

THE ECONOMIC ROLE OF AIR TRANSPORTATION

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I. THE INDUSTRY

Air transportation today occupies the same position in the national economy that rail transportation occupied a century ago. In 1846, however, the analyst projecting the role of rail transportation would have encountered fewer difficulties than are now encountered in assaying the future of air transportation. Like rail transportation in 1846, air transportation is at an early stage in its technological development; its market is likewise only partially foreshadowed in its past experience. A dynamic technology—new principles of design and of power production, a dynamic operational pattern—new organizational and managerial methods to be evolved, a dynamic market—new commercial relations to be tested as savings in time and reductions in cost enlarge the demand for air services, all of these and other factors warn that past experience affords no reliable blueprint for the future.

Air transportation today, like rail transportation a century ago, has proven itself. It is heralded as the instrument opening a new frontier. Air transportation has gone through its initial trial period. It has won a large measure of public acceptance. It is still predominantly a carrier of passengers, of mail, and of high-grade express. It has experienced a very substantial growth, but it may still prove to be dependent on government financial support, at least in establishing certain new international routes and in bringing service to less populous communities within the country. Unlike the railroads of a century ago, air carriers are subject to a considerable measure of governmental control; however, that control is not so inclusive and extensive as the present controls of rail transportation. The Civil Aeronautics Board, in terms of its statutory powers and experience, may be compared with the Interstate Commerce Commission before 1920.

A proper appraisal of the economic significance of air transportation requires that its performance be measured against that of other forms of transportation. However, a comparison without historical perspective would underestimate the potentialities of air transportation. In 1933, air carriers performed only 173 million passenger-miles of service, or less than one per cent of the total by intercity common

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carriers. In 1940, air carriers performed 1,147 million passenger-miles of service, or three per cent of the common-carrier total. The year 1933 was a year of depression; the year 1940, a prosperous year of high industrial activity. The difference in general business conditions is reflected in the increased performance of all carriers: a 52 per cent increase for the railroads, 280 per cent for the buses, and 563 per cent for the air carriers.¹

In cargo services, the record of air transportation indicates a token performance only. In both 1932 and 1940, the air carriers accounted for only a small fraction of one per cent of the ton-miles of cargo.² Even as carriers of the mail, the air lines in 1940 carried only 9 million ton-miles in a total of 1.3 billion non-local mail, or seven-tenths of 1 per cent.³

In international operations in 1937, United States air carriers (they accounted for all but a negligible portion of the air travel to and from the United States) performed 76 million passenger-miles of service,⁴ roughly 1.6 per cent of the total. In 1938, they carried three-tenths of 1 per cent of the mail;⁵ they carried only 635 short tons of cargo in 1938 while surface vessels handled 98.8 million short tons.⁶

¹ PASSENGER-MILES OF TRANSPORTATION BY CLASSES OF CARRIERS, 1933 AND 1940

Carrier	1933		1940	
	Passenger-Miles (1,000,000)	Per Cent	Passenger-Miles (1,000,000)	Per Cent
Railway*	16,335	83.3	24,761	65.7
Bus**	3,091	15.8	11,733	31.2
Air	173	0.9	1,147	3.1
Total	19,599	100	37,641	100

Sources: FED. COORDINATOR OF TRANSPORTATION, PASSENGER TRAFFIC REPORT (1935) 169; I.C.C., ANNUAL REPORT (1941) 9; AIR TRANSPORT ASS'N, LITTLE KNOWN FACTS ABOUT AIR TRANSPORTATION (1944).

* Commutation travel excluded.

** Intercity bus only.

² TON-MILES OF CARGO TRANSPORTATION PERFORMED BY CLASSES OF CARRIERS, 1932 AND 1940

Carriers	1932		1940	
	Ton-Miles (1,000)	Per Cent	Ton-Miles (1,000)	Per Cent
Railroads	235,891,521	74.1	376,218,000	61.4
Intercity Trucks	29,976,800	9.4	48,500,000	7.9
Inland Waterways	7,976,800	2.5	117,296,000	19.1
Great Lakes	24,733,878	7.8		
Pipelines (petroleum)	19,600,000	6.2	71,279,000	11.6
Air	260	*	3,476	*
Total	318,179,259	100	613,296,476	100

Sources: C.A.B., ANNUAL AIRLINE STATISTICS, 1938-1942 (1943); FED. COORDINATOR OF TRANSPORTATION, REPORT ON REGULATION OF TRANSPORTATION AGENCIES, SEN. DOC. 152, 73d Cong., 2d Sess. (1934) 2, 261; I.C.C., ANNUAL REPORT (1941) 9.

* Less than 0.05 per cent.

³ Air mail data from C.A.B., RECURRENT REPORTS OF MILEAGE AND TRAFFIC DATA; total mail data from POST OFFICE DEP'T, COST ASCERTAINMENT REPORT, 1940, table VII.

⁴ Estimate derived from data in C.A.B., OVERSEAS AIR SERVICE PATTERN—ALL AREAS (1944). Neither the air nor the surface transportation data include travel to Mexico or Canada.

⁵ C.A.B., SURVEY OF UNITED STATES OVERSEAS MAIL (1943) 18.

⁶ AIRCRAFT INDUSTRY ASSN., AVIATION FACTS AND FIGURES (1945) 72; DEP'T OF COMM., STATISTICAL ABSTRACT OF THE UNITED STATES, 1940 (1941) 469.

In summary, air carriage has been the junior member in the transportation system, domestic or international. Its impressive record of growth and achievement holds the promise that it can soon become a full partner, particularly in passenger carriage.

The air-transport industry was created originally for the carriage of mail and fostered by the financial support granted by the federal government. The Post Office Department inaugurated the carriage of the domestic mail, the first service being started on May 15, 1918. Although contracts were concluded in 1920 with private operators for international mail routes, the Congress did not decide that the domestic air-mail service should be performed by private operators until 1925, when it provided for mail contracts which made financially possible the development of combined mail, express and passenger operations.⁷ The Air Commerce Act of 1926 launched a program of providing civil airways, navigation aids and safety regulations.⁸ In 1930, governmental policy sought further to encourage the development of commercial aviation by providing differential payments in mail contracts for the use of larger planes with passenger capacity, powered by two engines and equipped with various safety devices.⁹ The Air Mail Act of 1934 amended the policy of awarding routes on the basis of competitive bids by providing for a continuing review and regulation of air-mail rates by the Interstate Commerce Commission;¹⁰ for the moment, regulation took precedence over the promotion of air commerce. Subsequently, the Civil Aeronautics Authority, by later reorganization, the Civil Aeronautics Board, was made responsible for the granting of certificates of convenience and necessity under a general mandate to provide an air-transport system adequate for the needs of the foreign and domestic commerce of the United States, the Postal Service and the national defense.¹¹ The accompanying statutory instruction to fix the mail pay with reference to the financial needs of the carriers created an assured economic basis on which the industry could secure suitable flying equipment, develop operating procedures and test the market for its services.

The domestic air-transport industry has been carried on principally by interstate air carriers operating under certificates of convenience and necessity issued by the Civil Aeronautics Board. At the present time, the certificated domestic air carriers may be classified in five groups. Four carriers operate transcontinental services—American Airlines, United Air Lines, Transcontinental & Western Air and Northwest Airlines.¹² The carriers of the second group operate in a generally north and south

⁷ 43 STAT. 805 (1925), 39 U. S. C. (1940 ed.) §461 *et seq.*

⁸ 44 STAT. 568 (1926), 49 U. S. C. (1940 ed.) §171 *et seq.*

⁹ The Waters Act, 46 STAT. 259 (1930).

¹⁰ 48 STAT. 933 (1934), 39 U. S. C. (1940 ed.) §461 *et seq.*

¹¹ Civil Aeronautics Act of 1938, 52 STAT. 973 (1938), 49 U. S. C. (1940 ed.) §401 *et seq.*

¹² American operates a southern route from Boston to Los Angeles, via Washington, Nashville, Memphis and Dallas. Transcontinental & Western's route extends from Boston, New York and Washington to Los Angeles and San Francisco, via Chicago or St. Louis, and Kansas City. United has a central route from New York to San Francisco and Seattle, via Chicago, Denver, Omaha. Northwest serves the northern route from New York to Seattle, via Detroit, Milwaukee, Twin Cities; it has recently

direction; they are Eastern Air Lines, Chicago and Southern Air Lines, Braniff Airways, Western Air Lines, National Airlines and Mid-Continent Airlines.¹³ A third group of air lines may be described as regional carriers. They are Pennsylvania-Central Airlines, Northeast Airlines, Colonial Airlines, Delta Air Corporation and Continental Air Lines.¹⁴ The fourth group contains only two members, both engaged in short operations: Catalina Air Transport operates between San Francisco and Catalina Island; Essair operates a route wholly within Texas from Houston to Amarillo with intermediate stops. All American Aviation is the only carrier in the fifth class; it engages in mail and cargo operations conducted in part by conventional methods and in part by the use of in-flight pick-up equipment.

There are also a number of carriers operating under an exemption order of the Civil Aeronautics Board which permits non-scheduled operations in interstate commerce without a certificate of convenience and necessity.¹⁵ They operate with smaller equipment and usually from a single base. There are also some intrastate common carriers operating under state certificates.

A significant amount of air-transportation services is provided by contract and charter operations. To some extent these contract and charter operations are performed by certificated air carriers. Other operations are conducted by fixed-base operators as a by-product of other aviation activities—the operation of airports, the training of pilots, the sale of personal aircraft, and the like.

United States aviation led the world before the war both in domestic and in international aviation. In 1938, the United States operated 71 thousand route miles, whereas the Soviet Union operated 66, France 41, Germany 33, and the United Kingdom 29. The United States operated its routes more intensively as is evidenced by its superiority in plane-miles flown, 81 million, more than the aggregate flown by the next four countries—the Soviet Union, the United Kingdom, Germany and

begun operating transcontinentally to New York. In addition to their transcontinental routes, American, Transcontinental & Western, and United also operate a number of regional routes.

¹³ Eastern operates along the eastern seaboard, from Boston to Miami and Brownsville. It also operates from Chicago to Miami. Chicago and Southern operates from Chicago and Detroit to New Orleans and Houston. Braniff operates between Chicago on the north, and Denver on the west, and Dallas, Houston and Brownsville on the south. Western operates from San Diego and Los Angeles to Lethbridge, Canada, via Salt Lake City and Great Falls; it also operates routes from Los Angeles to Denver and from Los Angeles to San Francisco. National operates along the eastern seaboard from Miami to New York and along the Gulf Coast from New Orleans to Jacksonville. Mid-Continent operates from the Twin Cities to New Orleans, via Des Moines or Omaha, Kansas City, Tulsa and Shreveport.

¹⁴ The principal route of Pennsylvania-Central is from Norfolk to Detroit by way of Washington, Pittsburgh and Cleveland; it also operates a number of other routes including New York to Pittsburgh, Chicago and Milwaukee to Detroit, Buffalo to Pittsburgh, Pittsburgh to Birmingham, Norfolk to Knoxville. Northeast operates from New York to Caribou, Maine, and Moncton, New Brunswick, via Boston, and also from Boston to Montreal. Colonial operates from Montreal to New York, via Albany and has recently been awarded a route from Ottawa and Montreal to Washington, via Syracuse, Reading and Baltimore. Delta operates from Forth Worth—Dallas, to Charleston and Savannah, and also from Chicago to Miami. Continental operates from Denver to El Paso to Kansas City, and to Oklahoma City.

¹⁵ C.A.B., Economic Regulations, §292.1 (Dec. 7, 1938), 14 CODE FED. REGS. (CUM. SUPP. 1944) §292.1.

Canada.¹⁶ Even these figures do not properly reflect the advanced position of civil aviation in the United States, for the United States lines characteristically operated with planes of larger capacity. Considering passenger-miles as an index of service performed and combining the domestic and international operations, the United States air lines performed nearly 636 million passenger-miles of service in 1938, nine times that of Germany, and more than eleven times that of the United Kingdom.¹⁷ The United States air lines performed 4.88 passenger-miles of passenger service per capita, four times as much as the air lines of any other nation with the sole exception of the Netherlands, whose 4.28 is more reflective of its small population than of the service performed.

International aviation made a promising beginning before the war. International aviation started in Europe where, by geographical necessity, most commercial aviation is international. Virtually every European country operated an air line with sub-

¹⁶ MAJOR NATIONAL NETWORKS OF THE WORLD IN 1938, RANKED ACCORDING TO ROUTE-MILES AND PLANE-MILES FLOWN

	<i>Route-Miles</i>
1. United States	71,199
2. Union of Soviet Socialist Republics	65,865
3. France	40,833
4. Germany	32,720
5. United Kingdom	29,064
6. Italy	23,583
7. Australia	21,748
8. Netherlands	16,055
9. Canada	11,917
10. Belgium	11,388
	<i>Plane-Miles Flown</i>
1. United States	81,058,127
2. Union of Soviet Socialist Republics	38,460,310
3. United Kingdom	14,331,000
4. Germany	13,895,356
5. Canada	10,853,405
6. Australia	9,654,678
7. France	9,000,727
8. Italy	8,447,448
9. Netherlands	6,489,539
10. Japan	3,321,450

Source: BRITISH AIR MINISTRY, CIVIL AVIATION STATISTICIAN AND TECHNICAL REVIEW (1938) 53. The Union of Soviet Socialist Republics figure for plane miles is for 1937.

¹⁷ RELATION OF AIR TRANSPORTATION TO POPULATION IN TERMS OF PASSENGER-MILES OF SERVICE PERFORMED IN 1938

Country	Passenger-Miles Domestic and International (Thousand)	Population (Thousand)	Passenger-Miles Per Capita
United States	635,556	130,215	4.88
Germany	73,100	79,375	0.92
United Kingdom	56,400	46,213	1.22
Soviet Union	55,507	192,696	0.29
France	38,890	41,907	0.93
Netherlands	37,330	8,729	4.28
Brazil	24,600	41,357	0.59

Sources: REPORT OF INT'L COMM. FOR AERIAL NAVIGATION (various dates); WORLD ALMANAC, 1943; DEP'T OF COMM., STATISTICAL ABSTRACT OF THE UNITED STATES, 1939 (1940) 10. (The data for the Soviet Union is for 1937.)

direct government operation. South and Central America was the second area where international commercial aviation was extensively developed, largely by European air lines. It was not until the close of the pioneer period in commercial aviation, about 1927 or 1928, that United States air lines entered the international field. At the outbreak of the war, the Germans, the French and the Italians operated to South America; the British, the Belgians and the French, to Africa; the British, the Dutch and the French, to Asia and Australia, the East Indies, and Indo-China, respectively.¹⁸

Prior to the war, the international air commerce of the United States was carried on almost exclusively by Pan American Airways and its affiliate, Pan American-Grace Airways. Pan American began its career in the Caribbean area where it operated from Miami to the principal islands of the Greater Antilles and the Lesser Antilles. From Brownsville it operated south through Mexico and Central America to the Canal Zone, which it also reached over the water from Cuba and Jamaica and by way of Guatemala City from New Orleans. Pan American also operated across the north coast of South America to Trinidad. Its operations from Florida crossed the Caribbean by the West Indies and the Antilles and continued on down the east coast of Brazil, serving Rio de Janeiro, Buenos Aires, and Montevideo (until larger planes made the airport inadequate) and all important intermediate cities. Pan American-Grace Airways operated from the Canal Zone south along the west coast of South America to Santiago, Chile, and across the continent to Buenos Aires. Pan American also operated from Seattle to Alaska. It was certificated to operate from San Francisco and Los Angeles to Honolulu, where one branch continued across the Pacific to the Philippine Islands, terminating at Hong Kong and Macau and at Singapore and a second branch went from the Hawaiian Islands to New Zealand. It was also authorized to operate across the Atlantic to London and to Lisbon and Marseilles.

The postwar international air network has not yet been fully determined. The Civil Aeronautics Board has announced its decision only in the *North Atlantic Route Case*.¹⁹ Pan American was extended from London to Calcutta via middle and southeastern Europe.²⁰ American Airlines' subsidiary, American Overseas Airlines (formerly American Export Airlines), is certificated to operate across the stantial government participation, managerial and financial, where there was not

¹⁸ The first transoceanic air transportation services were provided by lighter-than-air aircraft. In 1928, the Germans placed in service the Graf Zeppelin which operated commercially until 1937 when it was retired after the Hindenburg disaster. This was an airship of 3,700,000 cubic feet capacity. The Hindenburg, which was placed in service in 1936, had a capacity of 7,000,000 cubic feet. Since the Lakehurst disaster in May, 1937, when the hydrogen-inflated Hindenburg burned with a loss of thirty-six persons, the rigid airship has been in eclipse. However, in completing some 140 transoceanic trips with passengers, cargo and mail these two German ships not only demonstrated the technical possibilities of lighter-than-air transportation, but they also proved that such air operation could, at that time, be commercially successful.

¹⁹ Docket No. 855. Decided June 1, 1945.

²⁰ It is authorized to serve Belgium, south Germany, Czechoslovakia, Austria, Hungary, Yugoslavia, Rumania, Bulgaria, Turkey, Lebanon, Iraq, Iran, and Afghanistan.

Atlantic via Iceland or Eire, serving northern Europe from London to Moscow.²¹ Transcontinental & Western Air is authorized to operate two routes, one from Foynes and Paris via southern Europe to Cairo, the other from Spain via North Africa to Cairo, and beyond Cairo to Bombay, India.²² Pending cases concern services to Latin America and to Asia and Australia and New Zealand.

The future may be expected to see significant changes in the organization of air-transport services. Domestic air services have thus far been conducted principally by 17 interstate air carriers, all operating as common carriers. These common carriers have functioned also as charter or contract operators for passenger and cargo, and they have indicated a desire to do so in the future. Carriers operating only on a contract or charter basis will increase in number and they may be expected to become a more significant part of the country's air transportation services.

The character of the air services performed may be significantly broadened. The carriers now certificated for domestic operations, with one or two exceptions, either are, or may readily become, trunk-line carriers operating relatively long routes between important cities. In the past, service has commonly been given to all important cities at intervals of roughly 100 miles between stops. The growth in the volume of air travel has permitted the inauguration of express services which, with the availability of large long-range equipment, will encourage direct and nonstop services between the major metropolitan centers. For the future the trunk-line carriers will be offering two types of services: the conventional services between all important cities and direct nonstop express services wherever the traffic volumes justify.

Local services have hardly been explored. A few of the carriers have evolved service patterns which give a kind of "local" service between two not-distant cities. For the most part, however, air travel has not been attractive for distances under 100 or 150 miles except where surface travel has been circuitous or otherwise handicapped. Local services may be devised to conform to different patterns and to serve divergent economic needs. Local services may operate along the route of trunk-line carriers or cross country between major cities served by trunk-line carriers. Such operations may serve as feeder routes to provide long-distance travelers with trunk-line connections and to supply air services between communities where distances are too short to make stops by the trunk-lines economical. Local services may also develop radiating from metropolitan centers, bringing air services to the smaller communities in a market area. Market-area local services will naturally be of greater economic significance where distances are great or where the terrain makes surface transport difficult or expensive. If they are to succeed, local air services must secure suitable and economical equipment to reduce costs and must eliminate the losses of time involved in getting to and from airports.

²¹ Its certificate names Newfoundland, Labrador, Greenland, Iceland, Eire, United Kingdom, Netherlands, Denmark, Norway, Sweden, Finland, Estonia, Latvia, Lithuania, North Germany, Poland and the Soviet Union.

²² Its certificate names Newfoundland, Eire, France, Switzerland, Italy, Greece, Egypt, Palestine, Trans-Jordan, Iraq, Saudi Arabia, Yemen, and Oman; also, Portugal, Spain, Algeria, Tunisia and Libya.

II. ECONOMIC CHARACTERISTICS OF AIR TRANSPORTATION

The most significant single fact to be kept in mind in appraising the future role of air transportation is that this industry has been, and still is, extraordinarily dynamic. If air transportation is to achieve its full economic potential, all decisions of public policy and all arrangements projected by the industry must allow air transport to remain dynamic. Despite the past spectacular achievements of air transportation, both military and commercial, the industry and its art are still at a very early stage in their development. In evolution of equipment, in scope of physical operations, and in economic operating results, change and growth have ever been normal in air transportation. The immediate prospect is for an extremely vigorous expansion of air transportation in which new equipment, new types of services and new operating procedures may be expected.

The record of aircraft development can be briefly illustrated by reference to such characteristics as the size (gross weight), speed, horsepower, capacity (useful load and passenger capacity), and the range of selected land planes used in commercial operations. From the Fokker F-7 to the Lockheed Constellation, the gross weight of commercial land planes increased from 9,700 pounds to 92,000 pounds, an increase of 850 per cent. The increase in useful load was relatively greater—from 2,500 pounds for the Fokker to 36,306 for the Constellation, an increase of 1,350 per cent. The characteristic land plane of 1927 carried 8 passengers; ten years later the Douglas DC-3, the most widely used commercial plane before the war, carried 21 passengers. The Constellation, the most recently developed transport plane now owned by the air lines, can carry 64 passengers. Engine power increased from 660 horsepower for the Fokker F-7 to 9,600 for the Constellation. The Fokker F-7 cruised at 97 miles an hour; the Douglas DC-2 of 1935, at 160 miles per hour; and the Constellation, at 245 miles per hour.²³ Reduced gas consumption per hour per ton of gross weight reflects the improvements in aircraft design, from 9.8 gallons for the Fokker F-10-A of 1928, to 6.7 gallons for the Douglas DC-3, to 5.3 gallons for the Constellation. The increases in range and pay loads have been remarkable. The Fokker F-7 had a range of only 100 miles with a pay load of 1,220 pounds; the Douglas DC-3 has a range of 500 miles with a pay load of 4,430 pounds. The Lockheed Constellation can carry a pay load of approximately 16,000 pounds at a range of 2,500 miles.

The dynamic aspects of air transportation can also be seen in the indices of physical operation since the present regulatory program was adopted.²⁴ Consider first certain indices of service development. The domestic air network expanded by 63 per cent in the route-miles certificated between 1938 and March, 1945. As of

²³ On April 17, 1944, the first Constellation, flying Transcontinental & Western Air's insignia, crossed the continent from Burbank, Calif., to Washington, D. C., 2,400 miles, in just under seven hours. Later in the same year the C-97, the Army's transport version of the Boeing Superfortress B-29, flew non-stop from Seattle to Washington, D. C., in six hours, three minutes, covering the distance of 2,323 miles at an average speed of 384 miles per hour.

²⁴ The period from 1938 to the present is selected because comparable statistics are available for this period only. The figures used in this section are derived from the monthly reports of the carriers to the Civil Aeronautics Board.

the end of March, 1945, there were 64 thousand miles of route certificated, of which 46 thousand were in operation.²⁵

In 1938 the domestic air carriers were operating with an average of 238 planes; the number jumped to 360 in 1941, an increase of 51 per cent. In May of 1942, the Army purchased approximately half of the carriers' planes, reducing the carriers' fleet to 181 for 1942. Thereafter planes were gradually released to the carriers until they were operating 367 as of October 15, 1945. The necessities of war which reduced the carriers' fleets and restricted service patterns were met by increased utilization of equipment. Average daily utilization of aircraft, which had been 6 hours and 4 minutes in 1938, rose to 10 hours and 35 minutes for 1944, a gain of 72 per cent. The average plane traveled 795 miles per day in 1938; it traveled 1,744 in 1944. Moreover, equipment was more heavily loaded: the average revenue load increased from 1,694 pounds in 1938 to 4,122 pounds in 1945. The more spectacular gains in efficiency from the higher utilization of equipment must be regarded as essentially a war phenomenon. Indeed, such utilization with such loadings is not consistent with standards of adequate, satisfactory peacetime service; it represents what is physically possible without regard to whether all who seek service are accommodated. However, these performance figures will be a constant challenge in future operations.

The air-transport industry's record in patronage development has been as significant as in service development. For the twelve months ending March, 1945, the domestic air lines carried 4.5 million passengers, an increase of 369 per cent over 1938. In that twelve months they performed 2,560 million passenger-miles of service, a gain of 422 per cent for the same period. Greater increases were recorded in the volume of mail and express handled—656 per cent and 810 per cent, respectively.

III. THE FUTURE OF AIR TRANSPORTATION

The future economic role of air transportation will depend largely upon its specialized capacity to render a service superior to surface transportation in limited transportation markets. No one expects air transportation to become a serious rival of the private car, the bus, and the motor truck in purely local transportation, although with the development of the helicopter and other planes adapted to the requirements of short-distance operations, the absolute volume of local air transportation may be expected to become quite substantial. Nor does anyone expect air transportation to displace the railroad or the steamship as a carrier of the heavy commodities of the world. In tonnage terms, air transportation will supply a relatively small proportion of the ton-miles and passenger-miles of transportation which the world requires.

What are the characteristics of air transportation which are significant in determining its future sphere of usefulness? In the past, air transportation has emphasized speed as its principal advantage. In the future, air transportation will achieve even greater speeds, which will be more important as the volume of long-distance

²⁵ The wartime shortages of flying equipment forced the suspension of operations on some routes and delayed the inauguration of service on others.

travel, particularly intercontinental travel, increases. It has also offered comfort, personalized attention to the passenger's welfare and convenience, "extras" such as meals and personal service without additional charges, and a certain prestige. In the future, air transportation may be expected to play an extremely important role in supplying transportation to those parts of the world where surface transport is inadequate. By reason of its ability to operate on great-circle routes over sea or land and by reason of its declining costs and high speeds, air transport will frequently be more economical than the alternate means of surface transportation. In the carriage of cargo, air transportation offers advantages in addition to savings in time and availability where surface transportation is lacking; it can provide transportation with fewer handlings and with less danger of breakage or injury from vibration and movement. These advantages will combine to permit certain commodities to move by air which could never move to distant markets by surface carriage.

The future role of air transport depends on both its technical and its economic capabilities. Technically, air transport can not only handle passenger traffic with a speed and flexibility unmatched by other forms of transportation, but it can also handle physically all classes of manufactures and raw materials as the military transport services demonstrated during the war.

In the past, air transport has not always lived up to its schedules: adverse weather conditions have frequently delayed or interrupted flights. However, wartime achievements in radar and improved techniques in traffic control and instrument flying and landing, as well as improved weather information and more reliable aircraft, will enable air transportation to perform safely and reliably according to schedule.

What are the economic potentialities of the air transport industry? What costs and what rates will be typical of future air carrier services? These questions cannot be answered with certainty. There has never been an air-transport operation that constituted an optimum investment of capital and labor or an optimum utilization of capital investment, labor and management, as the economist defines optimum. All air lines have at all times had unused resources of capital, labor or management. Most air lines have operated a relatively small number of planes; much of the time, they have operated relatively few schedules; normally, the technical and managerial staffs have been capable of handling an expanding volume of operations; most carrier route systems, even the most heavily traveled, have been relatively extensive for the volume of traffic carried. Thus no one knows with any precision what air transportation costs should be with existing aircraft, and certainly no one knows what they can become with prospective aircraft. These uncertainties are particularly acute in the overseas operations, for Pan American had only limited experience before the war and that only with flying boats which are being displaced by land planes. Nevertheless, there is some gain in looking briefly at present costs, at their historical trends, and at some relatively informed estimates.

A downward trend in unit operating costs has resulted from both the use of larger and more efficient equipment and the development of a greater volume of

operations. The total operating expenses per available seat-mile declined from 5.88 cents for 1935 to 4.91 cents for 1944. The ten-year period witnessed a marked expansion in the relative volume of passenger traffic and a correspondingly reduced reliance upon mail revenues. In 1935 the domestic industry realized 61 per cent of its revenue from commercial (non-mail) traffic; in 1944 nearly 80 per cent of its revenues came from such sources.

The increased volume of operations has been accompanied by significant reductions in rates. The average revenue per passenger-mile declined from approximately 6 cents in 1932 to 5 cents in 1944. As of mid-1945, the average revenue per passenger mile in domestic air line service was approximately 4.75 cents. Average revenue per pound mile of mail has declined from 1.30 mills for 1935 to 0.33 mills for 1944, and express revenues have declined from 0.32 mills to 0.23 mills.²⁶

Fares in international operations have been considerably higher than in the domestic, but they have begun to decline recently. The most notable reduction in recent months was that made in trans-Atlantic fares by Pan American; the one-way fare from New York to Foynes, which had been \$525, or approximately 15 cents per mile, has been reduced to \$249, or about 7 cents. The new one-way fare from New York to London is \$375. It may be expected that substantial reductions will shortly be made for other international operations.

In considering the possible future level of air line rates, it is necessary to consider both the possible developments in aircraft technology and the developments in air line operational efficiency. The present domestic rates are based almost entirely on operation of the 21-passenger Douglas DC-3.²⁷ Before the war, this plane operated at an average total cost of about 68 cents per mile.²⁸ Its pay-load capacity is about 2½ tons, so that the cost per ton-mile of pay-load capacity was approximately 27 cents. As an indication of the improvement in aircraft technology embodied in the DC-3, it has been estimated that the Ford trimotor, commonly used in air-transport operations in the late 1920's, would have a total operating cost under present air line operating conditions of about 43 cents per ton-mile of pay-load capacity. In other words, during the eight-year interval between the development of these two planes, the cost per ton-mile was reduced by about 40 per cent as a result of aircraft improvements.

Many interrelated variables of aircraft design and performance enter into the determination of operating cost. Taking into account the possible improvements in conventional aircraft, it has been estimated that reduced costs may permit a 30 per cent cut in passenger rates and a 50 per cent cut in cargo rates. These estimates do

²⁶ C.A.B., ANNUAL AIRLINE STATISTICS, 1935-1940 (1940); *id.*, 1938-1942 (1943). See also monthly reports of carriers to C.A.B.

²⁷ As of October 15, 1945, the domestic air line fleet in actual operation consisted of 343 DC-3's, 16 Lockheed Lodestars, 3 Lockheed Electras, and 5 Boeing Stratoliners.

²⁸ This figure includes total air line operating expenses. The figures and most of the other statements contained in this discussion of possible future rates are based upon a series of lectures presented at Princeton University in the spring of 1945 by Dr. Edward Warner, then Vice-Chairman of the Civil Aeronautics Board.

not take into account any radical change in aircraft technology, such as the use of gas turbines, jet propulsion or similar developments.

Reductions in cost can also be achieved through improvements in air line operating efficiency. Economies in direct operation costs can be secured through increased aircraft utilization, joint use of operating facilities, and the like. Reductions can also be effected in indirect unit operating costs by spreading these expenses over an expanded volume of traffic. Cost reductions from both aircraft and air line improvements may, it has been estimated, permit domestic rates to fall to 3 cents per passenger-mile within a few years.

In the future, air transportation may be expected to utilize a variety of new aircraft. The war has stimulated the development of larger planes, more powerful and efficient power plants, and greatly expanded engineering and manufacturing capacities. The war-induced improvements in the conventional types of land planes will dominate air transportation for the immediate future. Much larger and somewhat faster planes will permit bigger pay loads per operation and more ton-miles of service per year.

Some new types of aircraft are in prospect. The helicopter is apparently not to be immediately available as a commercial vehicle. When it is able to carry substantial loads at economical costs, the helicopter will overcome one of the major weaknesses in the air transportation network—the inability of the conventional air services to operate from the business centers of the communities served. The ability of the helicopter to perform terminal services would make air transportation attractive and economical for many traveling two hundred miles or less. Moreover, the helicopter might develop local services to nearby communities, thus invading a field which has been served only by surface carriers.

The glider operating techniques developed during the war may make important contributions to the movement of air cargo. The application of glider technique holds a promise of low-cost transportation to areas where economical surface transportation is lacking.²⁹ Even in countries possessing highly developed transportation systems, the possibility of bringing air transportation to all communities is dependent upon finding new low-cost techniques, perhaps in the use of gliders and air trains.³⁰

²⁹ Only in Europe, the United States and a part of Canada does there exist a transportation network adequate for modern industrial civilization.

³⁰ Glider operations present certain advantages over the conventional operation of the cargo plane for many types of air movement. First, no expensive investment in ground facilities is required. Second, there is very considerable saving in investment. Whereas the powered aircraft of the DC-3 type involves an initial investment of approximately \$120,000, a glider developed by the Army, having a pay-load capacity of 10,000 pounds, can probably be produced for commercial operation at a cost of \$30,000 to \$35,000. This glider can be towed by a DC-3 plane with a loss of only 14 to 18 per cent of its normal cruising speed as the cost of increasing its pay-load capacity from the 3,000 to 3,500 pounds, which the plane itself can carry, to the 10,000 pounds which the glider can handle. Third, important economies in operating cost are available. If the powered airplane operates as the cargo carrier, it spends much of its time on the ground being loaded and unloaded; the use of the same plane as a tug to pick up and deliver loaded gliders permits the powered plane to be utilized a larger number of hours per day, reducing hourly overhead costs as well as direct flying expenses. These economies are estimated by those familiar

What are the future markets which air transportation can hope to serve? Will these markets be extensive enough to permit economical operations?

The future market for scheduled air line transportation will depend on three general classes of factors: the general level of the national income; public acceptance of air transportation from other than an economic standpoint; the competitive position of air transport in relation to competing surface transportation. The first factor is an important element in any market estimate. For present purposes it must be assumed that a high level of production and of national income, approaching full utilization of all resources, will be achieved. The general acceptance of air transportation involves the psychological, as contrasted with the economic, reaction of the public to this medium of travel—the established travel habits of the public which must be overcome before air transportation is fully utilized, and the fear of flying that still prevails among a portion of the traveling public. Both of these psychological deterrents have been greatly reduced by the war's emphasis upon aviation in general and air transportation in particular.

There remains as the primary factor for detailed consideration the competitive economic position of air lines with respect to surface transportation. The possible future level of air line rates has already been considered; it appears reasonable to expect that within the next five years passenger fares may be 3.0-3.5 cents for domestic and 4.0-5.0 cents for international operations, and that airport-to-airport cargo rates may be as low as 15 cents per ton-mile in domestic service and 20 cents in international service.

Considering first the domestic passenger market, the air lines' rates will have to compete with railroad fares which at present average 1.6 cents per mile for coach, and 2.9 cents per mile for Pullman (including berth). It should be borne in mind, however, that the railroad fare on any given trip is computed on a distance which is almost always longer than that of the air line.³¹ It has been estimated that for the country as a whole the average differential between air and surface distances amounts to 15 per cent and that the railroad rates adjusted to air line distances would, therefore, amount to about 1.9 cents for coach and 3.3 cents for Pullman.³² Under the threat of air line competition, the railroads will presumably reduce their present fares. There is little present basis for estimating how great such a reduction may be. However, it may be assumed that the new level of Pullman fares will be somewhat lower than the air fares but that the relative differential between the two will not be as great as in the past.

with glider operations to add up to important savings, making it possible to achieve direct operating costs of 8 to 11 cents per ton-mile or total cost of 13 to 16 cents per ton-mile for cargo operation by glider. Gliders can also be loaded at the point of origin without the necessity of antecedent highway or rail carriage and delivered direct to destination, thus eliminating other transportation costs. The more careful handling of glider cargo—less hasty loading, fewer handlings, and almost complete absence of vibration—will eliminate some of the hazards of breakage and spoilage.

³¹ Even under the existing fare structure, there are a number of routes where, due to the circuitry of the railroad route, the air line fare is lower than the Pullman fare.

³² Edward P. Warner, *Where Next* (Sept. 1944) 2 AIR TRANSPORT 32.

On the above assumptions, it is reasonable to expect that the air lines will early divert from surface carriers approximately 75 per cent of Pullman traffic moving distances of over 500 miles, a smaller percentage, perhaps about 30 per cent, of coach traffic moving a like distance, possibly 50 per cent of Pullman traffic traveling between 100 and 500 miles, and 15 per cent of coach travel between 100 and 500 miles. For trips of less than 100 miles, air transportation is not in a favorable competitive position. Until some experience has been obtained in local service operations, it is difficult to foresee how much of this traffic may be diverted. More important than the traffic diverted from surface common carriers will be the new traffic, business and recreational, that will be created as a result of the savings in time and costs which air travel will permit. Many trips which would not be made at all by surface transportation will in the future be made by air, particularly if fares are reduced to the levels expected. Taking into account both diverted and newly developed traffic, it has been estimated that the postwar volume of domestic air transportation will amount to 5.5 billion passenger miles per year if the present differential between air and rail fares remains. This compares with a prewar volume of some 1.5 billion passenger miles. It was further estimated that postwar air traffic might be increased to 11 billion passenger miles if air line rates are brought to equality with Pullman fares, and to 24 billion passenger miles if they are lowered to the level of coach fares.³³

Postwar improvements in the quality of service will probably favor the railroads. The air lines have been rendering a luxury service, and although new and larger equipment will make possible certain improvements, these improvement will not represent any radical change in their service. In fact, the air lines will presumably develop a low-fare, "coach" type of service to supplement their existing service. The railroads, on the other hand, have a considerable opportunity to improve the quality of their service. To the extent that the difference in quality of service between the air lines and the railroads is narrowed, the above estimates of postwar air line traffic may prove to be somewhat overstated.

In the foreign field, the competitive relationships between air and surface carriers will differ considerably from that in domestic operations. The longer distances involved and the low speed of surface carriers give air carriers an enormous time advantage. Furthermore, the cost of first-class accommodations by ship has been, and will very likely continue to be, quite high. In addition to a substantial diversion of first-class and cabin-class traffic from the steamships, it is certain that air transport will create a large amount of new traffic. According to one of the more conservative estimates,³⁴ the international passenger traffic carried by United States carriers by the fifth postwar year will amount to approximately 115 million passenger-miles.

In the cargo field, the air carriers are in a far less favorable competitive position. Their primary advantage, speed, is relatively unimportant for most commodities,

³³ Warner, *op. cit. supra* note 32.

³⁴ McDONALD AND DREW, AIR TRANSPORTATION IN THE IMMEDIATE POST-WAR PERIOD (Curtiss-Wright Corp., 1944) 18.

while their greatest disadvantage, high cost, is of prime importance. The railroads are able to haul carload freight at less than one cent per ton-mile, less-than-carload freight at 4-5 cents, and express at 12-15 cents. If, as seems likely, the air rates cannot be brought below 15 cents per ton-mile (airport-to-airport) in the immediate future, the airlines can expect to secure only a part of the express traffic, little of the less-than-carload freight, and practically none of the carload freight. It has been estimated that, at an airport-to-airport rate of 15 cents per ton-mile, the total domestic air cargo might amount to 100 million ton-miles per year.³⁵ While this would represent a thirty-fold increase over the volume handled in 1940, it would still represent only one-hundredth of one per cent of the total domestic cargo transportation handled by all forms of transportation in that year.

In international cargo operations, a number of partially offsetting factors affect the competitive position of air carriers. The cargo rates by steamship are extremely low, averaging less than a cent per ton-mile. Moreover, the cargo moving in foreign trade is preponderantly of a nature that is not suited to air shipment. On the other hand, air carriers in this field benefit from the very great saving of time, both relative and absolute, in comparison with slow water transportation. For those classes of cargo for which time is important, the relative advantage of air shipment internationally will be correspondingly greater than it is domestically. In fact, certain products, such as newspapers, news-magazines, and the like, which might have virtually no market in distant countries if moved by surface transport, may move in substantial quantities by air. It has been estimated that the volume of international air cargo handled by United States carriers by 1950 might amount to about 25 million ton-miles.³⁶

The above estimates of future markets relate solely to scheduled air transportation of a trunk-line nature. Other forms of commercial aviation will include feeder services, non-scheduled services (both common and contract carrier), and miscellaneous commercial operations (such as aerial photography, crop dusting, et cetera). It is impossible to predict the volume of such operations. The estimates for scheduled air transportation, although subject to a considerable margin of error, are at least based upon a past air line market and a past ground transportation market, both of which are known. In contrast, there are practically no data available regarding the past, present, or future extent and nature of other types of air operations. There is no doubt that these new aviation operations will experience a considerable growth. Some, such as feeder air lines, will be largely of an experimental nature for a number of years. All will be stimulated by the return of servicemen trained in aviation and seeking opportunities in civil aviation.

Few phases of aviation have been the subject of as many and as varied predictions as has private flying. While there can be no doubt that this market will expand greatly over prewar levels it will for some time continue to be limited by high costs, low utility, and the relatively high degree of skill required.

³⁵ Warner, *op. cit. supra* note 32.

³⁶ McDONALD AND DREW, *op. cit. supra* note 34, at 20.

There is no assurance that air transportation will be allowed to perform all services that are within its technical capacity. Only if the economic, legal and political frameworks within which air commerce operates are properly designed, will air transport be able to realize its full potential of public service. Like all new services, the success of air transport threatens an encroachment on markets occupied by other enterprises, and hence its progress meets opposition which, if effective, may suppress or distort the economic development of air transport.

Political obstacles to the full development of air transportation are significant chiefly in international air commerce. International air transport has never been simply private or commercial enterprise. International aviation developed with the generous support of the interested governments in the provision of facilities, the investment of capital and the payment of subsidies. The investment capital of many international carriers has been largely contributed by governments.³⁷ The payment of subsidies has taken many forms and their amounts are extremely difficult to estimate. The continuance of subsidy payments year after year before the war reflected the policy of continuous expansion of air routes and services.³⁸ Indeed, in the pre-war years, international air lines were essentially instruments of national policy—operating to enhance the prestige of the flag they carried, and to bind colonial and dominion areas more closely to the home country. To be able to conduct such operations without regard to commercial considerations of profits was sometimes considered a source of strength.³⁹

Before the war the doctrine of the national sovereignty of the air was used to further the development of a nation's airlines, international and domestic, by excluding the carriers of other nations from access to its territory or by granting access only in exchange for concessions to its air carriers. By a system of bilateral air treaties, air commerce was restrained and curtailed quite as much as it was encouraged and promoted.

To win for the air commerce of all nations a new charter of international freedom, the United States called an international civil aviation conference at Chicago

³⁷ British Overseas Airways Corporation, Trans-Canada Airlines, the Dutch Koninklijke Luchtvaart Maatschappij (KLM), and Ala Littoria are (or were) entirely owned by their respective governments. The Swedish Aktiebolaget Aerotransport (ABA), Air France, and the Belgian SABENA are, and the German Lufthansa was, largely governmentally owned. South African Airways is operated directly by a department of the Union of South Africa, and Aeroflot is the air transport organization of the Soviet Union.

³⁸ The subsidies paid are not always an outright grant; certain services are commonly exacted in return. The gross payments to United States air lines for the carriage of domestic and international mail are sometimes classified (in foreign publications usually) as subsidies. This is, of course, erroneous, as substantial services in the carriage of the mail have been performed by United States carriers. Indeed, it is significant that from 1926 to 1944, the aggregate postage revenue from air mail exceeded the aggregate payment to air carriers, domestic and international, by more than \$25,000,000.

³⁹ In the debate in the House of Lords on the bill to create the British Overseas Airways Corporation, the following significant statement was made:

"In our view, a non-profit-making public corporation, set up by statute, will offer greater possibilities of advancing British civil aviation than a limited-liability company, which must, of course, quite properly watch its shareholders' interest and also be sure of its subsidiaries and contracts before it can embark on a farsighted development programme for the operation of new air services with up-to-date and increasingly costly aircraft." 114 HOUSE OF LORDS, PARLIAMENTARY DEBATES (1939) 737.

in September of 1944. The conference achieved significant progress in providing an intergovernmental aeronautical organization (the Provisional International Civil Aviation Organization) and in providing for the formulation of recommended standards and practices relating to the technical aspects of civil aviation. However, the conference was not equally successful in securing universal operating rights for all international carriers. The United States proposed that unrestricted transit, landing and commercial rights be available to the air lines of all signatory powers. The proposal was opposed by a number of nations out of fear that a multiplication of services and keenness of competition would prevent them from securing their share of the international air commerce.

The conference drew up an Air Transit Agreement granting rights of transit and rights of non-traffic stops to the air lines of all signatories, and this agreement has been accepted by 21 countries.⁴⁰ The Air Transport Agreement formulated by the Conference would grant to the air lines of each signatory the right to engage in air commerce between the home country and the country of each signatory, and also the right to engage in air commerce between any two signatory countries on a reasonably direct route to or from the home country. The Air Transport Agreement has been accepted without qualification by only 8 countries;⁴¹ it has been accepted by one country with restrictions on the carriage of traffic other than that to or from the home country.⁴² Thus, in all essential aspects of securing international commercial traffic rights, air transportation is dependent, as it was before the war, upon the conclusion of bilateral agreements. It is, therefore, necessary to take note of certain national policies which are not completely compatible with the fullest development of commercial aviation.

The gravest political threat to commercial aviation is that nationalism which seeks to secure a predetermined quota of international air travel, not by seeking to make its carriers efficient in international competition, but by imposing artificial restraints on the right of foreign air lines to carry certain categories of traffic, the quantum of service to be provided, or the rates to be charged. These policies are consistent only with a determination to use air transportation as an instrument of national policy irrespective of economic principles or commercial considerations.

The economic obstacles to the full development of air transportation are important for both domestic and international aviation. They may be classified under a variety of headings as—restraints of a cartel character, the impairment of incentives to service and patronage development, problems of financing and capital investment, oppressive taxation, and obstructive and uneconomic regulatory policies.

Restraints of a cartel character are an immediate danger in the international field,

⁴⁰ As of November 1, 1945, the following countries had accepted this agreement: Afghanistan, Australia, Belgium, Canada, Czechoslovakia, El Salvador, Ethiopia, Greece, India, Iraq, Liberia, Netherlands, New Zealand, Norway, Paraguay, Poland, Spain, Switzerland, Turkey, the United Kingdom, and the United States.

⁴¹ As of November 1, 1945, the following countries had accepted this agreement: Afghanistan, China, El Salvador, Ethiopia, Liberia, Netherlands, Paraguay, United States.

⁴² Turkey.

but they may not be ignored in domestic air transportation. In prewar Europe, commercial aviation operated subject to a system of private control which eliminated virtually all rate competition. In conjunction with meetings of the schedule committee of the International Air Transport Association (IATA), the representatives of the carriers maintained understandings or agreements as to the rates to be charged by their air lines. These agreements were further supported by a series of pooling arrangements governing most of the important European routes.

If air transportation is to attain its full potential, the industry must be free from restraints which prevent progressive operators from introducing new services, reducing rates in order to develop new markets, or increasing volume to achieve lower unit cost. A consideration of the control of rates by cartel agreement will illustrate the danger. Where rates are established by agreement among several operators, there is a virtual certainty that the rates will be high enough to permit the survival of even the high-cost operators. Even though more efficient operators may be deriving profits which are excessive for a common carrier enterprise, experience indicates that cartels seldom consent to rate reductions that would reduce immediate profits. Thus, the inefficient are protected and perpetuated in the industry, and the efficient and progressive are prevented from developing their full capacity to serve the public. Incentives to improve efficiency are dulled and incentives to develop the market, except on a cooperative basis by the cartel group, which is usually ineffective, are destroyed.

In the appraisal of such cartel practices, it must be remembered that aviation is, and must continue to be, a dynamic industry. It is, therefore, essential that the more progressive operators be free from all private restraints, that the efficient air lines have every opportunity to improve their operations, and that every reduction in cost be translated into rate reductions which will bring new strata of users into the air-transport market. A new service in a new market must even be priced at times below current costs in order to obtain the large-volume operations which will make possible substantial reductions in unit costs. In a truly competitive industry, there will almost always be a saving minority of progressive leaders who, by radical innovations in operations and bold reductions in prices, demonstrate to the majority that new peaks of prosperity for the entire industry lie in the creation of larger and more stable markets.⁴³

⁴³ It may be noted that cartel restrictions seldom lead to large profits when there are *many* operators in the industry. Most operators are then unable to obtain optimum volume and lowest unit cost; prospective profits are dissipated in carrying operating and administrative overhead. Unless the cartel controls extend to all aspects of the business—the types of equipment used, the quantum of service offered, the nature of ancillary services (meals, stewards, free baggage, et cetera), and the solicitation of business—competition is directed into uneconomic channels which absorb carrier income but which are of no significant benefit to the users of the service. In fact, the competitive development of the market is incompatible with the fundamental *raison d'être* of cartels; in a highly developed cartel agreement all such manifestations of competition are rigidly eliminated. But if competition does exist, it takes the form of advertising, traffic solicitation, the provision of luxury equipment, the offering of “extras” in service, or the operation of more frequent schedules. Such competition increases costs; it may divert traffic from one carrier to another; it can scarcely increase the total volume of business significantly, for only rate reductions can do that. The net result is that costs are held well above competitive levels;

The absence of incentives to service and patronage development can be fatal to the promise of air transportation. Attention has already been directed to the very small percentage of public transportation provided by air carriers. A vast expansion in the amount of service provided, by new route extensions, by more frequent schedules, by the use of larger and faster planes, and by the offering of new types of service, must be accomplished if air transportation is to occupy its destined position in the national and international economy.

The incentives to service and patronage development are to be found primarily in vigorous competition. Competition is the foundation of that freedom of managerial decision which is basic if technical progress is to be exploited. Only the possibility of larger immediate profits will encourage monopolistic management to experiment with the promotional effects of rate reductions; however, in the presence of competition, no operator dare postpone the introduction of improved methods lest he fall behind in the competitive race.

Many developments could destroy the incentives to service and patronage development. The alliance of air carriers with, or their subordination to, interests having conflicting allegiances could do so. If air transport enterprises were merely departments in integrated transportation corporations operating rail, highway and air services, the large committed investment in these other forms of transport would certainly create incentives to suppress rather than encourage the development of air transportation. If individual air-transport companies become too large and too complex, the managerial caution of the overgrown enterprise will largely destroy the incentives and the willingness to take risks which are essential to progress. Likewise, if the industry becomes overcapitalized or overburdened with fixed charges, the incentives to develop are impaired by considerations of caution and the necessity of avoiding risks. If regulations should seek rigidly and immediately to balance all increases in efficiency profits with rate reductions, incentives would be impaired. It should be recognized that free competition operates at both ends of the scale, that the necessity of avoiding losses is quite as impelling a motive as the desire for large profits, and that competitive pressures combined with the opportunity for profit provide the most effective incentives for service and patronage development.⁴⁴

Unsound developments in the financing of air carriers or in their capital structures could easily blight the promise of the air-transport industry. For many years, capital requirements will remain large, not only to provide for the expansion of

rates and charges are held at monopoly level; profits are held at *competitive rates* but the total *amount* of profit is usually substantially less than would be realized in the absence of cartel restriction on rates. The users of the service and the investors are both the losers. The only way *some* investors can profit is through the elimination of other investors by the liquidation of some of the operators.

⁴⁴It may be noted that the incentives to develop service and to attain maximum efficiency in operation may be undermined in the presence of government operation or where the government undertakes to provide the capital for the enterprise. Also the adoption of the so-called "chosen instrument" policy, granting a monopoly or a series of monopolies to non-competitive national airlines, has not been associated with the most vigorous development of air transportation in those countries where it has been tried. These factors are certainly significant in understanding the eagerness with which European operators have embraced the cartel philosophy and entered into pooling arrangements.

service, extensively and intensively, but also to finance larger and more costly equipment. To assure an adequate supply of capital, the industry must avoid debt financing with its fixed charges and must continue to maintain a favorable relation between net investment and total capitalization. It must be recognized that transportation markets generally are sensitive to the business cycle and business depressions and that air transportation in particular, serving primarily a passenger market, and the high-priced luxury section of that market, will be peculiarly sensitive to general business depression.⁴⁵ Therefore, even contingent charges such as an accumulation of unpaid dividends on preferred stocks could have serious adverse effects on a carrier's ability to attract capital, and any substantial amount of fixed charges could precipitate bankruptcy. Therefore, air carriers, and especially international air carriers,⁴⁶ should adhere to a capital structure composed of a single class of common stock.

Air carriers operate under the jurisdiction of many governments, state and national. They are, therefore, subject to many taxing authorities and are continually exposed to multiple taxation. After an exhaustive study of the multiple taxation of interstate air commerce, the Civil Aeronautics Board reported to the Congress on April 3, 1945, recommending enactment of legislation to provide for the equitable allocation of the several tax bases among the states in which interstate air carriers do business.⁴⁷ The Board also reported that "taxation of aviation fuel by the States threatens to impede the development of air transportation," and recommended that steps should be taken "to protect interstate commerce from burdensome and discriminatory State aviation-fuel taxes." Multiple taxation can be even more oppressive and critical for international carriers, and here the adoption of an allocation procedure is hardly a feasible solution. Only by bilateral treaties, or a multilateral convention, granting reciprocal exemption from taxation for foreign air lines, making each international carrier taxable only in its home country, can international aviation be protected from multiple international taxation.

Government regulation can greatly advance the prospects of air transportation or it can adversely affect the realization by air transportation of its full service potential. Regulation should be positive, rather than negative, and should be based upon performance yardsticks or standards that will stimulate efficiency in management and economical operations. The chief dangers are twofold: (1) that regulation will fail to provide that measure of competition which will assure that each and every

⁴⁵ Air transportation has never experienced the full impact of a depression. Throughout the thirties, secular growth overshadowed cyclical influences. Moreover, the carriers could rely upon mail payments to keep them in operation. With the expansion of the industry, mail payments have become a progressively smaller proportion of earnings until most carriers have reached a size where no practicable increase in mail payments could offset the decline in commercial revenues attendant on a general depression.

⁴⁶ These considerations are doubly important in international operations: international operations are more costly than domestic, and international travel is more sensitive to general business depression; also many of the foreign competitors operate with government capital and can be indifferent as to whether or not anything more than operating cost is realized.

⁴⁷ C.A.B., MULTIPLE TAXATION OF AIR COMMERCE, H. DOC. 141, 76th Cong., 1st Sess. (1945).

operator will be under competitive pressures to achieve maximum efficiency in operation and that no operator will be in a position to rest secure in the exploitation of a monopoly market, and (2) that positive standards of performance will guide the regulatory authorities in disposing of the issues which come before them. A substantial measure of competition is essential because no external regulatory authority can by its unaided efforts assure maximum efficiency in operations; there is always an incalculable, perhaps insuperable, inertia which any management can oppose to unwelcome suggestions by a regulatory authority. The sanctions available to the regulatory authority—reducing rates, terminating certificates and the like—are often so drastic in their consequences, so adverse to the interest of the consuming public, that they can seldom be used. Normally, of course, the management of regulated industries willingly comply with suggestions and orders from the regulatory authority. If the regulatory authorities supply leadership and insight and if they develop and use performance yardsticks which objectively measure the attainments of the several regulated enterprises, it can be expected that the regulatory body will be an important factor in the achievements of the industry. However, even the availability of objective performance yardsticks and standards depends in large measure upon the existence of competing organizations operating under conditions sufficiently comparable to make the experience of one enterprise a yardstick for judging the performance of another. If there are also direct competitive incentives to improve service, to develop patronage, to reduce costs and rates, the public can be assured that regulation is an aid to the progress of the industry.

In summary, the future role of air transportation cannot be reduced to a blueprint or to a statistical chart. The possibilities of technical advances cannot even be foreseen, much less measured. The role of air transportation today will certainly not be its role ten years hence. Only by recognizing its inherent dynamic character, only by the preservation of economic and legal frameworks that are compatible with a growing and technically evolving industry, can the public be assured that air transportation will provide the public service of which it is capable.