally realized of airport facility costs.

weight to the return from passenger service. It can hardly be argued that, on a cost basis, the airlines should be entitled to more pay to handle the mail than they charge passengers, unless, of course, particularly on branch lines, the Post Office Department requires schedules primarily for the purposes of the mail. On the other hand, a fair mail pay would surely be considerably more than the amount charged for freight because of the special service and priority given to mail. In any case, until the matter of carrier cost of air mail service is determined, it seems reasonable to assume for purposes of analyzing the economic position of the carriers, that a service mail rate would be equal to the industry ton-mile return for passengers. On this premise, the service rate would have been 56 cents per ton-mile in 1950, 59.8 cents in 1949, and 52.3 cents in 1947, against an actual industry average mail pay of 101.3 cents in 1950, 110.2 cents in 1949, and 70.9 cents in 1947.

In table 1 there is presented the actual operating results, by airlines, for 1949 and adjusted results, assuming that all carriers had been paid on a mail rate basis equal to the industry average passenger return. This table, by removing most of the camouflage of air mail payments (even though it can well be argued that the *exact* amount of compensatory mail pay assumed cannot be supported by fact) shows some interesting results. Instead of only two carriers showing losses on their domestic operations, the number rises to 12 out of the 16 trunk line carriers, with only the so-called Big Four showing an operating income. Some carriers, like Capital Airlines, have their profit picture changed from one of a respectful net income to a large net loss. And, as might be expected, almost all of the smaller carriers show sizeable net operating losses.

Nor is the picture much improved in 1950. As table 2 indicates, the adjusted net income picture is greatly different from that before adjustment. Instead of a case of 14 of the 16 domestic carriers showing an operating profit, one finds only eight in the black after the mail pay adjustment, for this extraordinarily profitable period in American industrial history. Except for Northwest, whose losses are largely due to the exceptionally costly introduction of new airplanes, the striking change is again the case of Capital Airlines whose record turns from one of apparent success to one of the largest losses in the industry. While the first eleven months of 1950 depicts a more optimistic picture than for any period since World War II, it is still significant that probably no carriers other than the Big Four were in the black after mail pay adjustments, on a normal basis. In fact, the results for 1950 are of little real significance since the traffic demand after the start of the Korean hostilities reached abnormal proportions. Furthermore, even in 1950, only the Big Four earned, after mail pay adjustments, a healthy business profit.

In passing, it is interesting to note not only the dependence of three-fourths of the domestic trunk line carriers on mail pay, but the apparent lack of consistency and sense in the allocation of mail pay. Among the Big Four, there appears to be no valid reason why Eastern should

TABLE 1
NET OPERATING INCOME BEFORE AND AFTER MAIL PAY ADJUSTMENTS: 1949
DOMESTIC TRUNK AIRLINES
(Thousands of dollars)

	Operating Revenues Excl. Mail	Mail Revenues	Total Operating Revenues	Total Operating Expenses	Net Operating Income	Actual Mail Revenue Per ton mile (cents)	Adjusted Mail Revenue*	Adjusted Net Oper- ating Income
16 Trunk Lines	414,752	45,031	459,783	435,158	24,625	110.2	24,524	4,118
American	94,025	5,379	99,404	89,962	9,442	60.5	5,313	9,376
United	80,528	6,483	87,011	82,036	4,975	62.4	6,211	5,939
Trans World	57,991	5,720	63,711	61,115	2,596	65.1	5,254	1,930
Eastern	65,607	3,247	68,854	64,909	3,945	66.4	2,922	3,620
Northwest	24,398	2,963	27,361	28,542	(1,181)	116.6	1,520	(2,624)
Capital	22,339	4,567	26,906	25,537	1,319	428.2	638	(2,610)
Delta	13,513	2,385	15,898	15,191	707	264.8	539	(1,139)
Braniff	12,206	2,321	14,527	14,050	477	216.4	641	(1,203)
National	10,960	2,024	12,984	12,931	53	374.1	324	(1,647)
Western	6,996	1,863	8,859	8,379	480	414.4	269	(1,114)
Chicago & Southern	6,783	1,800	8,583	7,783	800	345.9	311	(689)
Midcontinent	6,048	1,467	7,515	6,975	540	468.1	187	(740)
Northeast	4,228	1,565	5,793	5,728	65	1,594.1	59	(1,441)
Continental	3,869	1,379	5,248	5,561	(313)	662.3	125	(1,567)
Colonial	3,219	1,226	4,445	4,229	216	1,223.3	60	(950)
Inland	2,042	641	2,683	2,178	505	546.7	70	(66)

* Adjusted on basis of revenue of \$0.598 per ton mile, the industry passenger revenue return.
Source: C.A.B., *Recurrent Report of Financial Data*.

enjoy a higher return per ton mile than the other carriers. Although this may be explained by Eastern's lower volume of mail, present basic mail rates providing a sliding scale mail rate structure for the Big Four, the mail pay seems to have little relationship to costs or need. But the greatest disparities lie in the medium sized carriers. The comparison of Northwest and Capital is a case at point. Both carriers are approximately the same size, as measured by revenues, but Capital's mail rate came to approximately \$4.28 per ton mile in 1949 and \$2.87 in 1950, while Northwest's was \$1.17 in 1949 and \$1.18 in 1950. Yet Northwest's need was obviously greater with its costly introduction of Martin 202's and Boeing Stratocruisers. Capital's rate seems to be out of line with the rate received by the three other medium sized airlines — Delta, National, and Braniff — all of which could surely show equivalent need, at least in 1949.

In calling attention to the importance of air mail pay, it is not intended to argue against the wisdom of air mail subsidy. Even though it may be shown that the subsidies for the domestic trunk line carriers approximated \$20,000,000 in 1949 and appeared to be running at the same rate in 1950, this may be a small price to pay for the development of a first class domestic air transport system with its contribution to national defense and the commerce of the nation. Its smallness becomes especially clear when we compare it with the \$89,000,000 spent by the government to buy and store eggs during a similar period of time and the like millions spent on the support of prices for such articles as flaxseed, peanuts, and potatoes.

At the same time, there is much logic in the position of the American railroads that the transportation companies of this country should pay their way and that a sound transportation system depends upon the allocation of traffic in accordance with the relative economy and fitness of the carrying agencies. Moreover, even the most ardent supporters of the aviation industry wish to see the dead hand of subsidy removed from the air transport business and to see the industry come of age as a privately operated and financed segment of our business structure.

There may be little hope that such financial maturity will be reached among the feederline or local service airlines, and the existence of competition with foreign subsidized airlines may make the removal of subsidies difficult for the American Flag carriers. But the fact that at least four of the domestic trunkline carriers have operated for two years without air mail subsidy (no matter how this subsidy might be measured), gives one hope that an answer can be found whereby true trunkline service may be placed on its own feet.

It is proposed, therefore, in the following pages to analyze the underlying economic and managerial factors which have determined the profitability of the domestic trunk airlines, with a view to finding the factors which explain profit or loss. Can the explanation be found in size? In managerial efficiency and cost control? In equipment modernization? In route? In aggressiveness of management?

TABLE 2
NET OPERATING INCOME BEFORE AND AFTER MAIL PAY ADJUSTMENTS: FIRST 11 MONTHS, 1950
DOMESTIC TRUNK AIRLINES
(Thousands of Dollars)

	Operating Revenues Excl. Mail	Mail Revenues	Total Operating Revenues	Total Operating Expenses	Net Operating Income	Actual Mail Revenue Per ton mile (cents)	Adjusted Mail Revenue*	Adjusted Net Oper- ating Income
16 Trunk Lines	\$433,198	\$40,627	\$473,825	\$423,658	\$50,167	101.3	\$22,458	\$31,998
American	98,214	5,183	103,397	83,894	19,503	59.7	4,862	19,182
United	80,880	6,413	87,293	74,358	12,935	60.0	5,985	12,507
Trans World	60,905	5,178	66,083	60,111	5,972	65.5	4,427	5,221
Eastern	66,936	2,973	69,909	63,662	6,347	67.5	2,466	5,840
Northwest	26,820	2,648	29,468	34,625	(5,157)	118.2	1,255	(6,550)
Capital	23,229	3,829	27,058	25,138	1,920	286.6	748	(1,161)
Delta	15,416	1,675	17,091	15,201	1,890	155.9	602	817
Braniff	12,285	2,023	14,308	12,461	1,847	176.1	643	467
National	13,580	1,604	15,184	13,106	2,078	274.1	328	802
Western	9,018	1,279	10,297	9,227	1,070	174.2	411	202
Chicago & Southern	6,659	1,609	8,268	7,574	694	301.9	298	(617)
Midcontinent	5,810	1,523	7,333	6,709	524	524.3	163	(836)
Northeast	4,483	1,384	5,867	5,709	158	1,319.4	59	(1,167)
Continental	4,018	1,604	5,622	5,327	295	895.6	100	(1,209)
Colonial	2,782	1,048	3,830	4,206	(376)	1,288.1	47	(1,377)
Inland	2,163	654	2,817	2,350	467	574.2	64	(123)

* Adjusted on basis of \$0.56 per ton mile, the industry average passenger return.

Source: C.A.B., *Recurrent Report of Financial Data* and reports filed by carriers with Board and reported in *American Aviation*.

COSTS AND THE ECONOMICS OF SIZE

Because the four airlines which seem to have found the formula for profitable operation are the Big Four, it may very easily be assumed that the economics of size account for airline success. In the very nature of airline business, with the apparent tendencies toward lower costs with large scale operations in such important cost elements as maintenance, and with the possibilities of spreading indirect expenses with high volume, it would seem that the economics of size should be of tremendous significance.

In order to obtain some size classifications, the sixteen domestic trunk airlines have been divided into groupings on the basis of 1949 gross revenues, available ton miles,² revenue ton miles and average route miles operated. These size groupings are shown in Table 3. As will be noted, there is a surprising variation in the size of the sixteen domestic trunk airlines. The Big Four are definitely in a size class by themselves and the next two largest airlines, Northwest and Capital, are approximately one-third of the average size of the Big Four as measured by revenues or available ton miles. The medium small airlines (Delta, Braniff, and National) and the small airlines (Western, Chicago and Southern, and Midcontinent) are approximately one-fifth and one-ninth, respectively, of the average of the Big Four. And the four small-

TABLE 3
COMPARATIVE SIZE GROUPS: 1949
DOMESTIC TRUNK AIRLINES

	<i>Gross Revenues (000,000's)</i>	<i>Adjusted* Gross Revenues (000,000's)</i>	<i>Available Ton Miles (000,000's)</i>	<i>Revenue Ton Miles (000,000's)</i>	<i>Average Route Mileage</i>
<i>Large</i>					
American	\$99.4	\$99.3	323.1	192.1	6,512
United	87.0	86.7	284.1	162.8	7,088
Trans World	63.7	63.2	196.6	115.9	5,325
Eastern	68.9	68.6	261.3	120.6	6,018
<i>Medium</i>					
Northwest	27.4	25.9	93.2	49.7	4,003
Capital	26.9	23.0	90.9	44.8	4,132
<i>Medium Small</i>					
Delta	15.9	14.1	53.1	23.7	3,065
Braniff	14.5	13.8	46.1	22.3	3,212
National	13.0	11.3	52.6	19.7	2,301
<i>Small</i>					
Western	8.9	7.3	26.3	13.1	2,709
Chicago & Southern	8.6	7.1	23.5	12.0	2,539
Midcontinent	7.5	6.2	20.0	10.5	2,846
<i>Very Small</i>					
Northeast	5.8	4.3	12.9	6.1	1,053
Continental	5.3	4.0	16.8	7.1	2,308
Colonial	4.4	3.2	11.1	5.3	1,024
Inland	2.7	2.1	5.65	3.3	1,539

* Adjusted for mail pay differences. See Table 1.

² "Available ton miles" is the measurement of the number of tons of weight available for revenue use multiplied by the number of miles this available weight is carried. It is probably the best single measurement of size, since it is, in effect, the total "production" of the airline plant, as actually operated. As will be noted below, it is an especially good datum against which to measure costs.

est airlines of the sixteen average little better than one-twentieth the size of the four largest.

This is, indeed, a wide disparity in size and would seem to indicate that only with an airline system of large companies could the public expect financial self-sufficiency now apparently enjoyed by the Big Four. But, strangely enough, the evidence does not support the supposition that the self-sufficiency of the Big Four is due to the economies of size.

Reference to tables 4 and 5 show some interesting facts with regard to operating expenses. On the basis of total operating expenses per available ton mile, there is little to choose between the four largest airlines, the two medium sized airlines, and the three medium small airlines, although the three small airlines show somewhat higher costs and the four very small airlines have rather noticeably higher costs. It is interesting that National Airlines has the lowest cost per available ton mile of all sixteen airlines even though it ranks ninth in size among the domestic carriers and is less than one-sixth the size of American as measured in available ton miles or revenues. Moreover, two of the smaller airlines, in addition to National, Capital and Delta have costs below those of two of the four largest.

There is even less correlation between size and cost when one considers direct flying costs.³ In this case, one of the smallest airlines (Continental) compares favorably with one of the largest (Trans World). While, on the basis of averages, inspection of the data in Table 4 will show that size has some advantage in direct expenses as well as in indirect expenses, the exceptions, such as Delta and National, seem to indicate that size has not really been the explanation for the financial self-sufficiency of the Big Four.

In order to see this matter of costs more clearly, break-even load factors have been computed (see Table 4) and some detail of major classes of operating expenses are summarized in Table 5. In order to make the breakeven load factors have some meaning from the standpoint of reflecting efficiency of management and operations, the actual breakeven load factor⁴ has been adjusted to give effect to differences in mail rates and in passenger returns per passenger mile. For the purpose of equating the effects of mail rates, the breakeven load factor of each airline has been computed on the assumption of a mail rate equal to the industry return for passenger service. To eliminate differences in passenger fare levels (some of which grow out of route and competitive factors which have nothing to do with efficiency) a break-

³ Those costs generally variable with the volume of flying, although actually most variable with hours of flying rather than miles. They include the cost of flying operations, direct equipment maintenance, and aircraft depreciation.

⁴ The actual breakeven load factor is that percentage of revenue utilization of available ton miles which will just pay for expenses of operation. Clearly, the breakeven load factor depends not only upon the level of expenses, but also the rate at which the revenue ton miles are sold. Consequently, the level of mail rate will affect the breakeven point, as will the level of passenger rates, as well as other service rates, and the relative proportion of high and low rate service sold.

TABLE 4
ANALYSIS OF OPERATING EXPENSES AND BREAK-EVEN LOAD FACTORS: 1949
DOMESTIC TRUNK LINE CARRIERS

	Direct (cents)	Operating Expenses Per Available Ton Mile Indirect (cents)	Total (cents)	Ratio of Indirect to Direct (percent)	Actual Total Load Factor (percent)	Actual Break-even Load Factor (percent)	Break-even Load Factor Adjusted for Mail* (percent)	Break-even Load Factor Adjusted for Passenger Returns** (percent)
Sixteen Trunk Airlines	13.8	14.9	28.7	108	53.4	50.5	52.9	52.9
American	13.4	14.5	27.9	108	59.4	53.8	53.8	52.7
United	13.3	15.7	29.0	117	57.3	54.0	54.3	53.8
Trans World	15.1	16.0	31.1	106	58.4	56.7	57.2	56.2
Eastern	13.1	11.8	24.9	90	46.2	43.5	43.8	46.1
Northwest	14.4	16.2	30.6	113	53.3	55.6	56.7	53.8
Capital	13.3	14.9	28.2	112	49.3	46.9	54.9	52.6
Delta	13.4	15.2	28.6	114	44.6	42.6	48.2	50.0
Braniff	15.0	15.5	30.5	105	48.2	46.7	52.8	53.0
National	12.7	11.9	24.6	94	37.5	37.5	43.0	45.0
Western	15.5	16.3	31.8	106	49.5	46.8	56.9	57.3
Chicago & Southern	14.2	18.9	33.1	133	51.0	46.3	56.0	57.3
Midcontinent	15.2	19.8	35.0	130	52.5	48.7	55.6	56.0
Northeast	22.1	22.3	44.4	101	47.0	46.4	62.7	70.1
Continental	15.3	17.8	33.1	117	42.8	45.4	59.6	56.8
Colonial	17.8	20.3	38.1	114	47.6	45.3	61.4	65.5
Inland	16.4	22.1	38.5	135	58.6	47.6	60.4	65.5

* Adjusted to reflect a basic mail rate equal to average passenger ton-mile return. See Table 1.

** Adjusted to reflect basic mail rate as well as differences in passenger returns, by calculating break-even load factor on assumption all carriers had collected average industry passenger return of 5.76 cents per mile.

even load factor has been computed on the basis of the industry's average passenger return, as well as with the mail pay adjustment.

The calculation of breakeven load factors, as adjusted for mail pay and passenger return differences, shows that there is no perceptible difference between the efficiency of the Big Four and the next five medium and medium small airlines. As a matter of fact the adjusted breakeven load factors of the latter five airlines is, on the average, slightly *lower* than the average of the Big Four. This is a surprising fact, particularly when it is considered how much smaller these five are than the four large leaders of the industry. It tends to prove either that airlines of the size of Delta, National, or Braniff are large enough to gain the economies of size in the industry, or that the managements of the medium sized airlines have been forced by circumstances to be more efficient than their big competitors, or, what seems most likely, that both factors account for the difference.

Further analysis of operating expenses has been made to determine the effect of size upon the economics of air transport services. The major expense classifications of the sixteen domestic trunk operators have been reduced to expenses per available ton mile and summarized in Table 5. On the basis of the nature of the airline business, one would expect the economies of size to be most evident in the case of direct maintenance of flight equipment, ground operations expense, traffic and advertising expense, and general and administrative expense.

Of all airline operations, the direct expense incurred in the maintenance of equipment is most like the manufacturing process in which the economies of size have been so pronounced. Of course, there are many custom type maintenance operations, but the overhaul of airframe, engines, and the other components of the airplane, of which approximately one-half of direct maintenance costs are comprised, is apparently best undertaken on a mass production basis. Moreover, many of the routine maintenance operations would seem to lend themselves to cost reduction through large scale operations.

As for ground operations expense, in which are included the cost of station operations and like expenses, there would seem to be distinct advantages in the case of the larger size operations, particularly where high traffic volume can make possible the distribution of these expenses to many available ton miles. Traffic and advertising expenses would likewise appear to be a type of cost which would be lower, on an available ton mile basis, for the larger companies than for the smaller. And general and administrative expenses, covering largely the costs of the general offices, would seem to be particularly susceptible to the economies of size.

In examining direct equipment maintenance expenses for 1949, one finds no particular evidence of the effect of economies of size. This

TABLE 5
ANALYSIS OF OPERATING EXPENSES: PRINCIPAL EXPENSE CLASSES: 1949
DOMESTIC TRUNK LINE CARRIERS
CENTS PER AVAILABLE TON MILE

	Flying Opera- tions	Direct Main- tenance Flight Equip- ment	Deprecia- tion Flight Equip- ment	Total Direct Opera- ting Expense	Ground Opera- tion	Ground & Indirect Main- tenance	Passenger Service	Traffic Sales & Adver- tising	General and Adminis- tration	Deprecia- tion Ground Equip- ment	Total Indirect Operat- ing Expense	Total Operat- ing Expense
Sixteen Trunk Lines	7.9	3.3	2.6	13.8	4.4	2.2	1.9	3.9	2.0	0.5	14.9	28.7
American	7.3	3.5	2.6	13.4	4.4	2.3	1.8	3.6	1.9	0.5	14.5	27.9
United	7.3	2.7	3.3	13.3	4.4	2.4	2.0	3.7	2.4	0.8	15.7	29.0
Transworld	9.2	3.4	2.5	15.1	4.2	2.3	2.2	4.8	2.1	0.4	16.0	31.1
Eastern	7.3	3.4	2.4	13.1	3.5	1.6	1.4	3.3	1.7	0.3	11.8	24.9
Northwest	8.5	3.2	2.7	14.4	4.5	3.2	1.8	4.0	2.1	0.6	16.2	30.6
Capital	8.1	3.5	1.7	13.3	5.4	1.6	1.6	4.3	1.6	0.4	14.9	28.2
Delta	8.1	3.3	2.0	13.4	4.5	1.9	2.0	4.4	2.0	0.4	15.2	28.6
Braniff	8.4	4.2	2.4	15.0	5.0	2.2	2.0	4.0	1.9	0.4	15.5	30.5
National	6.6	4.0	2.1	12.7	3.5	2.0	1.3	3.3	1.5	0.3	11.9	24.6
Western	8.9	2.5	4.1	15.5	4.8	2.1	1.6	4.3	2.7	0.8	16.3	31.8
Chicago & Southern	8.7	3.7	1.8	14.2	6.6	2.4	2.5	4.6	2.3	0.5	18.9	33.1
Midcontinent	10.0	2.4	2.8	15.2	6.6	2.2	2.1	5.6	2.7	0.4	19.8	35.0
Northeast	11.4	5.3	5.4	22.1	6.6	4.1	2.2	5.6	3.0	0.8	22.3	44.4
Continental	9.6	3.1	2.6	15.3	5.4	3.0	1.9	3.8	3.0	0.7	17.8	33.1
Colonial	10.4	5.0	2.4	17.8	5.6	3.0	2.8	4.5	4.1	0.3	20.3	38.1
Inland	13.2	2.9	1.3	16.4	8.5	2.9	2.6	3.9	3.7	0.5	22.1	38.5

Source: Calculated from Civil Aeronautics Board Data, *Recurrent Report of Financial Data and Recurrent Report of Mileage and Traffic Data*. Covers both scheduled and nonscheduled revenue operations.

startling fact, as measured by expense per available ton mile may be summarized as follows:

	<i>Number of Carriers Below or Equal to the Industry Average</i>	<i>Number of Carriers Above the Industry Average</i>
Large carriers	1	3
Medium size carriers	1	1
Medium small carriers	1	2
Small carriers	2	1
Very small carriers	2	2

The record is even more interesting when it is noted that in 1949 the three lowest cost carriers included United, a large carrier, and Midcontinent and Western, relatively small carriers. While some explanation for the cost differences in the direct maintenance expense category can be traced to problems with new equipment, this is not believed to be a significant factor. Western and United had Convairs or DC-6's in operation. Yet their costs were among the three lowest. Midcontinent, the lowest cost operator, had, to be sure, only DC-3's in operation in 1949. Yet Colonial, so far as its domestic operations were concerned, operated DC-3's almost exclusively in 1949 and had the highest cost per available ton mile. Other comparisons could be made. In the industry, the low cost operators are "explained away" by some of their higher cost competitors on the basis of accounting differences, claiming that many direct expense items are hidden away in the indirect expense categories. But analysis of accounts do not support the thesis and one must look to other explanations. While, as will be noted presently, trip distances have a material effect on all direct operating expenses per available ton mile, the fact that no real evidence of the economies of size are found in direct maintenance operations and that such wide differences are found must be ascribed to the quality of management over these operations. The statistical evidence is further supported by inspection and knowledge on the part of the writer who is well aware that good management and the provision of efficient facilities (likewise an evidence of good management) largely explain the maintenance cost records of such carriers as Midcontinent, Western, United, and Continental.

The advantages of size tend to show more positively in the case of ground operations expense. Classifying the carriers, as was done with direct maintenance, one finds the following:

	<i>Number of Carriers Below or Equal to the Industry Average</i>	<i>Number of Carriers Above the Industry Average</i>
Large carriers	4	0
Medium size carriers	0	2
Medium small carriers	1	2
Small carriers	0	3
Very small carriers	0	4

Although the above summary appears to be rather definite evidence of the economies of size in this important classification of expenses (which accounted for 15 per cent of all airline expenses in 1949), reference to table 5 will show that, in the medium and medium small carrier categories, many of those carriers above the industry average were only very slightly above.

It might be expected that the economies of size apparent in ground operations expense would be due not so much to the size of the airline itself but rather to the density of operations. Using the number of available ton miles flown per station operated, as an index of the density of operations in 1949, table 6 shows that, as a general rule, the higher the density of operations, the lower the cost of ground operations per available ton mile. There are, to be sure, some noteworthy exceptions. The exceptionally good record of National and the almost as good record of Delta, Western, Continental, and Colonial are somewhat out of line with the general trends. But the trend is distinct enough to indicate that the real economies of size are matters of density, rather than mere size of the total operations; and density is, of course, largely a matter of route structure although it tends to be affected also by the aggressiveness of management in offering a quantity and quality of service and through effective selling. When the wide differences in density of operations is considered one cannot help but wonder that some of the low density operators can keep their ground

TABLE 6
GROUND OPERATIONS EXPENSE AND DENSITY OF OPERATIONS: 1949
DOMESTIC TRUNK LINE CARRIERS

	<i>Available Ton Miles Per Station Served (000,000's)</i>	<i>Ground Operations Expense Per Available Ton Mile (cents)</i>
<i>Large Carriers</i>		
American	5.1	4.4
United	4.2	4.4
Trans World	4.0	4.2
Eastern	3.6	3.5
<i>Medium Carriers</i>		
Northwest	2.8	4.5
Capital	1.8	5.4
<i>Medium Small Carriers</i>		
Delta	1.6	4.5
Braniff	1.6	5.0
National	1.8	3.5
<i>Small Carriers</i>		
Western	1.5	4.8
Chicago & Southern	1.1	6.6
Midcontinent	0.7	6.6
<i>Very Small Carriers</i>		
Northeast	0.6	6.6
Continental	0.5	5.4
Colonial	0.6	5.6
Inland	0.4	8.5

operations costs so low and that some of the very high density operators should have costs as high as they are.

Review of traffic, sales, and advertising expenses shows in all size classes rather little deviation from the industry average, although there are noteworthy cases of Trans World, Midcontinent, and Northeast which are distinctly out of line on the high side in their respective classes, and Eastern, National, Continental and Inland, which are out of line on the low side. This group of expenses which account in the industry for more than 15 per cent of all air line expenses appears to be more variable with managerial policy than with size, although this policy may be determined by route considerations and competitive factors which are examined below.

Analysis of general and administrative costs (see table 5) shows little difference between the four largest airlines and the five medium sized and medium small airlines, so far as any expected economies of size are concerned. This is somewhat surprising as one should normally expect the larger airlines to have a materially lower general and administrative cost per available ton mile than such airlines as National or Braniff, whose volume of operations is less than one fifth the average of the Big Four. It is not surprising that in the case of the small and very small carriers the general and administrative expenses per available ton mile should be higher. On the contrary, it is remarkable that these costs should not be higher than they are.

Like maintenance expenses and the over-all picture of operating expenses, analysis of general and administrative expense statistics seems to indicate that (1) there are few economies of size beyond the size of those airlines which have been here classified as medium small; and (2) for airlines of lesser size the diseconomies of smallness tend to show up rather rapidly. While the statistics *seem* to mean this, there is some doubt that it is wholly true. It does seem to be clear that the small and very small carriers are so caught in the costs of small size that despite good management and sound policy (e.g. Western's and Midcontinent's record on maintenance) they are doomed to experience the few extra cents cost per available ton mile which amounts to so much in a year's operations.

The lack of difference between the operating costs of the Big Four and those of the next five carriers in size (and the size of these five, as has been pointed out, is much less than that of the Big Four) is unconvincing. From the standpoint of size, there *should* be greater differences in cost. After all, even the larger airlines are not large as American business enterprises go. Using revenues as a basis, they are small compared to railroads and to most of the well known industrial enterprises. Moreover, the fact that noteworthy cost records have been made by some of the smaller carriers leads one to the belief either that there are more important factors than size which determine airline costs or that the quality of management varies more widely than is sometimes supposed.

EFFECT OF TRIP DISTANCE ON COSTS

Among the other main determinants of cost which have not been examined are trip distances. Most direct operating expenses tend to vary with airplane *hour* operating costs and the average speed of airplanes tends to vary inversely with trip distance so that, with a given airplane, the available ton miles produced per hour will be greater the longer the trip distance. For example, in 1949, United Airlines operated their DC-6 airplanes at an average direct operating cost of approximately 80 cents per airplane mile with an average trip distance of almost 600 miles. Because of the importance of speed over trip distances (approximately 250 miles per hour average from take-off to landing for 600 miles and 202 miles per hour for a 200 mile distance), it is estimated that, had United operated these airplanes over a 200 mile average trip distance, the cost per airplane mile would have risen to approximately \$1.00. And the cost per available ton-mile which was approximately 10.7 cents at a 600 mile distance would have been 13.3 cents at a 200 mile distance. Further calculations indicate a cost of 16.7 cents per available ton mile with a 100 mile trip distance.

In view of the wide variation in direct operating costs per available ton mile with increasing trip distances, it might be well to examine the 1949 experience with this in mind although utilization of different

TABLE 7
EFFECT OF TRIP DISTANCE ON DIRECT OPERATING EXPENSE: 1949
DOMESTIC TRUNK LINE CARRIERS

		Actual Direct Operating Expense Per Available Ton Mile (cents)	Direct Operating Expense Using DC-6 Cost Curve as Basis (cents)	Direct Operating Expense Using DC-3 Cost Curve as Basis (cents)	Direct Operating Expense Using Average of DC-6 and DC-3 Cost Curves as Basis (cents)
	Average Trip Distance (Miles)				
Sixteen Domestic Carriers	178	13.8	13.8	13.8	13.8
American	241	13.4	12.9	13.3	13.1
United	258	13.3	12.7	13.3	13.0
Trans World	250	15.1	12.8	13.3	13.0
Eastern	178	13.1	13.8	13.7	13.8
Northwest	245	14.4	12.9	13.3	13.1
Capital	146	13.3	14.6	14.2	14.4
Delta	147	13.4	14.6	14.2	14.4
Braniff	168	15.0	14.0	13.8	13.9
National	181	12.7	13.8	13.8	13.8
Western	185	15.5	13.7	13.7	13.7
Chicago & Southern	180	14.2	13.8	13.8	13.8
Midcontinent	151	15.2	14.5	14.1	14.3
Northeast	89	22.1	17.5	15.8	16.7
Continental	158	15.3	14.3	14.0	14.2
Colonial	129	17.8	15.3	14.5	14.9
Inland	144	16.4	14.7	14.2	14.6

Note: Curve for DC-6 and DC-3 made to pass through industry average.

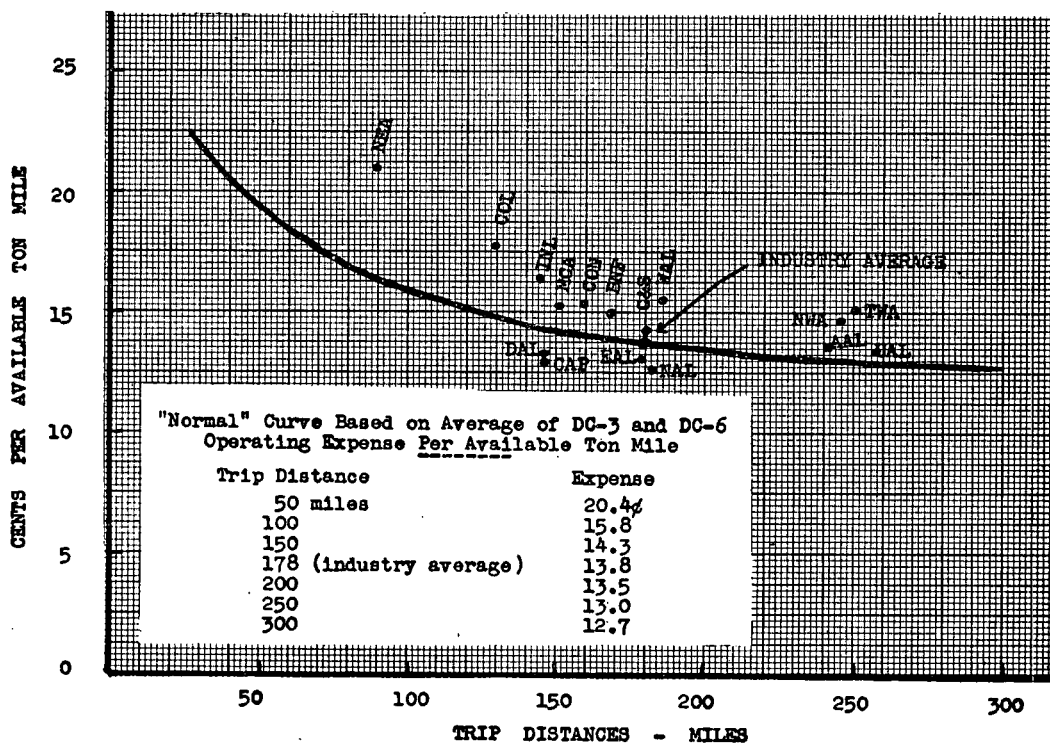
Source: Calculated from wheels-off wheels-on speeds actually experienced by airlines and reported to Civil Aeronautics Board in Form 41.

types of equipment will tend to cloud the basic effects of trip distances. The data on direct operating expense by carriers and the average trip distances flown in 1949 are shown in table 7. In order to gain some perspective on these trip distances and their effect, the expected cost per available ton-mile has been calculated by using (1) the industry direct operating expense average as the basis and (2) the slope of the DC-6 and the DC-3 operating costs as affected by distance and average speed. Since the aircraft being utilized by the domestic carriers probably, on the average, approximates a fleet half of DC-6's and half of DC-3's, expected operating costs per available ton mile are computed using an *average* of the expectable costs of these two airplanes as a basis. These costs are charted on Chart 1.

CHART I

EFFECT OF TRIP DISTANCES ON DIRECT OPERATING EXPENSES
DOMESTIC TRUNK LINE CARRIERS: 1949

Comparison of Actual with Expected Normal



While the so-called "expected normal" on Chart 1 cannot reflect individual differences in efficiency, size, weather, gasoline prices, equipment utilization and other factors, it does serve to show the extent to which trip distance enters direct operating expenses and the apparent extent to which individual companies are below or above the normally expectable industry average. The data in table 7 show also how route structure tends to affect costs. The low average trip mile of many of the carriers is almost entirely determined by route, and the deviation

from expected "normal" of certain carriers like Northeast and Colonial is partly due to route limitations which make it difficult to utilize equipment as fully as possible.

The true importance of trip length in its effect on costs is sometimes buried in averages. American, for example, scheduled its Convairs with an average trip length of approximately 140 miles early in 1950. Had this company been able to reschedule these airplanes to increase trip distance by approximately 20 miles or a 14 per cent increase, the savings on an annual basis are roughly estimated to be well over \$500,000. And could a small airline like Midcontinent improve its scheduling, either through revision of route or through revision of current scheduling practice, to reach the industry average (i.e. from 151 miles to 178 miles), it is estimated that expenses for the same available ton miles as flown in 1949 would have been reduced by more than \$100,000. Such low trip mileages as Northeast's average of 89 miles in 1949 appear to be hopeless, this factor alone, overlooking effects on utilization of equipment, accounting for an estimated 26 per cent higher direct operating expense as against what would have been encountered had this airline been able to schedule to the industry average of a 178 mile trip distance.

THE LEVEL OF INDIRECT COSTS

A further cost factor, in part related to size and in part related to the efficiency of management, might be noted. It is the level of indirect costs, generally measured by the ratio of indirect to direct expenses. Data reflecting this ratio may be found in table 4. The lowness of the ratio of indirect expenses to direct expenses accounts very largely for the financial success throughout the years of Eastern Airlines and to a considerable degree for the cost record of National. Likewise, the relative highness of indirect costs account for United's somewhat poorer profit showing in 1949 as compared to American. If *direct* operating expenses are at a reasonable level, this ratio shows much by way of efficient management and control of indirect costs. Where direct expenses are high, as in the case of Northeast, a low ratio has little real meaning. However, assuming a reasonable direct expense level, it would appear that no airline should be satisfied with an indirect expense level above 100 per cent of direct and a 95 per cent level appears entirely feasible, as is indicated by the experience of Eastern and National. It is an interesting commentary that had all the airlines been able to realize Eastern's indirect expense ratio, even with the somewhat high direct expenses in certain instances, eleven of the sixteen would have made a net operating profit in 1949, even though a mail rate equal to the passenger return had been paid.

There is hardly any question that the indirect expense ratio should be lower with a higher volume of operations. The record for 1949 shows that this is generally true. Most of the 12 medium and small

airlines have an indirect expense ratio higher than the industry average and all but one of the Big Four have a ratio equal to or lower than the industry average. There are exceptions among the smaller carriers where the ratio is low, as in the case of National, Braniff, and Western; and United in 1949 was the exception among the Big Four (although it must be recognized that Trans World's actual indirect expense per available ton mile was somewhat higher than United's, as one would expect with that airline's lower volume of operations). The management position of United has been, however, that a higher level of indirect expenses is justified on the basis of the additional revenue which higher expenses generate. As compared to Eastern or American, United's somewhat higher expenses for passenger service, sales and advertising, and general and administrative costs account in large part for the differences. The extra expenditure may well pay off in higher passenger load factors and the record seems to support the policy for United enjoyed in 1949 the highest passenger load factor in the industry. Additional cost differences lie in ground and indirect maintenance and depreciation of ground equipment. United has probably the finest maintenance facilities in the industry which might account for some of these increased costs and for that company's low direct maintenance record. Yet with all this justification, the higher volume lower cost operation of American paid off better than United's policy as is indicated by the higher net operating income enjoyed by American.

FINANCIAL SELF-SUFFICIENCY AND ROUTE CHARACTERISTICS

Even though the Big Four represent financial maturity and self-sufficiency for the airlines, as their 1949 and 1950 records appear to indicate, the answer to economic health for the other twelve carriers does not seem to lie on the side of costs or the economics of size.⁵ There is, to be sure, some evidence that at least four and perhaps as many as seven of the smallest airlines are doomed to indefinite subsidy because of the expense level which their size, shortness of haul, and low density of operations generate. But one is struck by the fact that the medium sized and medium small airlines do practically as well, from the point of view of costs, as the Big Four. Still, all except the Big Four showed losses in 1949, after high mail payments were stripped away, and the record for abnormal 1950 is not much more encouraging, when a reasonable rate of profit return is considered.

Therefore, the answer must be found in the revenue side of the airline picture for these airlines which can and have turned in a creditable cost performance. One does not have to look far. Examination of actual and breakeven (after mail pay adjustment) load factors

⁵ Similar conclusions were reached in the study by F. W. Gill and G. L. Bates, *Airline Competition* (Boston: Harvard University Graduate School of Business Administration, 1949), pp. 616-18. Unlike the study of Gill and Bates, this study concludes, as is shown below, that the problem is not carrier competition *per se* but rather the size and character of the market facing those carriers with inadequate routes.

shown in table 4 will prove that, in 1949, *every* airline except the very small four airlines would have made a profit, after mail pay adjustment, if they had enjoyed the load factors experienced by American, United or Trans World. Even one of the very smallest airlines, Continental, would have come very close to breaking even with American's load factor. However, had all the carriers enjoyed a load factor only equal to Eastern's, National alone, in addition to Eastern, would have been in the black. But in the case of Eastern and National, as has amply been shown, their advantage is primarily one of low costs even though their above-the-industry average passenger fare level in 1949 was of some assistance.

Why is it that three of the Big Four have gained their success through high load factors? The answer must be found in route characteristics, the quality and volume of service, or successful sales effort.

A fairly accurate guide to the traffic potentials of each of the domestic trunk line routes can be obtained from the traffic surveys made each March and September by the Civil Aeronautics Board.⁶ While these surveys cover only passenger traffic and have been made for only these two months each year, they do serve to show the flow of airline traffic. These surveys, to be sure, cover only the actual traffic handled and are not necessarily a good guide to *potential* traffic which is influenced by the quality and quantity of airline operations and other factors, such as safety, reliability and fare level which affect the volume of airline service generally.

The best guide for determining the strength of an airline route is the volume of traffic available between pairs of cities. The Civil Aeronautics Board Survey for March, 1949, covered traffic to and from 430 domestic cities having airline traffic between 15,532 pairs of cities. While some of these cities and pairs were served by the local service airlines, most were served by the sixteen domestic trunk line carriers studied here and by far most of the traffic handled was carried by these major carriers. Data from the September, 1948 and March, 1949, surveys have been summarized in tables 8 and 9. The importance of relatively few cities is striking. Of the 430 cities surveyed in March, 1949, ten of these cities generated 53 per cent of the domestic airline passenger miles and 100 of these cities generated 93 per cent of the passenger miles. Of the 15,532 pairs of cities surveyed, 100 pairs handled 47 per cent of the passenger miles. Thus, it appears reasonable to conclude that an airline route with the highest number of these major cities or pairs of cities is likely to have the highest density of traffic, the largest volume, and the highest average load factors.

Table 8, dealing only with the intercity route passenger traffic of the domestic trunk line carriers over the top 100 pairs of cities in September, 1948, and March, 1949, shows, as might be expected, the

⁶ Civil Aeronautics Board, *Airline Traffic Survey* (Washington: Sup't of Documents).

TABLE 8

PASSENGER MILE POTENTIAL OF DOMESTIC TRUNK LINE AIR CARRIER ROUTES
AS MEASURED BY INTERCITY ROUTE TRAFFIC OF TOP 100 RANKING PAIRS OF CITIES
C.A.B. AIRLINE TRAFFIC SURVEYS FOR SEPTEMBER 1948* AND MARCH 1949** COMBINED.

	<i>Average Number of Top 100 Pairs Served</i>	<i>Total Passenger Miles of Pairs Served (000,000's)</i>	<i>Potential to Airline Based on Equal proration (000,000's)</i>	<i>Average Number of Carriers Serving Pairs</i>	<i>Actual total Passenger Miles of Carriers in Two Survey Months (000,000's)</i>	<i>Ratio of Actual Passenger Miles to Prorated Potential</i>
American	44.5	269.5	115.9	2.3	248.6	2.15
United	36.5	256.9	100.5	2.5	205.4	2.04
Trans World	30	207.9	83.1	2.5	143.6	1.74
Eastern	22	143.8	82.2	1.8	174.3	2.12
Northwest	10	40.8	23.1	1.8	53.5	2.31
Capital	10.5	72.9	23.3	3.1	48.3	2.07
Delta	4.5	18.4	9.9	1.9	36.2	3.66
Braniff	5	12.3	7.1	1.7	32.8	4.62
National	6	49.4	26.7	1.8	25.4	0.95
Western	6.5	17.3	17.3	2.3	18.4	1.06
Chicago & Southern	2.5	5.8	3.1	1.9	18.5	6.00
Midcontinent	1	1.8	0.9	2.0	17.0	18.89
Northeast	1	17.6	5.9	3.0	9.7	1.64
Continental	..	....	....	..	10.6	..
Colonial	1	5.8	2.9	2.0	7.8	2.69
Inland	..	....	....	..	4.5	..
Total of Pairs	97	502.8				
Total Potential all pairs		1,113.9			1,054.6	2.10

* Note: Only 98 of the 100 pairs included in tabulations since other pairs not served by single carrier in a month.

** Note: Only 96 of the 100 pairs included in tabulations since other pairs not served by single carrier.

overwhelming route strength of the Big Four airlines and the great route weakness of such carriers as Continental, Midcontinent, and Inland. By arbitrarily allocating actual traffic among carriers on an equal basis, one obtains not only a prorated potential but also a competitive factor as disclosed by the average number of carriers serving each route. While the traffic of the top 100 pairs only covers 47 per cent of the total traffic, the importance of this top 2/3 of 1 per cent of the pairs is extraordinarily great to the route productivity of an airline.

The average number of carriers serving these top pairs is of significance. The strength of Eastern's route, among the Big Four, becomes apparent when it is noted that this airline has less competition over its route than any of the largest airlines; in fact, less competition than any of its competitors. Likewise, the weakness of Capital's and Northeast's route is also partly apparent when one finds an average of three carriers serving their most productive route segments. Based on an equal proration of traffic handled over the 100 pairs, the strength of National's route appears to be greater than has generally been realized. For the survey months covered, one finds National's route to stand, in terms of potential, as fifth in the nation and with a very low competitive factor of 1.8. The extraordinary weakness of Continental's and Inland's routes, without a single pair of cities in the top 100, doubtless accounts to a great extent for the low load factors and traffic densities which these carriers have.

To obtain a clearer picture of the relative route strengths of the various carriers, the distribution of the cities and pairs of cities by size groups has been made and summarized in table 9. The distribution of the pairs of cities in the top 100 pairs brings out even more sharply the traffic strength of the routes of the Big Four. Likewise it discloses the weaknesses of the smallest four and the small and medium small airlines. Except for Northeast's Boston-New York segment and Colonial's New York-Montreal route, none of the six smallest airlines have any of the top 50 pairs of cities on their routes.

Although the traffic generating ability of cities on an airline's route is of far less importance than the linking up of strong traffic generating cities (e.g. it is of far less significance for an airline to serve a city than to serve that city and another between which passengers wish to travel), some weight must be attached to the kind of traffic generation cities an airline has on its route. As will be noticed from table 9, both American and United have on their routes 8 of the top 10 cities of the country which generated 53 per cent of the passenger miles in March, 1949. Of the top 100 traffic generating cities, the routes of American and Eastern are noteworthy, as is the fact that Capital has more of these cities than Trans World and almost as many as United. However, as will be recalled from table 8, Capital does not have the strong *pairs* of cities and has a higher degree of competition over its

TABLE 9
DISTRIBUTION OF CITIES AND PAIRS OF CITIES ON ROUTE BY RANK ORDER OF PASSENGER MILES
CIVIL AERONAUTICS BOARD MARCH 1949 SURVEY

Rank Order of Pairs of Cities		Distribution of Pairs of Cities on Route by Rank Order of Passenger Miles Generated					Distribution of Cities on Route by Rank Order of Passenger Miles Generated				
		1-10	11-25	26-50	50-100	1-100	1-10	11-25	26-50	50-100	1-100	101-430*
Percentage of Total Passenger Miles Generated	20	8	9	10	47	53	19	12	9	93	7
American	6	6	8	22	42	8	6	16	10	40	24
United	6	6	9	13	34	8	4	6	12	30	38
World	6	4	6	13	29	7	7	5	8	27	22
Trans	4	7	5	10	26	6	9	8	21	44	28
Eastern	0	2	3	4	9	5	4	2	4	15	18
Northwest	1	2	4	4	11	4	6	5	14	29	20
Capital	1	1	0	3	5	2	3	5	8	18	15
Delta	0	0	2	3	5	2	4	5	6	17	12
Braniff	1	2	1	3	7	3	2	4	8	17	12
National	1	2	2	1	6	3	1	2	2	8	10
Western	0	0	0	3	3	2	4	2	6	14	8
Chicago & Southern	0	0	0	1	1	0	5	2	3	10	18
Midcontinent	1	0	0	0	1	2	0	2	1	5	18
Northeast	0	0	0	0	0	2	3	4	11	18	13
Continental	0	0	0	0	1	2	0	2	2	6	10
Colonial	0	0	1	0	0	0	2	0	3	5	10
Inland	0	0	0	0	0	0	2	0			

* Note that, while 430 cities served by all airlines operating domestically were covered in this study involving 15,532 combinations, only 324 cities and a lesser number of combinations were served by the domestic trunk line carriers. All the 100 top ranking cities except Honolulu and Hilo, Hawaii, were served by the sixteen domestic trunk line carriers and all the 100 top ranking pairs were served except Honolulu-Hilo. However, three other pairs (Los Angeles-Miami, Los Angeles-Minneapolis, and Los Angeles-Houston) were omitted since they were not on a single carrier's route.

good route segments. United's route which has 38 of the cities ranking 101 to 430, and generating only 7 per cent of the industry passenger miles, shows some weakness as compared to American and Trans World. One notes also, as a general rule, that the smaller airlines serving only a few of the top 50 or 100 of the traffic generating cities have more than their proportionate share of the weak traffic generating cities.

Study of the data summarized in tables 8 and 9 leads one to the following conclusions with regard to route strength: (1) the routes of the Big Four are considerably stronger than those of the other twelve airlines and doubtless account not only for their volume of operations but their relatively high load factors; (2) the routes of the smallest four are so weak that a reasonable load factor or density of traffic can hardly be expected; (3) certain airlines, like National, have a better route than the size of their operations would indicate; (4) the development of routes under the Civil Aeronautics Board has not only been widely varying as to expectable traffic volume but also as to the extent of competition, as is indicated by Eastern's ratio of 1.8 carriers serving major pairs and Braniff's 1.7 against Capital's 3.1 and Northeast's 3.0; (5) there has apparently been no attempt by the Civil Aeronautics Board to allocate the weaker traffic generating cities in such a way as to bring about routes of equal strength, regardless of size and (6) neither from the standpoint of traffic density nor the character of demand can normal (i.e. in a peacetime economy) load factors adequate to cover the present level of costs be expected for the majority of airlines in the medium small, small and very small categories.

STRENGTH OF ROUTE THE MOST IMPORTANT FACTOR

The lack of evidence that size alone accounts for the wide discrepancy in profit potentials not based on mail pay, the good load factors of the Big Four and their resultant profits, and the clearly superior route characteristics of the largest four airlines, lead to the belief that *route*, more than any other factor explains the profit or loss characteristics of domestic trunk airlines.

While route is clearly the most important single factor, one should not overlook aggressiveness in quality and quantity of service. It is a well proved phenomenon in transportation that, given equal route opportunities, the company offering the largest volume of service at a reasonably good quality will get the business. Volume is often more important than quality, for volume of service ordinarily means frequency of service and the travelling and shipping public is more likely to use the carrier with the highest frequency. While the advantages of frequency diminish with time and distance (e.g. there can hardly be too much frequency to suit travel tastes between New York and Washington, but perhaps three or four well timed frequencies each day between New York and Los Angeles will cover all normal

travel demands for frequent service), transportation is a true case of that company getting most which offers most.

THE FACTOR OF AGGRESSIVENESS IN OFFERING SERVICE

There is no adequate measure of the aggressiveness of carriers in offering service. For those carriers which have a proportionately equal number of the top ranking pairs of passenger traffic cities on their routes, a ratio between the total passenger miles of traffic carried in the two survey months studied here and the potential based on equal proration of traffic carried gives a fair index. Thus, for the airlines as a whole, the top ranking pairs (see table 8) accounted for approximately 47 per cent of the total traffic carried in these two months; and the ratio of total traffic to traffic for the top 97 pairs was 2.10. It is interesting that American was slightly above the industry ratio, while Eastern, United, and Capital were a little below, and Trans World, Western, and National were considerably below. Ratios for such carriers as Delta, Braniff, and Midcontinent have rather little meaning because of the proportion of traffic carried on less productive pairs of cities. But the low ratios of Trans World, Western, and National indicate that these carriers are not getting their fair share of the business through a lack of equipment and volume of service, unequal competition (e.g. United's stronger position than Western on the west coast because of its national prestige), or an inferior grade of sales promotion. As a matter of fact, study of the industry indicates that, with Trans World and National particularly, the principal problem has been a lack of first grade equipment to offer adequate competition over their most productive route segments.

Although over-all statistical measures are clouded with operating policies over branch lines and the practice of offering limited service on noncompetitive lines, the policies of most airlines in offering volume and quantity of service are fairly well known and can be ascertained from direct observation and study. Both American and Eastern have followed a policy of offering a high volume of service, particularly on competitive lines and the experience of many travellers is that, in the areas in which these carriers operate, competitors find it difficult to match these carriers' attraction through frequency and volume of service. United has apparently followed the policy of offering an exceptionally high quality of service, with a fair degree of volume on competitive routes, and a limited volume and frequency on noncompetitive routes. Trans World Airline has been hampered for many years by a lack of equipment (although this lack is currently being remedied) which has clearly not made it possible for this airline to follow a policy of high volume service, even though the management might wish to do so.

Capital Airlines has shown signs that its problem is not an ability to place a volume of service on its routes, but its financial position and

the necessity for reducing costs, as well as its highly competitive and rambling route structure, have led this airline to offer a grade of service somewhat inferior to its competitors. Northwest appears to be doing as well as can be expected from the standpoint of volume and quality of service, with its problems being route limitations and the incidence of high operating costs due to the introduction of two new and costly types of aircraft.

The outstanding case of being placed in an inferior position because of lack of volume of service is National whose small fleet of DC-6's and lack of other modern aircraft, as well as its small fleet of aircraft for the size and potential of its route, have placed it at a competitive disadvantage. Western has also not offered the volume of service which its route would seem to warrant, although, as has been pointed out, its problem of competing against nationally strong United on the west coast may overshadow any policy which the management might like to pursue. There is some evidence that both Delta and Braniff have followed too conservative a policy in putting modern aircraft into the better segments of their routes in volume large enough to meet the competition of such strong carriers as American and Eastern. As for the other airlines, there has naturally been some reluctance to meet the quantitative competition of large competitors, since, by and large, their routes are so weak that a strong promotional policy would be hazardous. Yet, one finds surprising cases of high quality and relatively high volume service among these carriers. Among such cases might be noted Continental and Midcontinent.

SUMMARY OF FACTORS AFFECTING PROFITABILITY

In summary, the answer to airline profitability and the ability of the domestic trunk airlines to stand on their own feet lies primarily in route structure. There are noteworthy cases of good and aggressive management and of extraordinary cost control. Virtually any airline which could combine United's or Western's low maintenance costs, National's low direct flying cost, and Eastern's low level of indirect cost could earn a profit with even the load factors experienced. But route characteristics necessarily affect these costs. Northeast, with a short trip route structure could never expect low direct flying costs. An efficiently operated airline like Continental could hardly expect Eastern's level of indirect costs because of the low traffic density of its route.

Moreover, there can hardly be doubt that the use of modern equipment has helped the cost and improved the load factors of such carriers as American and United. The domestic airline industry is far from modernized with more DC-3's and DC-4's in operation than all postwar airplanes combined.⁷ The railroads were slow to learn, although many

⁷ Although, to be sure, by mid-1949, more passenger miles were being carried in the larger and more efficient modern aircraft, such as Constellations, DC-6's and Convairliners.

now have, how new equipment can reduce costs and improve service. The airlines, traditionally aggressive, show signs in some quarters of falling into the lethargy of using old equipment indefinitely. And a mail pay system which emphasizes need and puts a premium on not trying the new does not help in developing aggressive management looking for new ways to lower costs and improve service.

As the analysis of the traffic generating possibilities of the various airline routes indicates, the problem of route inadequacy is not particularly one of multiple carrier competition.⁸ There are doubtless routes upon which too much competition exists, in the sense that all the advantages of competition could be obtained with fewer carriers and some advantages would result through remaining carriers handling traffic at a higher density. But this is not the major problem. The problem is rather the size and character of the market facing each individual carrier. In general, the weaker twelve of the sixteen domestic air carriers, and particularly the weakest seven, have facing them a market so inadequate from the standpoint of volume and density of traffic that they can hardly expect a load factor which will return revenue adequate to meet their costs.

To illustrate the conclusion that the problem is not so much the intensity of intercarrier competition, but rather that of market, the case of Continental Airlines might be used. This airline is among those with the least competition from air carriers on its lines (the data in Table 8 will not show this, since only the top 100 pairs of cities are considered, although complete analysis of Continental's system will reveal it). This airline had none of the top 100 pairs on it and only seven of the top 50 traffic generating cities, from which 84% of airline passenger miles came in March, 1949, were on its line. Yet it served 29 cities among the weakest 330 points generating only 7% of all airline passenger miles in the country. This airline is one of the best managed and most efficient airlines in the nation; still it is probably safe to say that in normal times the size of the demand facing this company cannot support a profitable business without some mail pay assistance.

Similar conclusions can be drawn from most of the other weaker carriers. Only in the case of Capital does it seem probable that the intensity of inter-carrier competition explains, in part, its weakness. And even in this case it is far from certain that the relatively few heavy traffic generating pairs of cities and the relatively large number of weak route segments may be more important than the intensity of competition.

THE IMPLICATIONS FOR PUBLIC POLICY: CONSOLIDATION

If profitability, economy, and self-sufficiency for the domestic trunk line carriers depend so much upon improved routes, the answer for public policy seems to be simple in principle. With the exception of a

⁸ As found by Gill and Bates, *supra*.

few segments which could stand additional service, the need for route improvement should not, of course, be met through new and additional routes for the weaker carriers but by a definite public policy for consolidation. A mere glance at the wide differences in route and size is sufficient to arouse suspicion that the present policy of continuing sixteen trunkline carriers will never lead to economic self-sufficiency for the airlines. And examination of the underlying factors amply supports the need for overhaul of the airline route structure.

Let us see how this policy might work. The Civil Aeronautics Board, whose responsibility it is to develop and foster such a program, must have a plan. This plan, to be practical, should not be based upon the premise of cutting up currently successful and well operated airlines, but rather upon the basis that the smaller airlines which cannot hope for self-sufficiency in normal times should be merged so as to make a system of strong airlines. It might also be necessary, although it is by no means clearly so, to force the abandonment of certain route segments, or to place them in the category of local service airlines whose service it is the intention of the government to support as a public service to small communities.

For example, suppose that some way could be found to force the merger of Northeast, Colonial, National, Delta, Chicago and Southern and Capital (except for those lines Chicago-Detroit-Cleveland-Pittsburgh-New York) into an airline system similar to Eastern's system. Such a system would be a strong north-south carrier in the eastern half of the United States. Analysis of the September, 1948 and March, 1949 Airline Surveys of the Civil Aeronautics Board indicates (see Table 10) that such a system would serve an average of 27.5 of the top 100 pairs with a prorated potential of more than 70 million passenger miles for the two months; a system with enough potential volume and traffic density to promise economic self-sufficiency.

Likewise, if a merger were forced between Northwest and Western (including Inland), plus Capital's route Chicago-Detroit-Cleveland-Pittsburgh-New York, along with a new route from San Francisco-Salt Lake-Denver-Chicago and certain transcontinental nonstop privileges, there would emerge a fourth transcontinental airline almost as strong as United.

These two merger programs, bringing a strong eastern and a strong transcontinental carrier out of nine smaller carriers would make a logical pattern with a minimum of cutting up of present carriers. Midcontinent, Braniff, and Continental have not been allocated in the suggested transcontinental and eastern mergers, although there might be some logic in doing so, since it is believed that a system so resulting would be rather too large, in comparison with the present transcontinental carriers. Consequently, for the purpose of this suggested plan, it is assumed that Continental is assigned to Trans World, along with most of Braniff's routes, and Midcontinent is allocated to Eastern,

along with Braniff's Chicago-Kansas City and Memphis-Tulsa routes. The result of so doing would be to strengthen both Trans World and Eastern in areas where the strength would be of material benefit to them.

While the above suggested mergers are not offered as a rigid plan, they do tend to show how a plan of mergers can bring forth a smaller number of large airlines, drawing upon the important traffic generating centers and traffic routes so as to make them strong. The relative strengths of the routes, revamped as suggested, is shown in Table 10. Using as a fairly good index of route strength the potential served by the top 100 pairs of cities in the September, 1948 and March, 1949 Airline Surveys, one finds a surprising degree of equality in the route strengths of the six airline systems.

While such a merger program, apparently drastic in nature, would reduce the domestic trunk line carriers from sixteen to six, it would not reduce competition in many of those route segments where competition now exists. In fact, in the major route segments, exemplified by the top ranking 100 pairs, the merger program would slightly increase competition. Comparison of the competitive factor (average number of carriers serving pairs of cities) in Table 10 with those in Table 8 shows a slight rise in the element of competition. Yet, even with this rise in competition, the pro-rated share of traffic remains high for all carriers, even though that of American, United and Eastern is slightly higher

TABLE 10
PROPOSED DOMESTIC TRUNK AIRLINE ROUTE STRUCTURE
COMPARATIVE ANALYSIS OF PASSENGER MILE POTENTIAL OF AIR CARRIER ROUTES
AS MEASURED BY INTERCITY ROUTE TRAFFIC OF TOP 100 RANKING PAIRS OF CITIES
IN SEPTEMBER 1948 AND MARCH 1949 AIRLINE SURVEYS

	<i>Average Number of Top 100 Pairs Served</i>	<i>Total Passenger Miles of Pairs Served (000,000's)</i>	<i>Potential to Airline Based on Equal Proration (000,000's)</i>	<i>Average Number of Carriers Serving Pairs</i>
American	43.5	269.5	98.7	2.7
United	38	256.9	87.6	2.9
Trans World(1)	40	240.3	85.5	2.8
Eastern(2)	26.5	155.9	70.8	2.2
Combination A(3)	27.5	153.6	70.1	2.2
Combination B(4)	33	242.8	90.1	2.7

(1) Present route plus all of Continental and Braniff's route Kansas City-Wichita-Oklahoma City-Fort Worth/Dallas-Houston and Tulsa-Oklahoma City-Denver.

(2) Present route plus all of Midcontinent and Braniff's route Chicago-Kansas City, and Memphis-Tulsa.

(3) A combination of domestic routes of Northwest, Colonial, Delta, National, Chicago and Southern, and Capital (except Chicago-Detroit-Cleveland-Pittsburgh-New York plus a new route Cleveland-Cincinnati).

(4) A combination of Northwest and Western (including Inland) plus Capital's route Chicago-Detroit-Cleveland-Pittsburgh-New York plus a new route San Francisco-Salt Lake City-Denver-Chicago, also nonstop flights permitted (in addition to present nonstops) New York-Los Angeles, New York-San Francisco, Chicago-San Francisco, Chicago-Los Angeles, and New York-Chicago.

under present circumstances, than could be the case if this program of mergers were effected.

Since it is believed that a program of mergers, somewhat along the lines of that suggested here, is the only answer to airline financial and economic self-sufficiency, there is immediately the question as to how any such merger might be effected. In the first place, it is the responsibility of the Civil Aeronautics Board to come forward with a plan. Unless airlines know what the Civil Aeronautics Board will approve, no one is likely to undertake the trouble and expense of putting together a successful merger only to find that the government agency in charge of civil air transportation will not approve it. In the past ten years there has not been a single major airline merger among the trunk airlines, although plans for a few have been announced and others have been abandoned because of the attitude of the Civil Aeronautics Board.

There is certainly no reason, legally or politically, why the Board should not study the problem of strengthening routes through the consolidation process. There appears to be no reason, except lethargy, why the Board should not come out with a positive statement that it will look with favor on consolidations which follow a particular plan. The development of such a plan cannot do harm and can surely do some good, especially when it is realized how strong a few well selected mergers can make an airline.

But, so long as consolidation is voluntary, there is no more reason to expect a series of consolidations according to plan than developed in the railroad industry after the Transportation Act of 1920. It is no secret that the airline industry is still led by men, most of whom were pioneers in aviation, and who like the idea of being head of an airline no matter how small or how economically insufficient the company is. While the abilities of these leaders are often great, their interest in protecting their position argues against any hope of any program of voluntary consolidation, even on a modest scale.

However, unlike the railroad industry in which a voluntary consolidation plan failed, the domestic trunk airline industry, except for the four largest carriers, appears to be dependent, at least in normal times upon a level of air mail pay higher than that which would normally be paid for the service. And the Federal Government is unwittingly the principal party in supporting an economically unstable industry through its mail payments. Since the power to withhold subsidy funds is one of the most effective instruments of control, and since the Civil Aeronautics Act provides for mail pay only under economical and efficient management, it appears that the Board has ample power *now* without any further legislation to force a plan of consolidation.

The threat to withhold excess mail pay would probably be an ample regulatory tool to force consolidation. Should the threat be insufficient, the actual withholding of mail pay subsidies would surely work even though a carrier might be forced into bankruptcy or trusteeship in

the meanwhile. There is a curious feeling in government and industry circles that an airline cannot be allowed to go bankrupt. There appears to be no basis in law or public policy for this attitude, for the Civil Aeronautics Act does *not* guarantee profits under all circumstances and financial reorganization need not affect operation of a public service.

Consolidation of the domestic trunk airlines into six large systems, through giving each airline a share in the lucrative haul between the major pairs of cities of the United States, would probably make for such strong airlines economically that the local service hauls for which these airlines are now certificated could be handled without causing loss to any system as a whole. If, after a period of trial, it should be proved that these local services so burden an airline that action is called for, the Civil Aeronautics Board could then decide upon an appropriate course of action. It would seem that, in such an event, either these services should be abandoned or, if required as a public service, should be paid for by separate subsidies. Such subsidies would be specific and for a definite service and not, as present subsidies, to place an umbrella over the efficient and inefficient alike.

If, as this analysis indicates, the basic cause for the need for air mail payments above a service rate of pay is the weakness of the routes of all but the four largest carriers the way for bringing economic self-sufficiency to the domestic trunk airlines is clear. All that is needed is a plan and the will to make payment of mail subsidy contingent upon a reasonable conformance with such a plan in a reasonable period of time. The Civil Aeronautics Board can act if it will.