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REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

LM101780

Lower Airline Costs Per Passenger Are Possible In The United States And Could Result In Lower Fares

Civil Aeronautics Board

Airlines in the United States regulated by the Civil Aeronautics Board could have operated at a lower total cost per passenger than they did from 1969 to 1974, and passenger fares could have been lower as a result. GAO estimates that travelers could have saved over a billion dollars annually if regulated airlines had operated with characteristics of less regulated airlines.

Accordingly, GAO recommends that two things be done:

- The Civil Aeronautics Board should work toward improving airline efficiency under existing legislation.
- The Congress should provide the Civil Aeronautics Board legislative guidance defining current national objectives for air transportation and the extent to which increased competition should be used to achieve those objectives.

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-182682

To the President of the Senate and the
Speaker of the House of Representatives

This is our analysis, update, and extension of Dr. Theodore E. Keeler's study entitled "Airline Regulation and Market Performance." It was requested by the Chairman, Subcommittee on Administrative Practice and Procedure, Senate Committee on the Judiciary, and is being sent to the Congress because of its interest in the effectiveness of economic regulation of air transportation.

We are sending copies of this report to the Director, Office of Management and Budget, and the Chairman, Civil Aeronautics Board.

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

LOWER AIRLINE COSTS PER PASSENGER ARE POSSIBLE IN THE UNITED STATES AND COULD RESULT IN LOWER FARES

D I G E S T

The Chairman, Senate Subcommittee on Administrative Practice and Procedure, asked GAO to review a study comparing airline fares regulated by the Civil Aeronautics Board in 1969 with estimates of fares the airline industry might have charged had it not been regulated.

The study was published in 1972 by Dr. Theodore E. Keeler, Professor of Economics, University of California (Berkeley) and is referred to in this digest as the Keeler study.

The Keeler study estimated that unregulated airline fares were lower than the Board-regulated fares, and Dr. Keeler attributed this to lack of price competition and too much service competition--primarily in the form of frequent flights.

GAO was asked to

--determine the validity of the Keeler study results,

--extend the results to an annual national estimate,

--update results to cover the 6 years from 1969 to 1974,

--identify the critical assumptions in the study, and

--determine the influence each assumption has on the study results.

The Keeler study attempted to determine the effects of domestic airline regulation. It estimated what fares would have been on a number of busy routes if the airlines were less regulated and compared those fares with fares actually charged by the regulated trunk airlines. GAO found Dr. Keeler's assumptions and methods generally valid and with some modifications, used them to estimate the annual effect a less regulated airline industry might have had in the long run on air travelers, airline fares, and airline revenues from 1969 to 1974.

Both GAO and Dr. Keeler assumed a less regulated airline industry would allow

--new and existing airlines to more freely enter or leave particular markets (flights between two cities);

--airlines to raise or lower fares largely at their own discretion; and,

--easier creation and certification of new airlines.

During the 1969-74 period covered by GAO's review the regulated domestic trunk airlines, representing nearly 90 percent of all domestic passenger services, included:

American Airlines	Delta Airlines
Eastern Airlines	National Airlines
Trans World Airlines	Northeast Airlines 1/
United Airlines	Northwest Airlines
Braniff Airways	Pan American World Airways
Continential Airlines	Western Airlines

FARES WOULD HAVE BEEN LOWER

GAO's analysis showed that for 1969-74:

--Less regulated airlines would probably have charged lower first-class and coach fares.

--Nationally, actual fares exceeded estimated fares by an annual average of 22 to 52 percent; in dollar terms, if airlines had been less regulated during 1969-74,

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1/Northeast merged with Delta on August 1, 1972.

passengers would have saved on the order of $1.4 billion to $1.8 billion, annually.

--To the extent lower fares would have induced increased air travel, the savings would have been even higher. (See p. 12.)

--While passengers on the average would have paid lower fares, they would have been required to give up certain conveniences the regulated airlines now provide. For example, some flights would have been more crowded, and fewer flights might have been provided on some routes. (See p. 14.)

Because GAO's study was based on assumptions about the characteristics that would occur in a less regulated airline industry over the long run, the estimates of savings should not be considered exact, but rather an indication of the magnitude of annual savings possible after a period of adjustment. The report also shows the individual effects of the most important assumptions. (See ch. 3.)

The Board has recognized that inefficiency exists in domestic trunk airline operations and has attempted to reduce it by applying more rigorous standards in its rate-setting proceedings. The magnitude of the difference between fares charged by the regulated trunk airlines and GAO's estimates of what less regulated airlines would have charged appears to have gone down, but it remains large.

The Board has concluded that the present form of economic regulation of the airline industry no longer serves the public interest and that increased competition would result in a better match between the kinds of airline service desired by travelers and available from the airlines.

The Board believes that under its existing legislation it could bring about some changes which would result in increased competition, but that such a fundamental change in the approach to regulating air transportation should be legislated by the Congress.

GAO's study offers reliable evidence that airlines could have operated profitably at a lower cost per passenger from 1969 to 1974, resulting in lower fares and therefore substantial savings to travelers. These results could have been achieved mainly by

--putting more seats on each aircraft;

--filling more of the seats available on each flight;

--increasing the average annual use of aircraft; and,

--using some of the more efficient aircraft available.

The airlines could have charged lower fares and, at the same time, maintained average annual rates of return on investment comparable to those of the entire corporate sector.

Although it finds the arguments for greater reliance on a more competitive market persuasive, GAO believes its study does not answer a number of questions about what might happen if the form of airline regulation were changed or if regulation were abandoned completely.

GAO recommends that the Board continue to work toward improving airline efficiency under its existing legislation by emphasizing the factors identified in this report and by increasing its reliance on competition to determine service and prices.

GAO also recommends that as part of its current reexamination of the need for economic regulation of the airline industry the Congress should provide the Board legislative guidance defining current national objectives for air transportation and the extent to which increased competition should be used to achieve those objectives.

The Board and the Congress should allow for reasonable transition periods to avoid undue disruption of the air transportation system.

GAO solicited comments on this report from a number of interested Federal agencies and experts. In general, they agreed with the premise that increased competition would result in more efficient airline operations, but suggested a number of ways in which the analysis could be improved. GAO modified its analysis to incorporate suggestions where they would improve the study results. (See ch. 4 and app. XVII.)

Contents

ABBREVIATIONS

CAB	Civil Aeronautics Board
DPFI	Domestic Passenger Fare Investigation
GAO	General Accounting Office
IRS	Internal Revenue Service
RPM	revenue passenger miles

CHAPTER 1

INTRODUCTION

The Chairman, Subcommittee on Administrative Practice and Procedure, Senate Committee on the Judiciary, asked us to review a 1972 study entitled "Airline Regulation and Market Performance." The study, authored by Dr. Theodore E. Keeler,

--compared fares regulated by the Civil Aeronautics Board (CAB) with estimated fares computed on the basis of certain assumptions (discussed in detail in ch. 2) about the way the airline industry would operate if it were not regulated,

--found the estimates of the deregulated airline fares were significantly lower, and

--attributed the higher fares in the CAB-regulated industry to lack of price competition and an excess of service-quality competition--primarily in the form of more frequent flights--fostered by CAB regulation.

We were asked to (1) determine the validity of the study results, (2) extend the results to annual national estimates for the years 1969-74, (3) identify the critical assumptions in the study, and (4) determine the influence each assumption has on the study results. As part of our review, we considered comments and analyses of the study and, where appropriate, altered assumptions and methods to eliminate problems.

BACKGROUND

CAB is a five-member board created by the 1938 Civil Aeronautics Act. This act subjected U.S. interstate airlines to CAB's direct economic regulation. CAB's powers and duties were reiterated by the Federal Aviation Act of 1958, which directs CAB to consider the following, among other things, as being in the public interest and in accordance with the public convenience and necessity.

1. Encouraging and developing a U.S. air transportation system properly adapted to the present and future needs of the foreign and domestic commerce of the United States, Postal Service, and national defense.

2. Regulating air transportation to recognize and preserve the inherent advantages, assure the highest degree of safety, and foster sound economic conditions and to improve the relations between, and coordinate transportation by, air carriers.

3. Promoting adequate, economical, and efficient service by air carriers at reasonable charges without unjust discriminations, undue preferences or advantages, or unfair destructive competitive practices.

4. Encouraging competition to assure the sound development of an air-transportation system properly adapted to the needs of the foreign and domestic commerce of the United States, Postal Service, and national defense.

5. Promoting air commerce safety.

6. Promoting, encouraging, and developing civil aeronautics.

CAB carries out these duties by among other things, controlling competition in the airline industry. To provide service between two points, an interstate airline must have a specific grant of authority from CAB to serve each point and not be prohibited from providing direct service between the points. This authority, or certificate, requires the airline to provide a minimum level of service that can be discontinued only with CAB approval. CAB determines how many airlines can operate between two points (often referred to as a route or as a city-pair market) and thereby determines whether there will be competition. Similarly, CAB must approve the rates an interstate airline charges between each of its city-pair markets. CAB's regulation of fare increases and decreases has generally resulted in the interstate airlines charging essentially the same fares on the routes where they compete.

CAB-regulated airlines

In 1974 there were 11 trunk airlines and 8 local service airlines. From 1938 to 1974, CAB-regulated airlines (including domestic and international air service) increased overall operating revenues from slightly under $76 million to nearly $15 billion. During the same period, revenues from the domestic operations of the domestic trunk airlines grew from $56 million to nearly $10 billion. Over the same period, travel on the CAB-regulated airlines grew from 755 million revenue passenger-miles (RPM) in 1939 to nearly 230 times that much by 1974, 174 billion RPM. That portion of the travel produced by the domestic operations of the domestic trunk airlines grew from 680 million RPM in 1939 to 121 billion RPM in 1974.

During the 1969-74 period covered by this review, the domestic trunk airlines as classified by CAB included:

American Airlines	Delta Airlines
Eastern Airlines	National Airlines
Trans World Airlines	Northeast Airlines1/
United Airlines	Northwest Airlines
Braniff Airways	Pan American World Airways
Continental Airlines	Western Airlines

As shown below, scheduled domestic operations of the domestic trunk airlines accounted for 88 to 90 percent of domestic passenger operations during 1969-74--both in terms of overall capacity (available seat-miles) and capacity used (revenue passenger-miles).

	Total domestic passenger operations of U.S. certificated carriers		Scheduled domestic operations of domestic trunk airlines as a percentage of total domestic passenger operations by certificated carriers	
Years	Available seat-miles	Revenue passenger-miles	Available seat-miles	Revenue passenger-miles
	(billions)			
1969	212.7	108.5	89.4	88.1
1970	218.0	108.4	89.0	88.4
1971	225.8	109.8	89.7	89.2
1972	231.4	121.8	89.6	88.9
1973	250.0	130.4	88.9	88.6
1974	239.0	133.7	88.4	88.1

1/Northeast merged with Delta on 8/1/72.

Intrastate air markets

A few airlines operate only within a single State and, therefore, are not regulated by CAB. These include Pacific Southwest Airways and Air California operating in California and Southwest Airlines operating in Texas. All three of these airlines compete with CAB-regulated airlines using the same or similar large aircraft over at least part of their route system and have often offered lower fares and more frequent service than the CAB-regulated airlines.

In his study, Dr. Keeler assumed that because the California intrastate airlines were not regulated by CAB and because their State regulatory agencies were less restrictive than CAB in some periods, some of their experience should provide a good approximation of what airlines would do in a less regulated environment. 1/ He therefore used Pacific Southwest Airways' operating experience during the early 1960s to adjust the operating and cost experience of the trunk airlines to estimate what unregulated fares would be in various city-pair markets. For each of the 30 markets he examined, Dr. Keeler estimated the fare the airlines would have to charge to cover all costs per flight, including a reasonable pretax rate of return on capital. A reasonable rate of return is defined to be the longrun average rate earned by all corporations. Dr. Keeler's estimated fares were lower than the airlines' published fares, and he attributed the difference to CAB's regulation of competition. (A more detailed description of the study method can be found in app. II.)

Airline safety

Airline safety is the Federal Aviation Administration's responsibility. The Aviation Administration maintains the airways and certifies aircraft, pilots, mechanics, and airports, whether or not they are subject to CAB regulation. Empirical studies indicate economic regulation has little effect on airline safety and show

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1/Dr. Keeler's report was completed in 1972 shortly after Southwest Airlines began operations in the Texas intrastate market. He felt he was not able to consider the Texas intrastate airline experience with the same confidence he had for Pacific Southwest Airways.

no correlation between fatality rates and profits. Both the Air Transport Association--a trade organization representing the domestic airline industry--and the Department of Transportation have agreed that the problem of safety argues neither for nor against economic regulation of the airlines.

SCOPE

Dr. Keeler set out to determine the effects of domestic airline regulation by estimating what fares would be if the airlines were unregulated and comparing those fares with fares actually charged by the regulated airlines. Our purpose was to determine whether his assumptions and methods were valid and, if so, extend them to estimate the annual effect a less regulated airline industry might have had on air traveler savings, air travel, airline fares, and airline revenue from 1969-74. In Dr. Keeler's study and this adaptation a less regulated airline industry was represented by modifying annual trunk airline cost and operating characteristics to incorporate some of the most cost-influential airline characteristics as they might have evolved over the long run in a less regulated environment. The portion of the airline industry addressed was the scheduled domestic passenger operations of the domestic trunk airlines, representing nearly 90 percent of all domestic passenger operations. We assumed a less regulated airline industry would have included (1) unhindered entry into or exit from the industry, (2) freedom for airlines to choose the markets they wished to serve and the manner in which they provided the service (a market is a route between city-pairs), and (3) freedom for airlines to establish whatever fares they wished.

As requested, we validated, modified, extended, and updated Dr. Keeler's study. In particular, we repeated Dr. Keeler's study to determine the validity of its results. Using Dr. Keeler's input data and methods for estimating costs, we found the same results Dr. Keeler reported. However, in the process of reconstructing his cost model, we encountered some statistical techniques that suggested modification or replacement of a portion of the model. A more detailed explanation of the study's assumptions and methods and our modification is contained in appendixes I, II, and III.

We asked CAB, the Department of Transportation, the Department of Commerce, and various experts, including Dr. Keeler, to comment on a draft of this study. Where the comments were valid we modified assumptions and methods. The comments and modifications are discussed in detail in chapter 4.

As requested by the Subcommittee, we extended Dr. Keeler's study to include annual estimates of a number of national-level and market-level characteristics of the domestic scheduled operations of the domestic trunk airlines for 1969-74 (see ch. 2). These characteristics include: fares in city-pair markets served by less regulated airlines, industry-wide savings to passengers, average by which actual fares exceeded fares for less regulated airlines operating at lower costs per passenger, increases in domestic air travel that might result from the generally lower fares, and airline revenues resulting from the estimated fares and increased air travel. The most important assumptions were identified and the individual effect of each was calculated. (See ch. 3.)

CHAPTER 2

INCREASED AIRLINE EFFICIENCY COULD MEAN

LARGE SAVINGS TO PASSENGERS

In his study "Airline Regulation and Market Performance," Dr. Keeler computed the difference between published 1969 air fares and his estimated unregulated (cost-based) fares--defined as fares which might have existed if airlines were not regulated. His basis for estimating fares for unregulated airlines was the 1967-69 cost experience of CAB-regulated trunk airlines modified to incorporate (1) efficiencies achieved in the 1960s by the less-regulated California intrastate airlines, particularly Pacific Southwest Airways, (2) some efficiencies demonstrated by the trunk airlines, and (3) some of the longrun characteristics of a fully competitive industry. The study estimated nonstop unregulated (cost-based) fares for 30 high-density routes served by CAB-regulated airlines. Dr. Keeler compared these fares with published fares and found that published air fares for these routes ranged from 20 to 95 percent higher than those which might have existed if the routes were flown by airlines with certain efficiencies and other properties Dr. Keeler believed characterized a fully competitive airline industry in the long run.

Our review of the study disclosed instances where either its methods or the assumptions could be improved. For example, the analysis compared estimated fares to 1969 published fares for 30 high-density routes whereas it could have been extended to more routes of other densities over a longer time. We modified the study to include what we believe are more reasonable approximations of airline experience. These modifications made some changes in the differences between the two sets of fares; however, they did not change the overall findings of the study. Our results showed that from 1969 to 1974:

--The annual industry-wide average by which actual fares exceeded estimated fares was 22 to 52 percent; in dollar terms, if passengers in the 1969-74 period paid fares based on the assumed airline characteristics, they would have saved from $1.4 billion to $1.8 billion.

--Lower fares would have increased air travel and total traveler savings.

--While passengers would pay lower fares, they might be required to give up certain amenities CAB-regulated airlines now provide.

ASSUMPTIONS AND METHODS

Dr. Keeler estimated what he termed "unregulated" or "cost-based" air fares in 30 high-density air markets and compared them to 1969 published fares to establish the effects of CAB regulation. We modified the estimating process to remove some technical problems, applied it to a more representative cross-section of the national airline system, estimated national-level impacts of estimated fares for city-pair markets, and updated them to include the years 1969-74. Our results are estimates of:

--Generally lower first-class and coach-class fares in city-pair markets served by a less regulated airline industry.

--Industry-wide savings to domestic air travelers from airlines operating at lower costs per passenger.

--Increases in domestic air travel that might result from the generally lower fares.

--Domestic airline revenues resulting from the estimated fares and increased air travel.

DR. KEELER'S STUDY METHOD

Dr. Keeler assumed that in the long run the removal of CAB regulatory powers over airline industry entry, exit, and fares would result in

--a seat occupancy rate of about 60 percent,

--increased seating densities incorporating all-coach seating configurations on all aircraft,

--annual aircraft utilization at average 1968 trunk airline rates,

--use of some of the most efficient aircraft,

--a pretax return-on-capital of 12 percent, and

--use of aircraft only over their design ranges.

Using cost data available for the industry, Dr. Keeler computed the effect of applying these assumptions to CAB-regulated airline operating costs over 30 heavily traveled routes. These costs became the basis for computing an unregulated or cost-based air fare for each route. This fare was then compared to the lowest regularly available daytime coach or economy fare published in the "Official Airline Guide" and the percentage difference was computed. (See apps. I and II.)

OUR MODIFICATIONS OF DR. KEELER'S STUDY

On the basis of our review of Dr. Keeler's study, we concluded that, with some minor changes, its assumptions are reasonable. We found it necessary to modify Dr. Keeler's method because of (1) what we believe are valid criticisms of the study, (2) problems encountered in applying statistical techniques, and (3) the need to expand the study to produce results representing the national air transportation system.

For example, we substituted parts of CAB's cost model 1/ to estimate both direct and indirect costs. We believe the cost model Dr. Keeler developed and used provided reasonable estimates in total, but certain portions, taken alone, were subject to question. Substituting parts of the CAB model avoided this and at the same time incorporated major parts of a cost model which is updated and validated quarterly and which provides detailed estimates of the effects of proposed fare changes and changes in operating and financial characteristics of CAB-regulated airlines. CAB's model, however, was not used to compute capital cost because it did not appear to be an improvement over the method of computing return on investment Dr. Keeler used.

We expanded Dr. Keeler's study to simulate the national air travel market by using samples of typical city-pair routes and their characteristics. We adjusted the published fares to show the effect of (1) fare changes during the year and (2) discount and promotional fares. To project our results to all scheduled domestic air travel on the domestic trunk airlines, we made and compared two estimates of total

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1/A mathematical or graphical representation of what actually occurs in a given situation. In Dr. Keeler's study and in our extension of his work, the cost model is a set of equations intended to provide estimates of the lowest longrun cost of a unit of airline output.

annual airline revenue for air travel in each year from 1969 to 1974. One set of revenue estimates, designated "actual revenues," was based on our estimated actual annual fares; the other revenue estimates were determined from our estimated increased efficiency fares and designated "increased efficiency revenues." Each type of revenue was estimated by:

--Categorizing by distance and traveler density 257 city-pair markets that accounted for nearly two-thirds of domestic air travel in 1969 on domestic trunk airlines.

--Using air travel characteristics for the 257 city-pair markets modified by the distribution of annual travel with distance to determine the annual air travelers in each city-pair market category for each year from 1969 to 1974.

--Multiplying for each category, annual passengers by average annual fares (either increased efficiency or actual annual fares) to make annual revenue estimates.

--Summing estimated annual revenues over all market categories to obtain estimated annual nationwide revenues.

We validated this method by comparing our estimates to actual revenue data CAB compiled and adjusting where necessary.

Some of the problems we encountered were resolved by using parts of CAB's cost model. We also found that the CAB model introduced a conservative bias into our estimates because it overestimates fares for markets in at least the under-400-mile range. This conservatism means that our estimates of annual savings to air travelers in 1969-74 would have been as much as $325 to $925 million higher if a cost model better showing intrastate operations had been used. Removal of this conservatism would increase our estimated savings to actual travelers from the cited $1.4 to $1.8 billion a year to a range of $1.8 to $2.5 billion a year.

ESTIMATED SAVINGS TO PASSENGERS

As the table below shows, the domestic trunk airlines earned annual revenues of $5.4 to $8.5 billion during 1969-74 from their domestic scheduled passenger operations. Using (1) annual airline costs and operating characteristics compiled by CAB and (2) the conservative cost model we constructed by combining complementary parts of CAB's Domestic Passenger Fare Investigation (DPFI) cost model and, Dr. Keeler's longrun cost model, we estimated annual fares based on the characteristics we would expect in the long run in a less regulated airline industry. Using these fares (for a set of 48 city-pair markets that we used to represent the national air travel system) and actual fares for the same markets, we estimated the effect a less regulated airline industry would have on the airlines' costs, fares, revenues, and passenger traffic. Our analysis showed that if the trunk airlines had achieved the kinds of long-term characteristics we assumed for a less regulated airline industry, travelers on the CAB-regulated airlines might have saved from $1.4 to $1.8 billion a year during 1969-74. These estimates are the annual differences between actual trunk airline revenue reported by CAB and lower revenues estimated for less regulated trunk airlines operating at lower costs per passenger and proportionately lower fares.

Year	Actual revenue	Passenger savings from less regulated airlines	Percent by which actual fares exceed estimated fares (note a)
	------------------billions---	---------------	
1969	$5.4	$1.8	52
1970	5.5	1.4	35
1971	6.0	1.6	36
1972	6.7	1.8	36
1973	7.4	1.6	29
1974	8.5	1.5	22

a/Percentage computed by dividing actual revenue by estimated revenue for actual travelers and subtracting 100 from the result. The computation was done in this manner to conform to and be comparable with Dr. Keeler's results. Another way to present these results would be to express the estimated savings as a percentage of actual fares. These percentages would be 33, 25, 27, 22, and 18 for the years 1969-74, respectively.

The $1.4 to $1.8 billion estimates indicate that actual airline fares were higher than they might have been if the airlines had been operating in a less regulated environment.

MORE PEOPLE WOULD TRAVEL
IF AIR FARES WERE LOWER

The above savings estimates do not include the effects of additional air travel that might be caused by lower fares. They represent savings to actual travelers. Airline experience and studies of how price changes affect air travel indicate that when fares are lowered, more people travel by air. An explicit quantitative measure of the amount of change in air travel to be expected from a change in air fares is called the price elasticity of demand for air travel. Airline, CAB, and other estimates of this measure range from -0.5 to -4.0, based on analyses of the effects of past airline fare and travel changes.

A price-elasticity value of -0.5 indicates that if average fares decreased by 20 percent, air travel would increase by 0.5 times the same amount, that is by 10 percent (0.5 x 20 percent). The -2.0 value indicates that if average air fares decreased by 20 percent, air travel would increase by 2.0 times this amount, or 40 percent (2.0 x 20 percent).

To estimate the additional travel that might occur because of lowered fares, we used a price-elasticity value of -1.3 as shown in some CAB staff studies and testimony.1/ The additional air travel caused by lower fares produces savings because some travelers are willing to travel by

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1/Studies:

"Traffic, Fares, and Competition, Los Angeles - San Francisco Air Travel Corridor," Staff Research Report No. 4, Research and Statistics Division, Bureau of Accounts and Statistics, August, 1965.

"Forecast of Scheduled Domestic Air Travel For the 50 States, 1972-1981," Office of Plans Study, U.S. Civil Aeronautics Board, November 1972.

Testimony:

Exhibit BC-T-5, Docket 21866-9, U.S. Civil Aeronautics Board, November 20, 1970.

air at an intermediate fare between the CAB-regulated fare and the lower fare. The sum of the differences between each additional traveler's intermediate fare and the final reduced fare may be defined as savings to travelers attracted by lowered fares.

The next table presents estimates of these savings combined with the savings to actual travelers, assuming additional passengers are allocated to aircraft so as to maintain an average 60 percent industry-wide load factor.

Year	Savings to actual passengers	Savings to actual and additional passengers for -1.3 elasticity
	(billions)	
1969	$1.8	$2.5
1970	1.4	1.8
1971	1.6	2.0
1972	1.8	2.2
1973	1.6	2.0
1974	1.5	1.8

Shown below are the corresponding actual annual revenues and estimated annual revenues assuming increased efficiencies and a fare elasticity of demand of -1.3.

Year	Actual revenue	Estimated revenue for -1.3 elasticity
	(billions)	
1969	$5.4	$6.1
1970	5.5	6.1
1971	6.0	6.5
1972	6.7	7.3
1973	7.4	7.9
1974	8.5	9.0

Following are the actual levels of annual air travel in revenue-passenger-miles for 1969-74 for passengers on CAB-regulated airlines and the estimated levels of air travel assuming increased airline efficiencies and a fare elasticity of demand of -1.3.

Year	Actual air travel	Estimated air travel for -1.3 elasticity
	----------(billions of RPMs)----------	
1969	96	165
1970	96	142
1971	98	146
1972	108	151
1973	115	160
1974	118	153

Possible effects to passengers

While the passenger tends to benefit from savings due to lower fares under the assumptions used in our analysis, his flight might be substantially different than under CAB regulation. For example, increased seating means that some passengers might have less space. Because our analysis also envisions higher average load factors the probability of not obtaining seats on desired flights may increase for some passengers. Passengers might also experience some inconvenience in that higher load factors could mean flights at less frequent intervals than are presently available on some routes.

On the other hand, the Texas and California intrastate airline experience on which these assumptions are partially based, included both lower fares and frequent flights for air travelers on medium and high density routes. The intrastate airline experience shows that to obtain lower air fares, and sometimes more frequent flights, travelers are willing to accept the somewhat more crowded conditions typical of the intrastate aircraft.

CHAPTER 3

EFFECTS OF CRITICAL ASSUMPTIONS ON THE STUDY RESULTS

This analysis of the effect of CAB regulation on airline fares, traveler savings, air travel, and airline revenue is based on certain assumptions, including increased efficiency, a return on capital equal to the long-term average return for all corporations, and an elasticity of demand for air travel of -1.3 as described in appendixes I and III.

In this chapter we show how changes in assumptions cause the study outcome to vary. This procedure, called sensitivity analysis, allows a decisionmaker to judge the importance of each assumption.

LOAD FACTOR

A passenger aircraft's load factor is defined as the percentage of available seats occupied by revenue passengers. An airline's load factor is determined as the ratio of revenue-passenger-miles to available-seat-miles. Dr. Keeler assumed unregulated airlines could maintain a 60-percent load factor in high-density markets over the long run. We believe this assumption is reasonable based on average load factors achieved by Pacific Southwest Airways in the California intrastate air market during the 1960s, Southwest Airlines in the Texas intrastate air market in the 1974-75 period, and the trunk airlines in the decade before the airlines' substantial use of jet aircraft.

Our study included markets of various densities, distances, and load factors. To approximate load factor variations, we assumed the airlines would achieve an industry-wide load factor of 60 percent, but varied the load factor by trip length in the same proportion as actually occurred during each year. Therefore flights in medium-distance markets were assumed to achieve more than a 60-percent load factor, and flights in short- and long-distance markets were assumed to achieve less than 60-percent load factors. We believe this adjustment better shows what actually would occur if the trunk airlines were to achieve an industry-wide 60-percent load factor.

To provide some understanding of how our study results are affected by variations in the load-factor assumption, we made computations using 72 percent--Pacific Southwest Airways' average load factor in 1960-65--and the actual annual coach class load factors for the domestic operations of the domestic trunk airlines--ranging from 52 to 59 percent during 1969-74. Actual coach load factors were used instead of combined first and coach class load factors to be consistent with our assumption of equal coach-class and first-class average load factors in our conversion of all coach seats into first-class seats and coach seats. The results of these computations are summarized below and presented in more detail in appendix X.

Effect of Load Factor
Uncertainties on Study Results

	Actual experience	Assumed industry-wide load factor		
		Actual	60%	72%
Annual savings to actual passengers in 1969-74 (billions of dollars)	N/A	1.1 to 1.5	1.4 to 1.8	1.9 to 2.4
Annual savings to actual and induced passengers in 1969-74 (billions of dollars)	N/A	1.2 to 1.9	1.8 to 2.5	2.6 to 3.4
Excess of actual over estimated fares in 1969-74 (percent)	N/A	19 to 39	23 to 52	39 to 72
Annual air travel in 1969-74 (billions of RPM)	96 t0 118	126 to 151	141 to 165	165 to 193
Annual airline revenue (billions of dollars)	5.4 to 8.5	5.9 to 9.0	6.1 to 9.0	6.3 to 9.4

AIRCRAFT SEATING

Dr. Keeler assumed all-coach seating with seating densities similar to densities on Pacific Southwest Airways aircraft and seats similar to those of the trunk airlines.

As shown, he assumed that only one of the three aircraft types he used had a galley for longer flights.

Aircraft	Range: trip distance	Number of coach seats	Galley
DC9-30	Short: under 350 miles	110	No; two coffee bars
B727-200	Medium: 350 to 900 miles	158	No; two coffee bars
DC8-61	Long: over 900 miles	251	Yes; small galley

Full food service might be needed on some long-range and medium-range flights. To accommodate this, we modified the seating assumption for the B727-200 to eliminate the coffee bars, added a full galley, and reduced seats accordingly. We also modified the DC8-61 all-coach seating to that of Trans International Airline's DC8-61 and DC8-63 that have full galleys and all-coach seating of 254 seats. We also assumed use of wide-bodied aircraft in the years they were actually used by the trunk airlines. The B747 was used from 1970 on, and the DC10 provided substantial scheduled passenger service beginning in 1971. The B747 all-coach seating figures with full galley service tabulated below are taken from World Airway's B747 configuration; the corresponding DC-10 all-coach seating with full-galley service is taken from Trans International's DC-10 experience.

The aircraft and seating estimates we used in our base case are shown below with the aircraft class to which they belong. Although we assumed that both coach and first-class service would be provided, the seating estimates we used are tabulated in terms of all-coach seats to facilitate comparison with Dr. Keeler's estimate shown above, and the aircraft manufacturers' estimates of maximum all-coach seating.

Aircraft	Dr. Keeler estimates	GAO estimates: all-coach seats	Manufacturer's estimates: maximum all-coach seats	Aircraft class
DC9-30	110	110	115	2-Engine, turbo regular body
B727-200	158	153	189	3-Engine, turbo regular body
DC8-61	251	254	259	4-Engine, turbo regular body
DC10	-	376	380	3-Engine, turbo wide body
B747	-	461	500	4-Engine, turbo wide body

For our base case we assumed that in a fully competitive environment the airlines probably would provide first class as well as coach travel. Accordingly, we converted our estimates of all-coach seating to a mix of first class and coach seating using the following assumptions:

1. The average first-class seat uses 160 percent of the floor space used by the average coach seat.

2. The same load factors for coach and first-class seats.

3. The average proportions of coach and first-class revenue passenger-miles per aircraft flight were the same as the proportions for the entire year.

We varied our seating assumptions to determine how changes in seating densities affected our estimates. In one case, for low-seating, we used the average trunk airline seating per year for the five aircraft; in another case, for high-seating density, we used the aircraft manufacturers' estimate of maximum seating for these aircraft. The high-, low-, and base-case estimates of aircraft seating used in our seating sensitivity analysis are compared on the following page.

1969-74 Average Annual Seating per Aircraft

Aircraft	Low seating (based on actual trunk airlines) First class	Coach class	GAO base case (our assumed seating) First class	Coach class	High seating (based on manufacturer's maximum) First class	Coach class
DC9-30	16	73	14	89	14	93
B727-200	22	103	19	123	23	152
DC8-61	26	155	31	205	32	209
DC10	40	188	42	309	42	313
B747	50	285	53	376	58	408

The effect of using these different seating figures in the study is shown below. More detailed annual estimates are shown in apppendix XI.

Effect of Uncertainties in Aircraft Seating Density

	Actual experience	Aircraft seating density: Trunkline seating	GAO assumed seating	Manufacturers' maximum
Annual savings to actual passengers in 1969-74 (billions of dollars)	N/A	0.5 to 1.5	1.4 to 1.8	1.7 to 2.1
Annual savings to actual and induced passengers in 1969-74 (billions of dollars)	N/A	0.5 to 1.9	1.8 to 2.5	2.2 to 2.9
Excess of actual over estimated fares in 1969-74 (percent)	N/A	6 to 39	23 to 52	31 to 61
Annual air travel in 1969-74 (billions of RPM)	96 to 118	122 to 146	141 to 165	152 to 178
Annual airline revenue (billions of dollars	5.4 to 8.5	5.9 to 8.7	6.1 to 9.0	6.2 to 9.2

AIRCRAFT UTILIZATION

An aircraft's annual utilization rate is defined as the average number of block-hours it is used in a year (block-hours are measured from the time the plane first moves under its own power for purposes of flight until it comes to rest at the next point of landing). Dr. Keeler used 1968 trunk airline utilization rates to estimate flight equipment capital cost in his study.

We used the highest annual aircraft utilization rates experienced by the trunk airlines during 1969-74 to calculate flight equipment capital cost because (1) our study covered that period, (2) we believed maximum trunk airline aircraft utilization rates are a better measure for rates that would exist in an interstate airline industry operating with price and service competition in a less regulated market, and (3) we believe the rates are consistent with the longrun airline cost approach used in Dr. Keeler's study.

To determine how changes in aircraft utilization rates affect the study results, we compared results obtained by using the minimum annual utilization rates experienced by the trunk airlines during the period 1969-74 with our basic assumptions which included the higher utilization rates. We also compared these to results obtained by modifying our basic assumptions to include actual annual utilization rates.

Some of the aircraft utilization rates used were:

Annual Aircraft Utilization Rates

Aircraft	Keeler	Highest 1969-74 utilization	Lowest 1969-74 utilization
	--------(block-hours)----------		
DC9-30	3,294	3,680	3,284
B727-200	3,426	3,440	3,052
DC8-61	4,136	4,007	3,282
B747	(a)	3,794	3,392
DC10	(a)	3,370	3,084

a/Dr. Keeler's study did not include these aircraft.

The effect on our study results of using different aircraft utilization rates is summarized below and is presented in more detail in appendix XII.

Effect of Aircraft Utilization Rate on Results

	Actual experience	Annual aircraft utilization: Actual 1969-74	Lowest 1969-74	Highest 1969-74
Annual savings to actual passengers in 1969-74 (billions of dollars)	N/A	1.4 to 1.7	1.3 to 1.7	1.4 to 1.8
Annual savings to actual and induced passengers in 1969-74 (billions of dollars)	N/A	1.6 to 2.3	1.6 to 2.3	1.8 to 2.5
Excess of actual over estimated fares in 1969-74	N/A	20 to 47	20 to 48	23 to 52
Annual air travel in 1969-74 (billions of RPM)	96 to 118	139 to 158	137 to 159	141 to 165
Annual airline revenue (billions of dollars)	5.4 to 8.5	6.0 to 9.0	6.0 to 9.0	6.1 to 9.0

MOST EFFICIENT AIRCRAFT

Dr. Keeler assumed that without CAB regulation, airlines would assign some of the most efficient aircraft to each route in accordance with their original design distances. On the other hand, trunk airlines use various aircraft over a variety of routes because of scheduling considerations, feeder routes, and ownership of earlier generations of aircraft than the improved versions assumed in Dr. Keeler's study. We believe that in the long run, a less regulated airline industry would probably not have the characteristics of the current industry to the same extent because the expected intense price (fare) competition would cause more emphasis to be placed on development and use of low cost per seat-mile aircraft. We also believe city-pair market entry and exit freedom for airlines would enable airline management to better match capabilities of existing and new aircraft to air travel markets.

Assuming use of some of the most efficient aircraft on each route might result in a higher estimate of savings to passengers than could be achieved in a fully competitive airline industry. On the other hand, we believe use of the current match of aircraft to routes would probably result in a lower estimate of savings than would actually occur. To obtain an estimate of the longrun effect that could reasonably be expected in a less regulated airline industry, we combined two assumptions concerning use of the least cost per seat-mile aircraft. We based our analysis on use of some of the most efficient aircraft available in the 1969-74 period because we believe that price competition in a fully competitive airline industry would probably have encouraged earlier development of such aircraft by aircraft manufacturers. We also used these aircraft in our analysis over ranges outside their most efficient ranges. We assumed they would have been used to the same extent and in the same way that the aircraft classes they belonged to were used by the trunk airlines in the 1969-74 period.

In summary, comparatively low cost second and third generation stretch-version aircraft were used in our analysis, but the potential savings from using these aircraft were reduced by using them over the ranges actually flown by the classes of aircraft to which they belong. The aircraft we used and the classes to which they belong are tabulated below.

Years used	Aircraft used in base case	Class to which aircraft belongs
1969-74	DC9-30	2 Engine, turbofan, regular-bodied aircraft
1969-74	B727-200	3 Engine, turbofan, regular-bodied aircraft
1969-74	DC8-61	4 Engine, turbofan, regular-bodied aircraft
1971-74	DC10	3 Engine, turbofan, wide-bodied aircraft
1970-74	B747	4 Engine, turbofan, wide-bodied aircraft

We also determined the effect of using the aircraft tabulated here over those ranges at which we believe their per seat-mile costs to be close to their minimum values. The two results are tabulated below and presented in more detail in appendix XIII.

Effect of Uncertainties in the Assumed Use of the Most Efficient Aircraft Per Route

	Actual experience	Our base case: Most efficient aircraft used in same proportions as trunk airline actual use of corresponding aircraft classes	Alternative case: Most efficient aircraft used only in their most efficient ranges (note a)
Annual savings to actual passengers in 1969-74 (billions of dollars)	-	1.4 to 1.8	1.6 to 1.9
Annual savings to actual and induced passengers in 1969-74 (billions of dollars)	-	1.8 to 2.5	2.0 to 2.7
Excess of actual over estimated fares in 1969-74 (percent)	-	23 to 52	24 to 56
Annual air travel in 1969-74 (billions of RPM)	96 to 118	141 to 165	147 to 170
Annual airline revenue (billions of dollars)	5.4 to 8.5	6.1 to 9.0	6.1 to 9.1

a/We defined an aircraft's most efficient range to be that range over which we expected the aircraft to have close to its least average cost per seat-mile.

RATE OF RETURN ON CAPITAL

Dr. Keeler assumed a 12 percent pretax rate of return on airline capital. He expected this to yield a longrun aftertax return on capital of about 7.5 percent. His assumption was based on his research and comparison of airline and general corporate pretax and aftertax return on capital and on similar work by Richard E. Caves which was reported in a 1962 airline study. 1/ From this work Dr. Keeler concluded:

--Average annual pretax rate of return on capital during 1960-66 for all corporations was about 11.7 percent

--Average annual aftertax rate of return on capital during 1939-66 for all corporations was about 7.5 percent

--Average annual airline aftertax rate of return on capital during 1939-66 was about 7.5 percent.

From this and the airlines' rate of expansion, Dr. Keeler concluded that (1) in the long run airlines had earned a sufficiently high rate of return to attract adequate capital for expansion and (2) the airlines' rate approximated that of the entire corporate sector. Because (1) the cost model he constructed represented longrun airline costs (and capital costs in longrun cost models are based on the longrun rate of return on capital), (2) historic longrun capital costs for the airlines approximated those of the corporate sector, and (3) he found no compelling reason why this should change, Dr. Keeler selected the historic longrun pretax rate of return on capital for all corporations as the appropriate value for his study.

We reviewed the work on which Dr. Keeler's conclusions were based and found that he intended to calculate a return estimate composed of interest, depreciation, corporate income taxes, and corporate aftertax income. By using this return estimate to calculate longrun annual capital costs, Dr. Keeler included costs representing airline corporate income taxes, interest payments, depreciation costs, and aftertax earnings. We accepted and used Dr. Keeler's definition of the long-term pretax return on capital. However, we were unable to reproduce his estimated return using Dr. Keeler's data sources and stated procedures. Instead, using the same Internal Revenue Service (IRS) data and his definition, we obtained an estimated annual pretax return on capital

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1/Caves, Richard E., "Air Transport and Its Regulators, An Industry Study," Harvard University Press, 1962, p. 394.

of 10.5 percent. Dr. Keeler notified us that the difference in our 10.5 percent and his 12 percent was probably due to a set of approximate adjustments he made to consolidate aggregate corporate financial and income statements for all active corporations. Making these adjustments required disaggregating some of the published IRS accounts for all active corporations used by Dr. Keeler in his study.

We examined this published IRS data which consisted of various disaggregations for various groups of corporations but did not find what we needed. The IRS official responsible for these statistics of income data told us there are no other disaggregated data available of the sort we needed. Lacking these data, we felt that adjustments to consolidate the IRS' aggregate corporate income and financial data were too uncertain to include in our base-case calculations. Instead, we included, as a sensitivity analysis, the results of using the 12-percent rate of return Dr. Keeler assumed. The results are tabulated below for: our base case using our assumed 10.5 percent rate of return, our base case except that Dr. Keeler's 12 percent rate was used, and our base using an 18 percent rate of return on capital. The 18 percent pretax return is included as an approximation of the post-tax 12 percent rate of return that CAB uses as a standard in ratemaking decisions for the trunk airlines. More details of the effects of these rates-of-return are presented in appendix XIV.

Effect of Uncertainties in
Pretax Rate of Return on Capital

Impact area	Actual experience	Pretax rate of return on capital: 10.5 percent	12 percent	18 percent
Annual savings to actual passengers in 1969-74 (billions of dollars)	N/A	1.4 to 1.8	1.4 to 1.8	1.0 to 1.5
Annual savings to actual and induced passengers in 1969-74 (billions of dollars)	N/A	1.8 to 2.5	1.7 to 2.4	1.1 to 1.9
Excess of actual over estimated fares in 1969-74 (percent)	N/A	23 to 52	21 to 50	13 to 40
Annual air travel in 1969-74 (billions of RPMs)	96 to 118	141 to 165	139 to 161	128 to 148
Annual airline revenue (billions of dollars)	5.4 to 8.5	6.1 to 9.0	6.0 to 9.0	5.9 to 8.8

FARE ELASTICITY OF DEMAND

To estimate the effect lower fares might have on the number of passengers the airlines served during the years 1969-74, we assumed a fare elasticity-of-demand factor of -1.3 based primarily on (1) empirical studies of elasticities demonstrated by Pacific Southwest Airways in 1961-64 and Southwest Airways in 1971-74 and (2) cross-sectional statistical studies of airline travel in two sets of city-pair markets. The empirical studies produced elasticity estimates of -1.3 to nearly -4; the statistical studies produced elasticity estimates of -0.96 to -1.37. We also considered other studies and testimony that suggested elasticities could range from -0.5 to -2.0, and found that CAB uses an assumed value of elasticity of -0.7 in its rate setting proceedings.

In view of this wide range of elasticity estimates and assumptions and what we believe to be substantial uncertainty as to the correct value, we made computations using -0.7 and -2.0 to determine how varying the elasticity factor would affect our study results. These computations are compared in the following table. Annual estimates are compared in appendix XV.

Effect of Uncertainties in
Fare Elasticity of Demand for Air Travel

	Actual experience	Fare elasticity of demand -0.7	-1.3	-2.0
Annual savings to actual passengers in 1969-74 (billions of dollars)	N/A	1.4 to 1.8	1.4 to 1.8	1.4 to 1.8
Annual savings to actual and induced passengers in 1969-74 (billions of dollars)	N/A	1.6 to 2.1	1.8 to 2.5	2.0 to 3.0
Excess of actual over estimated fares in 1969-74 (percent)	N/A	23 to 52	23 to 52	23 to 52
Annual air travel in 1969-74 (billions of RPM)	96 to 118	118 to 136	141 to 165	174 to 221
Annual airline revenue (billions of dollars)	5.4 to 8.5	4.7 to 8.0	6.1 to 9.0	7.5 to 10.4

CHAPTER 4

AGENCY AND EXPERT COMMENTS

Because any study of this kind includes both generalizations and assumptions that are not certainties, we solicited comments on our proposed report from a number of interested Federal agencies and experts.

Federal agencies

Civil Aeronautics Board
Department of Transportation
Department of Commerce
Council of Economic Advisors

Experts 1/

Dr. Theodore E. Keeler
Dr. George W. Douglas
Dr. William A. Jordon
Dr. George C. Eads

In general, these agencies and experts agreed with the premise that increased competition would result in more efficient airline operations, but suggested a number of ways in which the analysis could be improved. Further, there was agreement that the sensitivity analyses presented in chapter 3 identify the effects of the most important assumptions and make available alternative results in cases where a reader may be interested.

In several cases, the agencies and experts suggested caution in interpreting the proposed report's results. The technique used in the analysis predicts results based on assumed relationships between independent measurable factors. In actuality, these relationships are not the only factors that influence airline operations. Others we have not included may also be important. As we have stated, we find the assumptions and techniques used to be reasonable but agree that the results should be interpreted and used carefully.

1/Resumes of experience and training are included as appendix XVI.

We did not solicit comments from individual airlines or the Air Transport Association.

Some of the major comments and our responses are outlined below. The complete comments are included as appendix XVII.

LOAD FACTORS

The 60-percent load factor used in our study represents the average industry-wide annual load factor we believe would be achieved in the long run by domestic airlines operating with less regulation. CAB doubted the ability of the trunk airlines to achieve this level on all routes and over the entire airline system while adhering to the (1) assumption of only three types of aircraft which allows little flexibility in serving markets of various densities and distances, (2) assignment of aircraft types to specific mileage blocks, and (3) high aircraft utilization rates assumed. Dr. Eads also pointed out that an average load factor does not take into consideration the many variables in the market place. Dr. Keeler stated that the extension of his assumption to low- and medium-density routes may overstate potential benefits because 60-percent load factors may not be feasible on such routes.

We agreed that our assignment of aircraft types to specific mileage blocks would have limited an airline's ability to serve its markets, so we modified the assumption by assigning aircraft to each city-pair market in the same average proportions as the proportions of air travel that the aircraft classes represented by these aircraft provided in city-pair markets of comparable distances in each year.

We did not modify our assumption of aircraft utilization rates because we believe changes we made in two other assumptions would permit the airlines to operate at these rates. One change was the use of each of our assumed aircraft over the same distances and to the same extent as the aircraft classes they represented. For example, we assumed B727-200 aircraft would be flown over the same distances to the same extent (same proportion of revenue passenger-miles per year) as the aircraft class that it represents--3-engine turbofan regular-bodied aircraft. This change would permit airlines to fly smaller, shorter range aircraft, such as the DC9-30, over longer nonstop and multistop routes--thereby increasing utilization rates over those achievable with an arbitrary limitation. The other change was made in assumed load factors for city-pair markets.

To incorporate the variation in load factors that actually occurs over routes (city-pair markets) of various lengths and densities, we varied the assumed load factors per market by trip distance in the same proportion as actually occurred in each year. Thus our overall load factor is 60 percent, but average load factors over medium-distance routes are higher than 60 percent, and average load factors over short- and long-distance routes are less than 60 percent.

Dr. Douglas stated the report is correct to assume significantly higher load factors in an efficiently configured industry and that his research, while indicating that load factors would vary by market density and distance, confirms that an overall efficient load factor for all markets would be in the neighborhood of 60 percent. Dr. Jordan believes the 60-percent load factor is unduly low in view of intrastate airline results and his assumptions about the form an unregulated airline system would take in the long run.

Our bases for using the 60-percent load factor include (1) Pacific Southwest Airways experience in 1960-70, (2) Southwest Airlines' experience in 1974-75, and (3) trunk airline experience in the 1950s, when industry load factors ranged above 60 percent. Load factors in particular markets of course, would vary depending on, among other things, the value travelers place on their time, the market density, and the distances involved.

Most efficient aircraft

Our report assumes the airlines, if unregulated, would use some of the most efficient aircraft. CAB believes this assumption is unrealistic in view of the existing fleet of aircraft, scheduling considerations, and the manner in which aircraft are designed and improved. CAB points out that each efficient aircraft was preceeded by less efficient earlier models which were necessarily purchased and used before the better versions were built.

It is true that the existing fleet includes aircraft other than those identified as most efficient. Our assumption is not that the present airline industry, if regulation were reduced in December of one year, would begin realizing savings from using more efficient aircraft in January of the next year, but that over many years the industry would tend to emphasize efficiency and match the most efficient aircraft with the markets they serve best.

Our purpose in selecting the aircraft we assumed for our study was to represent all the major classes of aircraft the trunk airlines actually used during each period. Therefore, we added two additional aircraft, the B-747 and DC-10, in the years they became available. The effects of variations in the assumption are detailed in appendix XIII and discussed and summarized in chapter 3.

Aircraft utilization

We used the highest annual aircraft utilization rates experienced by the trunk airlines during 1969-74 to calculate flight equipment capital cost. CAB thinks the rates are too high because of, among other things, stage length differences between actual experience and our assumptions.

We agreed with CAB's comment, but believe that by changing the analysis to allow assumed average load factors in each market to conform to actual experience and assumed aircraft use to approximate trunk airline actual use (including nonstop and multistop flights), we have relaxed the constraints to a point that could reasonably be achieved in actual operation.

Our sensitivity analysis (see ch. 3) shows the results of using the lowest utilization rates actually experienced by trunk airlines and the actual utilization rates for all the trunk airlines, in contrast with our assumed high utilization.

Seating densities

CAB had several comments about the seating densities we used in our proposed report. It objected to our assumption that there would be no first-class travel and seating and to the inclusion of savings generated by replacing first class with lower quality service. We agreed with its criticism and changed the analysis to include first-class service on all flights.

CAB also objected to the assumption that full galleys would not be needed on 2-engine, turbofan regular-bodied aircraft--it believed food service might well be required on relatively short flights. We left our assumption unchanged because we believe airlines operating efficiently would not serve food requiring galleys on short flights.

Rate of return on capital

The rate of return on capital Dr. Keeler used represented the average pretax rate of return on all active corporations. We considered the rate a reasonable estimate of earnings airlines would have to sustain to attract capital investment over the long run.

CAB stated the rate we used is too low because the airline industry is cyclical, oligopolistic, 1/ and capital intensive. CAB has concluded airlines must earn 12 percent on invested capital after taxes, equivalent to a 15 to 20 percent pretax rate of return.

Dr. Douglas also stated the 10.5 percent of pretax rate of return we used for the report was too low. He believes an 18-percent rate would be more appropriate considering airline financial risks and current interest rates.

We believe an average rate of return in a competitive industry would include both successful and unsuccessful businesses. It would take into account businesses consciously operating at a low rate of return or even a loss to gain a foothold in the market, and businesses whose rate of return was so low the investors would choose to cease operation. We believe the average pretax rate of return for all corporations is a reasonable rate to use for a competitive airline industry as a whole in the long run.

Dr. Keeler believes we may have duplication in our income and rate base calculations because income and capital may be reported more than once in cases where corporate assets include securities in other corporations and earnings from securities of other corporations. We believe Dr. Keeler may be correct, but IRS could not provide us data that would permit a calculation of the incidence and effect of such a duplication. Dr. Keeler believes a 12-percent rate of return would be the average pretax rate of return for all corporations corrected for income consolidations, and we have included that value as one of our sensitivity analyses.

1/An industry in which each of a few companies affects but does not control the market.

Our sensitivity analyses (see ch. 3) show the study results at 10.5, 12, and 18 percent rates of return.

Fare elasticity of demand

To estimate the effect lower fares would have on the number of passengers airlines served during 1969-74, we used a fare elasticity of demand factor of -1.3. Both CAB and the Department of Commerce pointed out that we applied the elasticity factor assuming that demand for air travel would vary in a regular, consistent pattern, when demand might actually change in some other way.

Our review of available evidence including CAB staff, consultant, and airline studies and testimony before CAB in its DPFI, disclosed estimates of this elasticity ranging from -0.5 to -4.0. Based on our review, we concluded that -1.3 is the most reasonable estimate of the average fare elasticity of demand for the entire trunk airline system.

CAB and the Department of Commerce are correct in their comments and the fare elasticity of demand may vary in actuality. Again, we believe the -1.3 factor is a reasonable approximation of what might occur on average over the entire airline system and have presented alternatives in our sensitivity analysis.

CAB also commented that our method of applying elasticity of demand resulted in percentage ambiguity and that the use of logarithms would result in a better application. We agreed with its comment and changed our method of computation.

Use of CAB's cost model

We substituted parts of the CAB's DPFI cost model for the complementary noncapital cost elements of the cost model Dr. Keeler used in his study. Dr. Keeler, Dr. Douglas, Dr. Jordan, and Dr. MacAvoy all expressed the opinion that CAB's cost model is inaccurate; Dr. Keeler because actual block times are not used and because of arbitrary cost allocations; Dr. Douglas because he believes the trunk airlines do not minimize costs under CAB regulation; and Dr. Jordon because he believes airline costs are increased by the current regulatory structure and therefore our costs are overestimated for unregulated airline performance and our savings underestimated. Dr. Keeler pointed out that our cost model estimated fares for some intrastate air markets that exceeded fares that Pacific Southwest Airways actually charged and made a profit on.

We agree that CAB's cost model overstates costs, particularly for intrastate air markets. However, we believe it provides computational advantages and is frequently updated and validated. Since the overstatement of costs results in a corresponding conservative (underestimated) estimate of savings, we used the CAB cost model despite its flaws. We found that our estimated savings were from $325 to $925 million less than they would have been if we had used a cost model that better represented intrastate airline operations.

Hawaii-Alaska markets

CAB observed that in our original computations we had used fares applicable to markets in the continental United States for routes from the mainland to Alaska and Hawaii. CAB said this overstated savings because fares on mainland-Hawaii routes are considerably lower than fares for comparable routes within the continental United States.

We agreed with CAB's comment and revised our computations accordingly.

Published versus actual fares

Dr. Keeler's study compared estimated fares to published fares for CAB-regulated airlines. We felt that published fares generally overstate actual fares because of discount programs which reduce the average fares actually charged, and therefore, modified published fares to include reductions due to the discount programs in effect during 1969-74. Dr. Keeler and Dr. Jordan both commented that published fares would have resulted in more realistic estimates of savings because these are the fares available to most passengers. Dr. Keeler also believes published coach fares are the fares for service most closely comparable to the service provided by less regulated airlines.

These are reasonable arguments for using published fares, but we continued to use the modified published fares because we believe they result in actual fare estimates that better represent CAB-regulated airline actual annual fare experience, and because they are consistent with our method of transforming fares per city-pair market to national-level revenues.

Net welfare to travelers

As we have pointed out, the lower fares computed in this study would be possible because of changes that might not be to the passenger's liking. These changes (mainly higher load factors, denser seating, and possibly less timely flights) can all be expressed as costs (loss of benefits) to individual travelers, so that the net welfare to travelers would actually amount to something less than the amount of savings from lower fares. Both Dr. Douglas and CAB pointed out that neither Dr. Keeler's study nor our revision of it attempts to evaluate the additional costs of inconvenience to individual travelers that might result from more efficient airline operation.

Such an evaluation is beyond the scope of this report. However, other studies have attempted to evaluate these costs. 1/

Airline system as a network

Dr. Eads states that both Dr. Keeler's study and our revision treat the airline system as an aggregation of individual city-pair markets instead of as an interdependent network. He believes airline decisions are made in terms of maximizing system profits rather than minimizing costs on individual segments, allowing some segments to operate at low load factors and still contribute to network profits. Dr. Eads believes an analysis, such as presented in this report, is best used to estimate results for a few carefully selected markets rather than an entire network.

However, Dr. Keeler never suggested his study represented anything other than a few high-density city-pair markets, and he has some of the same reservations about extending the analysis to the entire network that Dr. Eads expressed. We believe many of the changes we made in Dr. Keeler's assumptions and techniques allow the analysis to better approximate the airline network. These changes include (1) assuming that aircraft would be used in the same proportions over various markets as the aircraft classes they represent were actually used, (2) assuming load factors would vary by distance in the same proportions as actually experienced, (3) including both first-class and coach-class service,

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1/George W. Douglas and James C. Miller, III, "Economic Regulation and Domestic Air Transport," The Brookings Institution, Washington, 1974.

(4) using the same pattern of dilution by distance that actually occurred, and (5) including the characteristics of both multistop and nonstop service.

Unfortunately, existing techniques do not seem to provide a way to more realistically approximate what would actually happen in a network as complex as the airline system, and we therefore agree with Dr. Eads' recommendation that figures resulting from our analysis be treated as possible "order of magnitude" estimates, not as exact predictions of what might occur in a differently regulated market.

Combination of fares and trip lengths

CAB commented that our use of passenger aggregates based on segment RPM by mileage block overstates the number of passengers in the short- and intermediate-distance blocks and understates the number in long-distance routes. In its view, for example, a passenger originating in New York destined for Los Angeles but connecting in Chicago would show up twice in our analysis as two intermediate distance travelers, each paying an intermediate distance fare, instead of a single traveler who pays one long-distance fare. Since fare-per-mile rises as distances shorten because of fixed costs, the sum of fares for two shorter trips would be more than one long trip. CAB believes the overall effect of this situation is to overstate our total revenue figure by about 7.5 percent.

We agreed with CAB's comment, although not with its estimate of the size of the effect, and obtained a conversion factor from it to eliminate the problem by using origin-destination RPM by mileage block.

Stewardess expense

In its comments on the proposed report, CAB observed that we misinterpreted and misapplied the ratio of stewardesses to available seats. CAB was right and we corrected this error in our final computations.

Passenger densities

CAB stated that our estimate of the number of passengers who actually use various classes of city-pair markets (we classed city-pair markets by distance and passenger density) is not representative of the domestic airline system. CAB believes our method tends to understate the percentage of passenger-miles generated in low-density markets and overstates those generated in higher density markets. It concluded that the effect of such a bias is unclear.

CAB also observed that the number of passenger enplanements estimated by our model exceeded actual enplanements in the same periods by about 5 percent, thus building an upward bias into our revenue estimates. The adjustments we made to correct other problems in the analysis eliminated this effect. The estimated number of passengers per year are now below the CAB reported passenger enplanements.

CAB has attempted to encourage airline efficiency

In recent years, CAB has developed and applied standards in its rate deliberations intended to encourage more efficient airline operations. CAB said it (1) predicates passenger fares on standard, full-fare load factors to eliminate the effect of excess capacity on fare levels, (2) calculates load factors assuming optimum seating densities, and (3) adjusts aircraft utilization rates upward when appropriate. CAB believes these adjustments have resulted in savings of approximately $750 million to domestic air travelers in 1975.

The standards CAB said it applies parallel the sources of passenger savings estimated in our report. We are pleased that CAB recognized the inefficiencies present in the trunk airline industry, and our results confirm that CAB's actions have reduced them.

Shortly before we issued our proposed report for comment, CAB proposed legislation to increase the role of competition and decrease the role of regulation in determining the correct mixture of fares and services for the domestic airline system. CAB specifically recognized the desirability of a gradual transition to a domestic air transport system essentially governed by competitive market forces.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

Our study offers reliable evidence that airlines could have profitably operated at a lower cost per passenger during the 6 years from 1969 to 1974, resulting in lower fares and therefore savings to domestic air travelers on the order of $1.4 to $1.8 billion a year. These results could have been produced by higher load factors, denser seating, increased average annual aircraft utilization rates, and use of some of the more efficient aircraft available, while at the same time yielding average annual rates of return on investment which were comparable to those of the entire corporate sector. The tradeoff for lower fares would have been less space for some passengers and fewer flights on some routes.

CAB has recognized that inefficiency exists in domestic trunk airline operations and has attempted to reduce inefficiencies by applying stricter standards in its rate decisions. Although the magnitude of the difference between fares charged by regulated trunk airlines and more efficient carriers not CAB regulated appears to have gone down, it remains large. CAB has concluded that economic regulation of the kind that has been applied to the airline industry is no longer in the public interest and that increased competition among new and existing airlines would result in a better match between the kinds of airline service desired by consumers and available from the airlines. CAB believes it could bring about some changes that would result in increased competition by proceeding under its existing legislation, but that such a fundamental change in the approach to regulating air transportation should be mandated by the Congress. Therefore, CAB has recommended that the Congress pass legislation facilitating creation and certification of new airlines, permitting new and existing airlines to more freely enter or leave particular markets, and allowing airlines increasing freedom to raise or lower fares.

Under the existing regulatory structure, CAB controls competition mainly by determining (1) what airlines can operate, (2) the markets they may serve, and (3) the fares they are permitted to charge. Proponents of reduced regulation believe increased competition among new and existing airlines would result in a better match between the kinds of airline service and fares desired by consumers and those supplied by the airlines. Increased price and service competition can be achieved by various combinations and degrees of reduction in CAB's control over what airlines provide service in particular markets and the rates they charge.

The Government's objectives in regulating the airline industry in the late 1930s were apparently to provide stability to an infant industry by protecting existing airlines from the threat of competition, enhancing the national security, expanding service, and rationalizing the airline subsidy system, thus permitting growth and public acceptance. Today, however, the trunk airlines are large, well-established corporations, and intercity air travel has become an indispensible feature of the transportation system. The only airlines still subsidized are local service carriers originally created as "feeder" carriers that would specialize in providing short-haul, low-density air service, to expand air service to the smaller and more isolated communities of the country.

Even though the original arguments for Government regulation no longer apply to the airline industry, opponents of less regulation have stated that to discontinue CAB regulation would be a needless disruption of a good system and would result in loss of service to many communities and severe economic disorder for existing airlines. We believe it is questionable whether many communities would lose air service if CAB regulation were reduced or discontinued.

The fear that there will be a considerable change in the industry and some economic disorder if regulation were significantly changed is reasonable. Efficient airlines would put considerable competitive pressure on less efficient airlines that are now protected by regulation. Investors and lenders who made commitments based on the stability provided by regulation would lose some of their security and new investors would likely be cautious at the outset. The disruptive effects of a change in regulation however, can be reduced by providing a transition period that would permit gradual adjustment to the new system.

CONCLUSIONS

Based on this report, we believe that markets now served by the trunk airlines could be profitably served at a lower total cost per passenger, and that passenger fares could be lower as a result. The arguments for greater reliance on a more competitive market to determine services and prices are persuasive, but this report does not answer a number of questions about what might happen if the form of airline regulation were changed or if regulation were abandoned completely.

RECOMMENDATIONS TO CAB

We recommend that CAB continue to work toward improving airline efficiency under its existing legislation by emphasizing higher load factors, higher seating densities, and the other factors identified in this report and by increasing its reliance on competition to determine service and prices.

RECOMMENDATIONS TO THE CONGRESS

We also recommend that the Congress, as part of its current reexamination of the need for economic regulation of the airline industry, provide to CAB legislative guidance defining current national objectives for air transportation, and the extent to which increased competition should be used to achieve those objectives.

Both CAB and the Congress should allow for reasonable transition periods to avoid undue disruption of the air transportation system.

DETAILS OF THE ASSUMPTIONS USED IN DR. KEELER'S AIRLINE REGULATION AND MARKET PERFORMANCE STUDY

Dr. Keeler's study was based on the following assumptions about characteristics of the competitive airline industry he expected to develop in the long run after CAB's powers to regulate market entry and exit and fare changes were eliminated.

1. Load factors: Load factors (percent available seats occupied by revenue passengers) would average 60 percent.

2. Most efficient aircraft: Three of the most efficient aircraft would be used in each city-pair air market as follows:

Aircraft	Market	
DC9-30	Short-range:	Under 350 miles
B727-200	Medium-range:	350 to 900 miles
DC8-61	Long-range:	Above 900 miles

3. Seating: All planes would have all-coach configurations with seating densities similar to Pacific Southwest Airways as follows:

Aircraft	Number seats	Galley
DC9-30	110	2 Coffee bars
B727-200	158	2 Coffee bars
DC8-61	251	Small galley

4. Return-on-capital: All capital costs include the long-term pretax average return on capital--12 percent--based on IRS reports for all active corporations since 1938.

5. Aircraft utilization: All aircraft were utilized (number of block hours per year) at their 1968 trunk airline utilization rates.

DETAILS OF THE METHODS USED IN DR. KEELER'S AIRLINE REGULATION AND MARKET PERFORMANCE STUDY

Dr. Keeler's study estimated unregulated (cost-based) air fares from 1967-69 data in 30 high-density air markets and compared them to early 1969 published fares using the following methods.

1. Identified competitive market efficiencies:

   Identified the long-term competitive airline industry efficiencies (see app. I) expected to develop if CAB's regulatory powers were eliminated primarily regarding (1) fare changes, (2) entry to or exit from any market by an airline, and (3) hindrance of certification of new willing and able airlines.

2. Constructed airline cost model:

   Constructed a long-run airline total-cost model from domestic trunkline cost data modified to incorporate the long-term competitive market efficiencies cited in step 1.

3. Selected city-pair air market sample:

   Selected a set of 30 high-density, city-pair air markets.

4. Estimated unregulated fares:

   Used the total-cost model and the distance and time characteristics of each of the 30 air markets to estimate unregulated or total-cost based air fares.

5. Compared unregulated and regulated fares:

   Compared unregulated fares to coach and economy class fares published in the "Official Airline Guide."

APPENDIX III

DETAILS OF OUR MODIFICATIONS MADE TO DR. KEELER'S

AIRLINE REGULATION AND MARKET PERFORMANCE STUDY

In general, the modifications we made to Dr. Keeler's study were as follows:

1. Efficiency assumptions:

   We used Dr. Keeler's study assumptions regarding the efficiencies that could reasonably be expected in th long run in a less regulated scheduled domestic air- line industry with among others, the following six exceptions. We modified the seating assumption to introduce full galleys in two aircraft. The effect on seating was to reduce all-coach seating to 153 in the B727-200 aircraft and increase it to 254 in the DC-8-61 aircraft. We also added representative of the two groups of wide-bodied aircraft--the B747 aircraft (for the four-engine turbofan, wide-bodied aircraft group) with all coach seating of 461 seats with full galley service and the DC10 aircraft (for the three-engine turbofan wide-bodied aircraft grou) with full-coach seating of 376 all-coach seats with full galley service. In response to CAB suggestions with which we concurred, we converted these all-coac seating configurations to mixtures of coach and first-class seating with common costs, cargo costs, and offset cargo revenues allocated on the basis of floor space to first class and coach travel. After reviewing studies and testimony regarding appropriat elasticity values, and in view of the empirical evi- dence from the Texas and California intrastate mar- kets, we assumed the most likely long run value of fare elasticity of demand for air travel is -1.3. We used Dr. Keeler's method for calculation of the longrun pretax corporate rate of return on capital except for modifying one step in the procedure he followed thereby changing his estimate from 12 to 10.5 percent. We assumed each aircraft was utilized at the highest average annual trunkline utilization level in the period 1969-74. We used aircraft over market distances to the same extent as actually oc- curred for the aircraft group they represented. We included first-class and coach-class travel to the same extent that it actually ocurred.

2. Modified Long-Run Cost Model

We modified Dr. Keeler's airline cost model--used to estimate increased efficiency fares--to increase its validity by:

a. Replacing all but the capital cost portions of the direct-cost part of the model with the direct cost portion of a detailed CAB cost model 1/ except for the CAB model's flight equipment, depreciation and flight equipment rental cost.

b. Replacing the indirect cost portion of Dr. Keeler's cost model--except for capital cost accounts--with the indirect cost portion of the DPFI cost model except for depreciation accounts. Dr. Keeler's inclusion of a pretax return on capital based on the annual average of returns on capital for all corporations for nearly 30 years made use of the DPFI depreciation accounts unnecessary. Profits, interest, depreciation, and taxes are implicitly included in Dr. Keeler's and our computation of the capital cost accounts.

c. Adding the DPFI cost model's methods of estimating block-time.

d. Adding the DPFI cost model's method of estimating cargo revenues used to reduce expense and modifying it to account for all reported offsetting cargo revenue.

3. Increased market sample:

We modified Dr. Keeler's sample of 30 high-density city- pair air markets by adding medium- and low-density markets and separate Alaska-Hawaii markets to obtain more representative sets of 48 and 110 markets. The 48 market set was used to provide a

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1/Hereafter referred to as the "DPFI cost model," this model was developed as part of the CAB's Domestic Passenger Fare Investigation (DPFI) in the late 1960s and is now maintained, updated, and used by the CAB's Bureau of Accounts and Statistics to provide estimates of the impacts of possible fare and cost changes. See "Costing Methodology, Version 6," Domestic Fare Structure, U.S. Civil Aeronautics Board Docket 21866-7. Exhibit No. BC-3999. August 1970.

base for making national level estimates. The 110 market set was used to provide markets for annual fare comparisons similar to Dr. Keeler's.

4. Estimated unregulated fares:

We used each market's distance, the competitive airline industry operating and efficiency assumptions, the modified total cost model, and model inputs obtained from CAB or estimated by us or Dr. Keeler to estimate for each of the years 1969-74, increased efficiency (cost-based or unregulated) air fares (both first class and coach class) for each market in the 48 market set and each market in the 110 market set.

5. Compared unregulated and published fares:

For each of the years 1969-74 we compared the estimated increased efficiency fares (both first class and coach class) for each market to weighted averages of published fares for each market. These weighted averages of published fares--designated "actual annual fares"--were weighted to reflect: (1) the influence of CAB-approved fare changes by weighting fares by revenue passenger-miles by month by market distance before and after fare changes and (2) the influence of discount fares by weighting first class and coach fares by dilution factors (that reflect discount fare types, discount levels, and traffic mix) by market distance.

6. Constructed fare-to-revenue extension method

We constructed a fare to revenue extension method that extended fare estimates for 52 air market cells to revenue estimates for all domestic scheduled passenger operations of the domestic trunk airlines in the 50 states. The fare-to-revenue extension method consisted of the following steps:

a. Represent total market by a 42-cell distance-density matrix for the 48 contiguous State markets, and a set of 10 market cells for Alaska/Hawaii markets.

We represented the entire air market for the airline industry sector in question by a 10 cell set representing Alaska/Hawaii air markets, plus a 6 x 7, 42-cell matrix representing air markets in the 48-contiguous states.

In the 42-cell matrix, a six division axis represented average passenger density (average number of passengers per day) and a 7-division axis represented market distance.

b. Estimate fares per cell:

We estimated first- and coach-class fares for 48 city-pair markets that occupied 48 of the 52 cells. Fares were either increased efficiency fares or published fares, that were weighted to provide more accurate estimates of actual fares and which were designated "actual annual fares." City-pair markets with sufficient information for our review were not available for 4 of the 52 cells.

c. Estimate passengers per cell:

We allocated the revenue-passenger-miles (RPMs) for the airline industry sector in question to the 42 cells using RPM data obtained from the DPFI for 257 city-pair markets in 1969 in the contiguous 48 states (these 1969 data represented two-thirds of the 1969 air travel in the 48 states). In 1969 and in subsequent years, we updated and expanded to 50-state travel using DPFI cost model allocations of all RPM by market distances to modify the 1969 data and 10 additional cells to represent Alaska/Hawaii-mainland travel markets. From these modified RPMs data, we estimated the number of passengers per cell by dividing RPM by distance estimates per cell. These distance estimates were calculated to provide estimates of passengers by market distances consistent with CAB distributions of RPM with market distances. City-pair markets from the sample of 257 markets, and therefore market RPM as well, were located in only 48 of the 52 cells. Consequently 4 of the cells were considered to produce negligible air travel in the review.

d. Estimate revenue per cell:

We estimated the revenue per cell per travel class by multiplying passengers per cell by each cell's corresponding fare estimate.

e. Estimate total revenue:

We estimated total revenue by summing revenue per cell across the 52 cells for the two traffic classes--first class and coach.

7. Estimated unregulated and regulated revenues:

We estimated unregulated revenue from estimated increased efficiency fares (analagous to Dr. Keeler's unregulated or cost-based fares) and regulated revenue from our estimated actual annual fares. We estimated these revenues from these fares using the fare-to-revenue extension method described in six above for each of the years 1969-74.

8. Modify revenues:

Using results from the previous step we modified revenues to insure that estimated actual airline revenues and estimated offset cargo revenues equaled CAB-reported actual airline revenues and offset cargo revenues.

9. Estimated industry-wide excess of actual over estimated fares:

For each of the years 1969-74, we calculated the industry-wide excess of actual over estimated fares due to the domestic trunk airlines' lack of longrun competitive market characteristics. The excess was calculated as the percentage increase in unregulated revenue required to equate unregulated and regulated revenue.

10. Estimated impact of unregulated fares:

For the years 1969-74, we used air travel in RPM, air fares expressed as yields (average fare expressed in cents-per-mile), and a fare elasticity of demand of -1.3 to estimate (1) the impact on demand for air travel of a fare reduction from regulated to unregulated levels, (2) the associated impact on actual and induced air traveler costs and savings, and (3) airline revenue.

ESTIMATED AND ACTUAL AIRLINE FARES FOR 110

CITY-PAIR MARKETS IN 1969

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS CORPUS CHRISTI	351	$ 17.60	$ 25.35	44.0%	$ 25.40	$ 35.40	39.3%
HARTFORD WASH., D. C.	319	17.42	21.22	21.8	25.23	29.42	16.6
KANSAS CITY, MO SPRINGFIELD, MO	145	12.54	13.94	11.1	17.90	19.40	8.4
CLEVELAND DETROIT	94	12.56	11.33	- 9.8	18.07	15.97	-11.7
NORFOLK PHILADELPHIA	215	14.70	18.69	27.1	21.16	26.06	23.2
BALTIMORE BOSTON	370	18.83	23.62	25.4	27.35	32.97	20.6
HARTFORD NEW YORK	107	12.39	10.66	-14.0	17.77	15.04	-15.3
BALTIMORE NEW YORK	179	13.98	15.65	12.0	20.11	21.87	8.8
EL PASO PHOENIX	346	18.03	24.25	34.5	26.12	33.59	28.6
NEW YORK SYRACUSE	197	14.28	15.86	11.0	20.54	22.15	7.8
NEW YORK ROCHESTER	252	15.81	19.75	24.9	22.85	27.40	19.9
BOSTON PHILADELPHIA	274	16.34	20.81	27.4	23.64	28.86	22.1
CHICAGO LOUISVILLE	271	16.27	20.16	23.9	23.52	27.96	18.8
LAS VEGAS LOS ANGELES	227	14.98	19.54	30.5	21.57	27.25	26.3

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS HOUSTON	222	$ 14.87	$ 19.54	31.4%	$ 21.42	$ 27.25	27.2%
CHICAGO ST. LOUIS	256	15.93	19.09	19.9	23.03	26.50	15.1
MIAMI TAMPA	199	14.58	16.51	13.3	21.03	22.94	9.1
BUFFALO NEW YORK	289	16.71	20.81	24.5	24.19	29.00	19.9
CHICAGO CLEVELAND	312	17.25	21.22	23.0	24.97	29.42	17.8
NEW YORK PITTSBURGH	329	17.89	22.73	27.0	25.96	31.50	21.3
BOSTON NEW YORK	191	14.20	15.00	5.6	20.42	20.96	2.6
NEW YORK WASH., D. C.	215	14.70	16.72	13.7	21.16	23.34	10.3
CHICAGO DETROIT	238	15.26	18.23	19.5	21.98	25.43	15.7
CHICAGO MINNEAPOLIS	344	17.98	24.25	34.9	26.05	33.59	28.9
EUGENE SAN FRANCISCO	441	19.77	27.68	40.0	28.90	38.60	33.6
HARTFORD DETROIT	540	22.22	31.84	43.3	32.58	45.71	40.3
HOUSTON KANSAS CITY	643	25.64	38.72	51.1	37.79	55.78	47.6
HARTFORD PITTSBURGH	406	19.13	27.28	42.6	27.97	38.04	36.0

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
MINNEAPOLIS ST. LOUIS	448	$ 19.89	$ 32.44	63.1%	$ 29.07	$ 45.20	55.5%
JACKSONVILLE PHILADELPHIA	749	28.67	40.98	42.9	42.38	58.79	38.7
CHICAGO MEMPHIS	485	20.80	31.13	49.7	30.44	43.96	44.4
BOSTON PITTSBURGH	496	20.98	30.69	46.3	30.71	43.34	41.1
BOSTON DETROIT	623	25.01	35.13	40.5	36.84	50.55	37.2
ATLANTA WASH., D. C.	540	22.22	33.86	52.4	32.58	47.79	46.7
BALTIMORE CHICAGO	613	24.71	33.46	35.4	36.39	48.19	32.4
HARTFORD CHICAGO	777	29.35	41.18	40.3	43.40	59.07	36.1
BOSTON WASH., D. C.	406	19.13	25.32	32.4	27.97	35.33	26.3
CLEVELAND NEW YORK	410	19.20	26.17	36.3	28.08	36.51	30.0
CHICAGO WASH., D. C.	591	24.05	33.46	39.1	35.38	48.19	36.2
CHICAGO PHILADELPHIA	675	26.66	36.16	35.7	39.35	52.00	32.1
SAN FRANCISCO SEATTLE	671	26.10	37.64	44.2	38.46	54.08	40.6
DETROIT NEW YORK	489	20.87	29.21	40.0	30.55	41.26	35.1

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK CHICAGO	721	$ 27.98	$ 38.67	38.2%	$ 41.35	$ 55.54	34.3%
ATLANTA NEW YORK	755	28.81	42.89	48.9	42.60	61.49	44.3
DALLAS MINNEAPOLIS	850	31.31	49.41	57.8	46.81	71.39	52.5
DENVER MEMPHIS	880	32.03	49.60	54.8	47.90	71.66	49.6
CHICAGO SAN ANTONIO	1041	36.16	55.78	54.2	54.15	80.47	48.6
BALTIMORE MIAMI	946	33.64	51.45	52.9	50.32	74.30	47.7
BOSTON TAMPA	1183	41.37	60.68	46.7	62.09	89.06	43.4
HARTFORD MIAMI	1194	41.70	62.54	50.0	62.59	91.76	46.6
CHICAGO NEW ORLEANS	831	30.20	46.43	53.7	45.05	66.48	47.6
ATLANTA BOSTON	946	33.64	50.36	49.7	50.32	72.75	44.6
CLEVELAND MIAMI	1083	37.42	58.71	56.9	56.07	84.65	51.0
CHICAGO HOUSTON	932	33.30	52.91	58.9	49.80	76.39	53.4
CHICAGO TAMPA	1006	35.14	54.76	55.8	52.58	79.02	50.3
DALLAS WASH., D. C.	1161	40.66	60.86	49.7	61.00	88.78	45.5

APPENDIX IV

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
BOSTON CHICAGO	860	$ 31.55	$ 43.78	38.8%	$ 47.17	$ 63.21	34.0%
LOS ANGELES SEATTLE	959	33.95	51.83	52.6	50.79	74.84	47.3
CHICAGO MIAMI	1188	41.55	61.68	48.4	62.36	89.96	44.2
MIAMI NEW YORK	1093	37.71	59.18	56.9	56.52	85.83	51.9
MINNEAPOLIS PHOENIX	1276	42.69	67.65	58.5	64.78	99.18	53.1
LAS VEGAS MINNEAPOLIS	1300	43.45	70.52	62.3	65.96	103.34	56.7
MINNEAPOLIS SAN DIEGO	1532	47.32	73.87	56.1	71.64	110.07	53.6
MINNEAPOLIS SEATTLE	1398	45.22	72.20	59.7	68.57	106.43	55.2
CHICAGO SPOKANE, WASH.	1508	46.92	75.54	61.0	71.06	112.54	58.4
HOUSTON LAS VEGAS	1229	41.21	65.18	58.2	62.48	95.02	52.1
MINNEAPOLIS SAN FRANCISCO	1587	48.28	73.87	53.0	73.04	110.07	50.7
BOSTON MIAMI	1258	42.14	66.22	57.1	63.92	97.10	51.9
DALLAS NEW YORK	1363	44.60	67.78	52.0	67.66	99.97	47.8
CHICAGO PHOENIX	1445	46.08	72.05	56.4	69.83	106.21	52.1

APPENDIX IV

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS LOS ANGELES	1248	$ 41.84	$ 60.82	45.4%	$ 63.46	$ 88.72	39.8%
DALLAS SAN FRANCISCO	1493	46.62	72.89	56.3	70.61	108.62	53.8
CHICAGO LAS VEGAS	1521	47.12	75.73	60.7	71.34	112.81	58.1
NEW ORLEANS SAN FRANCISCO	1915	56.87	93.56	64.5	86.45	140.10	62.1
DALLAS PORTLAND, ORE.	1637	47.48	83.44	75.7	71.76	124.20	73.1
HOUSTON SAN FRANCISCO	1647	47.77	81.94	71.5	72.20	121.99	69.0
DALLAS SEATTLE	1681	48.72	86.97	78.5	73.67	129.57	75.9
LOS ANGELES NEW ORLEANS	1658	48.08	81.22	68.9	72.68	121.08	66.6
SEATTLE ST. LOUIS	1710	49.62	80.53	62.3	75.08	120.05	59.9
CHICAGO SAN DIEGO	1729	49.52	84.78	71.2	74.85	126.34	68.8
DENVER NEW YORK	1627	47.31	77.25	63.3	71.50	115.06	60.9
CHICAGO PORTLAND, ORE.	1748	50.62	84.78	67.5	76.62	126.34	64.9
ATLANTA LOS ANGELES	1934	57.32	93.12	62.5	87.14	139.45	60.0
CHICAGO SEATTLE	1730	50.14	84.78	69.1	75.88	126.34	66.5

APPENDIX IV

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
CHICAGO LOS ANGELES	1740	$ 53.84	$ 84.78	57.5%	$ 82.05	$126.34	54.0%
CHICAGO SAN FRANCISCO	1853	55.13	84.26	52.8	83.75	127.21	51.9
LOS ANGELES TAMPA	2153	60.84	102.35	68.2	89.83	156.02	73.7
LOS ANGELES PITTSBURGH	2124	60.17	101.29	68.4	88.83	153.47	72.8
CLEVELAND LOS ANGELES	2046	58.36	97.92	67.8	86.15	147.54	71.3
DETROIT SAN FRANCISCO	2086	59.29	95.52	61.1	87.53	144.82	65.5
ATLANTA SAN FRANCISCO	2141	60.56	101.73	68.0	89.42	154.12	72.4
LOS ANGELES WASH., D. C.	2288	63.96	109.10	70.6	94.48	166.94	76.7
MIAMI SAN FRANCISCO	2589	72.29	123.53	70.9	110.50	189.67	71.6
NEW YORK SEATTLE	2408	67.08	115.33	71.9	102.38	177.98	73.8
PHILADELPHIA SAN FRANCISCO	2526	70.37	112.30	59.6	107.49	177.48	65.1
BOSTON SAN FRANCISCO	2703	74.80	120.75	61.4	114.32	185.44	62.2
LOS ANGELES PHILADELPHIA	2396	66.18	112.31	69.7	97.37	174.14	78.8
BOSTON LOS ANGELES	2600	72.45	120.75	66.7	110.73	187.09	69.0

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK SAN FRANCISCO	2574	$ 72.14	$115.33	59.9%	$110.30	$178.78	62.1%
LOS ANGELES NEW YORK	2453	69.03	115.33	67.1	105.49	178.78	69.5
ANCHORAGE SEATTLE	1448	44.64	86.10	92.8	67.11	124.00	84.8
SAN FRANCISCO HAWAII	2408	63.40	99.66	57.2	94.86	150.00	58.1
LOS ANGELES HAWAII	2573	67.07	99.66	48.6	100.38	150.00	49.4
PORTLAND, ORE. HAWAII	2603	65.65	104.07	58.5	97.91	140.00	43.0
SEATTLE HAWAII	2677	67.28	104.07	54.7	100.35	140.00	39.5
ANCHORAGE CHICAGO	2846	89.38	170.30	90.5	136.59	240.00	75.7
FAIRBANKS NEW YORK	3278	119.91	226.59	89.0	181.19	284.00	56.7
DALLAS HAWAII	3785	101.81	158.08	55.3	153.88	234.00	52.1
CHICAGO HAWAII	4248	107.67	188.61	75.2	161.96	261.00	61.2
NEW YORK HAWAII	4974	164.99	235.58	42.8	254.95	305.00	19.6

ESTIMATED AND ACTUAL AIRLINE FARES FOR 110

CITY-PAIR MARKETS IN 1970

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS CORPUS CHRISTI	351	$ 19.76	$ 25.80	30.6%	$ 29.33	$ 35.78	22.0%
HARTFORD WASH., D. C.	319	18.99	24.36	28.3	28.16	33.51	19.0
KANSAS CITY, MO SPRINGFIELD, MO	145	14.11	15.68	11.1	20.51	21.77	6.1
CLEVELAND DETROIT	94	12.88	13.19	2.4	18.61	18.31	-1.6
NORFOLK PHILADELPHIA	215	16.07	19.00	18.2	23.58	26.26	11.4
BALTIMORE BOSTON	370	20.50	26.64	30.0	30.52	36.92	21.0
HARTFORD NEW YORK	107	13.21	13.19	- 0.2	19.12	18.31	-4.2
BALTIMORE NEW YORK	179	15.19	17.34	14.2	22.22	23.97	7.9
EL PASO PHOENIX	346	19.64	26.01	32.4	29.16	35.78	22.7
NEW YORK SYRACUSE	197	15.62	18.17	16.3	22.89	25.11	9.7
NEW YORK ROCHESTER	252	17.29	20.65	19.5	25.51	28.41	11.4
BOSTON PHILADELPHIA	274	17.85	22.70	27.2	26.39	31.23	18.3
CHICAGO LOUISVILLE	277	17.91	22.70	26.7	26.49	31.23	17.9
LAS VEGAS LOS ANGELES	227	16.39	19.83	20.9	24.08	27.40	13.8

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS HOUSTON	222	$ 16.24	$ 19.83	22.1%	$ 23.84	$ 27.40	14.9%
CHICAGO ST. LOUIS	256	17.39	20.65	18.8	25.68	28.41	10.6
MIAMI TAMPA	199	15.85	18.17	14.6	23.28	25.11	7.9
BUFFALO NEW YORK	289	18.23	22.70	24.5	26.98	31.23	15.7
CHICAGO CLEVELAND	312	18.83	24.36	29.4	27.90	33.51	20.1
NEW YORK PITTSBURGH	329	19.24	25.19	30.9	28.53	34.64	21.4
BOSTON NEW YORK	191	15.48	17.34	12.0	22.66	23.97	5.8
NEW YORK WASH., D. C.	215	16.07	19.00	18.2	23.58	26.26	11.4
CHICAGO DETROIT	238	16.67	19.83	18.9	24.50	27.40	11.8
CHICAGO MINNEAPOLIS	344	19.59	26.01	32.8	29.08	35.78	23.0
EUGENE SAN FRANCISCO	441	22.03	29.92	35.8	32.95	41.48	25.9
HARTFORD DETROIT	540	24.72	34.78	40.7	37.15	48.86	31.5
HOUSTON KANSAS CITY	643	27.69	40.26	45.4	41.77	56.82	36.0
HARTFORD PITTSBURGH	406	21.20	28.28	33.4	31.68	39.20	23.7

 APPENDIX V

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
MINNEAPOLIS ST. LOUIS	448	$ 22.21	$ 30.74	38.5%	$ 33.22	$ 42.62	28.3%
JACKSONVILLE PHILADELPHIA	749	30.45	44.56	46.3	46.05	63.05	36.9
CHICAGO MEMPHIS	485	23.30	32.35	38.9	34.95	45.44	30.0
BOSTON PITTSBURGH	496	23.58	33.16	40.7	35.38	46.58	31.6
BOSTON DETROIT	623	27.15	38.65	42.3	40.93	54.55	33.3
ATLANTA WASH., D. C.	540	24.72	35.59	44.0	37.15	49.99	34.6
BALTIMORE CHICAGO	613	26.89	37.03	37.7	40.54	52.27	28.9
HARTFORD CHICAGO	777	31.20	45.25	45.0	47.21	64.15	35.9
BOSTON WASH., D. C.	406	21.20	28.28	33.4	31.68	39.20	23.7
CLEVELAND NEW YORK	410	21.28	29.10	36.8	31.80	40.34	26.9
CHICAGO WASH., D. C.	591	26.34	37.03	40.6	39.67	52.27	31.8
CHICAGO PHILADELPHIA	675	28.50	40.15	40.9	43.03	56.81	32.0
SAN FRANCISCO SEATTLE	671	28.40	40.96	44.2	42.87	57.95	35.2
DETROIT NEW YORK	489	23.42	32.35	38.1	35.15	45.44	29.3

APPENDIX V

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK CHICAGO	721	$ 29.70	$ 42.95	44.6%	$ 44.89	$ 60.77	35.4%
ATLANTA NEW YORK	755	30.60	44.44	45.2	46.29	63.01	36.1
DALLAS MINNEAPOLIS	850	33.32	49.26	47.8	50.58	69.84	38.1
DENVER MEMPHIS	880	34.07	49.92	46.5	51.74	70.97	37.2
CHICAGO SAN ANTONIO	1041	38.34	57.35	49.6	58.36	81.74	40.1
BALTIMORE MIAMI	946	35.81	52.69	47.1	54.44	74.90	37.6
BOSTON TAMPA	1183	43.01	63.35	47.3	65.64	91.39	39.2
HARTFORD MIAMI	1194	43.29	63.35	46.3	66.07	91.39	38.3
CHICAGO NEW ORLEANS	831	32.10	48.45	50.9	48.57	68.70	41.4
ATLANTA BOSTON	946	35.81	53.49	49.4	54.44	76.04	39.7
CLEVELAND MIAMI	1083	39.44	58.59	48.5	60.08	84.02	39.9
CHICAGO HOUSTON	932	35.46	53.49	50.8	53.89	76.04	41.1
CHICAGO TAMPA	1006	37.37	55.75	49.2	56.85	79.46	39.8
DALLAS WASH., D. C.	1161	42.40	62.56	47.6	64.69	90.26	39.5

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES			FIRST CLASS FARES		
		ESTIMATED FARES	ACTUAL FARES	MARK UP	ESTIMATED FARES	ACTUAL FARES	MARK UP
BOSTON CHICAGO	860	$ 33.57	$ 49.12	46.3%	$ 50.96	$ 69.83	37.0%
LOS ANGELES SEATTLE	959	36.14	54.15	49.8	54.95	77.18	40.5
CHICAGO MIAMI	1188	43.13	63.35	46.9	65.83	91.39	38.8
MIAMI NEW YORK	1093	39.70	59.38	49.6	60.47	85.16	40.8
MINNEAPOLIS PHOENIX	1276	43.95	66.09	50.4	67.04	95.95	43.1
LAS VEGAS MINNEAPOLIS	1300	44.59	67.66	51.7	68.04	98.22	44.3
MINNEAPOLIS SAN DIEGO	1532	50.69	75.39	48.7	77.64	111.30	43.3
MINNEAPOLIS SEATTLE	1398	47.30	77.13	63.1	72.26	111.28	54.0
CHICAGO SPOKANE, WASH.	1508	50.03	74.62	49.1	76.61	110.16	43.8
HOUSTON LAS VEGAS	1229	42.69	64.92	52.1	65.08	93.67	43.9
MINNEAPOLIS SAN FRANCISCO	1587	52.25	75.39	44.3	80.09	111.30	39.0
BOSTON MIAMI	1258	43.45	65.31	50.3	66.27	94.81	43.1
DALLAS NEW YORK	1363	46.37	70.36	51.7	70.82	102.77	45.1
CHICAGO PHOENIX	1445	48.58	73.07	50.4	74.26	106.73	43.7

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS LOS ANGELES	1248	$ 43.21	$ 64.92	50.3%	$ 65.89	$ 93.67	42.2%
DALLAS SAN FRANCISCO	1493	49.54	73.85	49.1	75.84	109.03	43.8
CHICAGO LAS VEGAS	1521	50.35	75.39	49.7	77.12	111.30	44.3
NEW ORLEANS SAN FRANCISCO	1915	60.00	91.43	52.4	92.87	135.15	45.5
DALLAS PORTLAND, ORE.	1637	51.35	79.23	54.3	79.20	116.97	47.7
HOUSTON SAN FRANCISCO	1647	51.59	78.42	52.0	79.58	115.77	45.5
DALLAS SEATTLE	1681	52.47	81.83	55.9	80.97	120.95	49.4
LOS ANGELES NEW ORLEANS	1658	51.92	81.06	56.1	80.10	119.82	49.6
SEATTLE ST. LOUIS	1710	53.24	83.36	56.6	82.17	123.22	50.0
CHICAGO SAN DIEGO	1729	53.70	85.67	59.5	82.89	126.63	52.8
DENVER NEW YORK	1627	51.11	79.23	55.0	78.82	116.97	48.4
CHICAGO PORTLAND, ORE.	1748	54.16	85.67	58.2	83.61	126.63	51.4
ATLANTA LOS ANGELES	1934	60.61	92.20	52.1	93.85	136.29	45.2
CHICAGO SEATTLE	1730	53.72	85.67	59.5	82.93	126.63	52.7

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
CHICAGO - LOS ANGELES	1740	$ 53.97	$ 85.67	58.7%	$ 83.31	126.63	52.0%
CHICAGO SAN FRANCISCO	1853	58.33	85.67	46.9	90.26	126.63	40.3
LOS ANGELES TAMPA	2153	66.29	99.87	50.7	101.70	150.51	48.0
LOS ANGELES PITTSBURGH	2124	65.33	101.01	54.6	100.16	151.27	51.0
CLEVELAND LOS ANGELES	2046	62.93	96.80	53.8	96.37	144.07	49.5
DETROIT SAN FRANCISCO	2086	64.07	94.49	47.5	98.16	141.50	44.2
ATLANTA SAN FRANCISCO	2141	65.83	99.87	51.7	100.95	149.56	48.2
LOS ANGELES WASH., D. C.	2288	71.01	107.94	52.0	109.21	163.38	49.6
MIAMI SAN FRANCISCO	2589	78.48	116.78	48.8	121.53	179.11	47.4
NEW YORK SEATTLE	2408	72.81	113.70	56.2	112.50	172.86	53.7
PHILADELPHIA SAN FRANCISCO	2526	78.29	111.40	42.3	121.38	170.10	40.1
BOSTON SAN FRANCISCO	2703	81.41	118.31	45.3	126.11	181.47	43.9
LOS ANGELES PHILADELPHIA	2396	75.06	111.40	48.4	115.53	169.35	46.6
BOSTON LOS ANGELES	2600	78.76	118.31	50.2	121.97	181.47	48.8

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK SAN FRANCISCO	2574	$ 78.20	$113.70	45.4%	$121.11	$174.40	44.0%
LOS ANGELES NEW YORK	2453	74.35	113.70	52.9	114.98	173.62	51.0
SAN FRANCISCO HAWAII	2408	69.69	92.94	33.4	107.30	150.00	39.8
LOS ANGELES HAWAII	2573	73.64	92.94	26.2	113.45	150.00	32.2
PORTLAND, ORE. HAWAII	2603	69.55	92.94	33.6	106.51	140.00	31.4
SEATTLE HAWAII	2677	72.60	92.94	28.0	111.34	140.00	25.7
DALLAS HAWAII	3785	110.53	178.81	61.8	174.64	257.75	47.6
CHICAGO HAWAII	4248	114.06	158.47	38.9	178.12	271.92	52.7
NEW YORK HAWAII	4974	174.48	203.43	16.6	277.96	310.00	11.5
SEATTLE ANCHORAGE	1448	48.17	95.71	98.7	74.25	124.37	67.5
ANCHORAGE CHICAGO	2846	94.75	171.24	80.7	148.99	248.00	66.5
FAIRBANKS NEW YORK	3278	114.35	185.44	62.2	177.09	264.00	49.1

ESTIMATED AND ACTUAL AIRLINE FARES FOR 110

CITY-PAIR MARKETS IN 1971

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS CORPUS CHRISTI	351	$ 19.62	$ 24.31	23.9%	$ 27.97	$ 33.72	20.6%
HARTFORD WASH., D. C.	319	19.39	25.82	33.2	27.67	35.52	28.4
KAN. CITY, MO. SPRINGFIELD, MO.	145	16.45	16.48	0.2	23.47	22.88	-2.5
CLEVELAND DETROIT	94	15.80	14.09	-10.8	22.60	19.57	-13.4
NORFOLK PHILADELPHIA	215	16.89	19.67	16.5	24.00	27.19	13.3
BALTIMORE BOSTON	370	21.00	27.99	33.3	30.09	38.80	28.9
HARTFORD NEW YORK	107	15.45	14.09	- 8.8	22.00	19.57	-11.1
BALTIMORE NEW YORK	179	16.40	18.08	10.3	23.31	24.99	7.2
EL PASO PHOENIX	346	20.09	27.42	36.5	28.72	37.71	31.3
NEW YORK SYRACUSE	197	16.53	19.45	17.7	23.48	26.89	14.5
NEW YORK ROCHESTER	252	17.92	21.85	21.9	25.53	30.05	17.7
BOSTON PHILADELPHIA	274	18.37	24.23	31.9	26.18	33.33	27.3
CHICAGO LOUISVILLE	277	18.43	24.21	31.3	26.27	33.30	26.8
LAS VEGAS LOS ANGELES	257	17.96	21.04	17.2	25.59	29.09	13.7

 APPENDIX VI

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS HOUSTON	222	$ 17.03	$ 21.62	27.0%	$ 24.20	$ 29.88	23.5%
CHICAGO ST. LOUIS	256	18.01	21.85	21.3	25.66	30.05	17.1
MIAMI TAMPA	199	16.83	18.88	12.1	23.94	26.09	9.0
BUFFALO NEW YORK	289	18.68	24.23	29.8	26.63	33.33	25.2
CHICAGO CLEVELAND	312	19.22	25.82	34.4	27.42	35.52	29.5
NEW YORK PITTSBURGH	329	19.65	27.20	38.4	28.07	37.41	33.3
BOSTON NEW YORK	191	16.49	18.66	13.1	23.43	25.79	10.1
NEW YORK WASH., D. C.	215	16.89	19.67	16.5	24.00	27.19	13.3
CHICAGO DETROIT	238	17.36	21.04	21.2	24.68	29.09	17.9
CHICAGO MINNEAPOLIS	344	20.04	27.42	36.8	28.64	37.71	31.7
EUGENE SAN FRANCISCO	441	22.70	31.15	37.3	32.70	43.18	32.1
HARTFORD DETROIT	540	25.52	36.78	44.1	36.94	51.67	39.9
HOUSTON KANSAS CITY, MO.	643	28.98	42.03	45.1	42.16	59.33	40.7
HARTFORD PITTSBURGH	406	21.87	29.57	35.2	31.48	40.99	30.2

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
MINNEAPOLIS ST. LOUIS	448	$ 22.86	$ 31.94	39.8%	$ 32.93	$ 44.28	34.4%
JACKSONVILLE PHILADELPHIA	749	32.11	46.56	45.0	46.87	65.88	40.6
CHICAGO MEMPHIS	485	23.99	34.45	43.6	34.65	48.38	39.6
BOSTON PITTSBURGH	496	24.23	35.22	45.4	34.99	49.48	41.4
BOSTON DETROIT	623	28.35	40.48	42.8	41.22	57.14	38.6
ATLANTA WASH., D. C.	540	25.52	37.56	47.2	36.94	52.76	42.8
BALTIMORE CHICAGO	613	28.03	38.93	38.9	40.73	54.95	34.9
HARTFORD CHICAGO	777	32.90	47.78	45.2	48.05	67.74	41.0
BOSTON WASH., D. C.	406	21.87	29.57	35.2	31.48	40.99	30.2
CLEVELAND NEW YORK	410	21.98	30.36	38.1	31.64	42.09	33.0
CHICAGO WASH., D. C.	591	27.36	38.93	42.3	39.72	54.95	38.3
CHICAGO PHILADELPHIA	675	29.96	41.92	39.9	43.64	59.31	35.9
SAN FRANCISCO SEATTLE	671	29.85	42.70	43.0	43.48	60.41	38.9
DETROIT NEW YORK	489	24.07	34.45	43.1	34.77	48.38	39.2

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK CHICAGO	721	$ 31.32	$ 45.02	43.7%	$ 45.69	$ 63.69	39.4%
ATLANTA NEW YORK	755	32.27	46.44	43.9	47.11	65.84	39.8
DALLAS MINNEAPOLIS	850	35.05	51.63	47.3	51.29	73.21	42.7
DENVER MEMPHIS	880	35.88	52.14	45.3	52.54	74.11	41.1
CHICAGO SAN ANTONIO	1041	40.36	59.67	47.8	59.26	85.05	43.5
BALTIMORE MIAMI	946	37.66	55.21	46.6	55.21	78.49	42.2
BOSTON TAMPA	1183	45.51	66.39	45.9	67.19	95.78	42.6
HARTFORD MIAMI	1194	45.86	66.39	44.7	67.72	95.78	41.4
CHICAGO NEW ORLEANS	831	33.78	50.86	50.6	49.29	72.12	46.3
ATLANTA BOSTON	946	37.66	55.98	48.6	55.21	79.58	44.1
CLEVELAND MIAMI	1084	41.65	62.03	49.0	61.20	88.00	43.8
CHICAGO HOUSTON	945	37.64	55.98	48.7	55.17	79.58	44.3
CHICAGO TAMPA	1006	41.47	58.14	40.2	61.14	82.86	35.5
DALLAS WASH., D. C.	1161	44.87	65.63	46.3	66.22	94.69	43.0

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
BOSTON CHICAGO	860	$ 35.31	$ 51.37	45.5%	$ 51.68	$ 73.02	41.3%
LOS ANGELES SEATTLE	959	38.01	56.60	48.9	55.72	80.68	44.8
CHICAGO MIAMI	1188	45.70	66.39	45.3	67.48	95.78	41.9
MIAMI NEW YORK	1093	41.93	62.13	48.1	61.64	89.09	44.5
MINNEAPOLIS PHOENIX	1276	47.18	68.99	46.2	71.60	100.16	39.9
LAS VEGAS MINNEAPOLIS	1300	47.93	70.50	47.1	72.77	102.34	40.6
MINNEAPOLIS SAN DIEGO	1532	53.88	78.91	46.5	81.95	116.50	42.2
MINNEAPOLIS SEATTLE	1398	50.59	79.59	57.3	76.86	116.25	51.2
CHICAGO SPOKANE, WASH.	1508	53.24	78.17	46.8	80.98	115.41	42.5
HOUSTON LAS VEGAS	1229	45.77	67.90	48.4	69.41	97.97	41.1
MINNEAPOLIS SAN FRANCISCO	1587	55.40	78.91	42.4	84.30	116.50	38.2
BOSTON MIAMI	1258	46.65	68.24	46.3	70.77	99.06	40.0
DALLAS NEW YORK	1363	49.66	73.60	48.2	75.43	107.50	42.5
CHICAGO PHOENIX	1445	51.90	76.59	47.6	78.88	111.88	41.8

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS LOS ANGELES	1248	$ 46.33	$ 67.90	46.6%	$ 70.27	$ 97.97	39.4%
DALLAS SAN FRANCISCO	1493	52.84	77.43	46.5	80.37	114.32	42.2
CHICAGO LAS VEGAS	1521	53.59	78.91	47.3	81.50	116.50	42.9
NEW ORLEANS SAN FRANCISCO	1915	64.89	95.71	47.5	98.37	141.47	43.8
DALLAS PORTLAND, ORE.	1639	55.67	82.62	48.4	83.94	121.97	45.3
HOUSTON SAN FRANCISCO	1647	55.88	85.40	52.8	84.26	126.08	49.6
DALLAS SEATTLE	1681	56.84	86.03	51.4	85.72	127.17	48.4
LOS ANGELES NEW ORLEANS	1658	56.24	85.29	51.7	84.80	126.08	48.7
SEATTLE ST. LOUIS	1710	57.66	87.51	51.8	86.98	129.36	48.7
CHICAGO SAN DIEGO	1729	58.16	89.73	54.3	87.74	132.64	51.2
DENVER NEW YORK	1627	55.36	82.62	49.2	83.46	121.97	46.1
CHICAGO PORTLAND, ORE.	1748	58.65	91.41	55.8	88.49	135.12	52.7
ATLANTA LOS ANGELES	1934	65.56	96.45	47.1	99.41	142.56	43.4
CHICAGO SEATTLE	1730	58.19	89.73	54.2	87.78	132.64	51.1

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
CHICAGO LOS ANGELES	1740	$ 58.45	$ 89.73	53.5%	$ 88.17	$132.64	50.4%
CHICAGO SAN FRANCISCO	1854	63.12	89.79	42.2	95.66	132.72	38.7
LOS ANGELES TAMPA	2153	70.34	104.24	48.2	106.16	157.08	48.0
LOS ANGELES PITTSBURGH	2124	69.40	105.72	52.3	104.71	158.32	51.2
CLEVELAND LOS ANGELES	2046	66.86	101.45	51.7	100.77	150.98	49.8
DETROIT SAN FRANCISCO	2086	68.15	99.06	45.4	102.77	148.35	44.3
ATLANTA SAN FRANCISCO	2141	69.94	104.24	49.0	105.53	156.10	47.9
LOS ANGELES WASH., D. C.	2288	74.25	112.92	52.1	112.15	170.92	52.4
MIAMI SAN FRANCISCO	2589	82.01	121.85	48.6	125.13	186.89	49.4
NEW YORK SEATTLE	2408	76.77	118.89	54.9	117.02	180.74	54.5
PHILADELPHIA SAN FRANCISCO	2526	81.37	116.67	43.4	124.57	178.15	43.0
BOSTON SAN FRANCISCO	2703	85.73	123.94	44.6	130.95	190.10	45.2
LOS ANGELES PHILADELPHIA	2396	76.85	116.67	51.8	116.08	177.37	52.8
BOSTON LOS ANGELES	2600	82.41	123.88	50.3	125.77	190.00	51.1

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
NEW YORK SAN FRANCISCO	2574	$ 81.60	$118.89	45.7%	$124.52	$182.35	46.4%
LOS ANGELES NEW YORK	2453	77.96	118.89	52.5	118.86	181.54	52.7
SEATTLE ANCHORAGE	1448	52.17	95.56	83.2	78.62	130.00	65.4
SAN FRANCISCO HAWAII	2408	72.06	100.26	39.1	107.85	176.46	63.6
LOS ANGELES HAWAII	2573	76.01	100.26	31.9	113.79	176.46	55.1
PORTLAND, ORE. HAWAII	2603	75.34	101.14	34.2	113.17	176.46	55.9
SEATTLE HAWAII	2677	76.52	99.73	30.3	114.54	176.46	54.1
ANCHORAGE CHICAGO	2846	104.04	171.24	64.6	159.74	248.00	55.3
FAIRBANKS NEW YORK	3278	113.32	185.44	63.6	171.54	264.00	53.9
DALLAS HAWAII	3785	113.79	151.85	33.5	170.60	264.00	54.7
CHICAGO HAWAII	4248	121.87	158.47	30.0	182.81	299.00	63.6
NEW YORK HAWAII	4974	192.21	206.72	7.5	298.35	343.00	15.0

ESTIMATED AND ACTUAL AIRLINE FARES FOR 110

CITY-PAIR MARKETS IN 1972

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
BOSTON BURLINGTON	182	$ 17.60	$ 20.13	14.4%	$ 25.76	$ 27.82	8.0%
HARTFORD WASH., D. C.	319	20.87	26.50	26.9	30.82	36.45	18.3
KANSAS CITY SPRINGFIELD	145	16.94	16.93	-0.1	24.77	23.52	-5.1
CLEVELAND DETROIT	94	16.95	14.55	-14.2	24.92	20.20	-18.9
NORFOLK PHILADELPHIA	215	18.36	20.13	9.6	26.93	27.82	3.3
BALTIMORE BOSTON	370	23.16	28.66	23.8	34.47	39.73	15.2
HARTFORD NEW YORK	107	17.03	14.55	-14.6	25.01	20.20	-19.2
BALTIMORE NEW YORK	179	17.90	18.54	3.6	26.27	25.63	- 2.5
EL PASO PHOENIX	346	21.59	28.09	30.1	31.93	38.64	21.0
NEW YORK SYRACUSE	197	18.03	19.89	10.4	26.42	27.49	4.0
NEW YORK ROCHESTER	252	19.43	22.28	14.7	28.60	30.64	7.1
BOSTON PHILADELPHIA	274	19.87	24.91	25.3	29.28	34.26	17.0
CHICAGO LOUISVILLE	277	19.94	24.91	24.9	29.38	34.26	16.6
LAS VEGAS LOS ANGELES	227	18.64	21.48	15.3	27.36	29.69	8.5

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
DALLAS HOUSTON	222	$ 18.52	$ 22.04	19.0%	$ 27.17	$ 30.46	12.1%
CHICAGO ST. LOUIS	256	19.52	22.28	14.1	28.75	30.64	6.6
MIAMI TAMPA	199	18.34	19.34	5.4	26.95	26.72	-0.8
BUFFALO NEW YORK	289	20.16	24.91	23.5	29.72	34.26	15.3
CHICAGO CLEVELAND	312	20.69	26.50	28.1	30.52	36.45	19.4
NEW YORK PITTSBURGH	329	21.15	27.85	31.7	31.24	38.30	22.6
BOSTON NEW YORK	191	17.99	19.10	6.1	26.38	26.39	0.0
NEW YORK WASH., D. C.	215	18.36	20.13	9.6	26.93	27.82	3.3
CHICAGO DETROIT	238	18.85	21.48	14.0	27.68	29.69	7.3
CHICAGO MINNEAPOLIS	344	21.53	28.09	30.5	31.84	38.64	21.3
EUGENE SAN FRANCISCO	441	24.20	31.82	31.5	36.28	44.11	21.6
HARTFORD DETROIT	540	26.78	37.80	41.1	40.30	52.87	31.2
HOUSTON KANSAS CITY	643	30.18	43.12	42.9	45.67	60.86	33.2
HARTFORD PITTSBURGH	406	23.34	30.24	29.6	34.93	41.92	20.0

APPENDIX VII

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
MINNEAPOLIS ST. LOUIS	448	$ 24.36	$ 32.61	33.9%	$ 36.52	$ 45.20	23.8%
JACKSONVILLE PHILADELPHIA	749	33.26	47.64	43.2	50.54	67.41	33.4
CHICAGO MEMPHIS	485	25.25	35.45	40.4	37.89	49.58	30.8
BOSTON PITTSBURGH	496	25.50	36.23	42.1	38.30	50.68	32.3
BOSTON DETROIT	623	29.58	41.33	39.7	44.74	58.34	30.4
ATLANTA WASH., D. C.	540	26.78	38.58	44.1	40.30	53.96	33.9
BALTIMORE CHICAGO	613	29.26	39.78	36.0	44.22	56.15	27.0
HARTFORD CHICAGO	777	34.01	48.83	43.6	51.71	69.23	33.9
BOSTON WASH., D. C.	406	23.36	30.00	28.4	34.97	41.59	18.9
CLEVELAND NEW YORK	410	23.44	31.03	32.4	35.10	43.01	22.6
CHICAGO WASH., D. C.	591	28.59	39.78	39.1	43.17	56.15	30.1
CHICAGO PHILADELPHIA	675	31.19	43.00	37.9	47.28	60.84	28.7
SAN FRANCISCO SEATTLE	671	31.05	43.78	41.0	47.05	61.94	31.6
DETROIT NEW YORK	489	25.35	35.45	39.8	38.06	49.58	30.3

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK CHICAGO	721	$ 32.51	$ 46.10	41.8%	$ 49.37	$ 65.22	32.1%
ATLANTA NEW YORK	755	33.42	47.52	42.2	50.79	67.37	32.7
DALLAS MINNEAPOLIS	850	36.24	52.92	46.0	54.81	75.03	36.9
DENVER MEMPHIS	880	37.03	53.52	44.5	56.03	76.08	35.8
CHICAGO SAN ANTONIO	1041	41.36	61.27	48.1	62.78	87.33	39.1
BALTIMORE MIAMI	946	38.75	56.60	46.1	58.70	80.46	37.1
BOSTON TAMPA	1183	46.14	67.91	47.2	70.45	97.98	39.1
HARTFORD MIAMI	1194	46.43	67.91	46.3	70.90	97.98	38.2
CHICAGO NEW ORLEANS	831	34.87	52.14	49.5	52.56	73.93	40.7
ATLANTA BOSTON	946	38.75	57.37	48.0	58.70	81.55	38.9
CLEVELAND MIAMI	1083	42.60	62.97	47.8	64.73	90.30	39.5
CHICAGO HOUSTON	932	38.38	57.37	49.5	58.14	81.55	40.3
CHICAGO TAMPA	1006	40.31	59.52	47.6	61.14	84.83	38.8
DALLAS WASH., D. C.	1161	45.45	67.15	47.7	69.37	96.89	39.7

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
BOSTON CHICAGO	860	$ 36.51	$ 52.75	44.5%	$ 55.22	$ 74.99	35.8%
LOS ANGELES SEATTLE	959	39.09	57.98	48.3	59.23	82.64	39.5
CHICAGO MIAMI	1188	46.27	67.91	46.8	70.66	97.98	38.7
MIAMI NEW YORK	1093	42.87	63.73	48.7	65.14	91.39	40.3
MINNEAPOLIS PHOENIX	1276	48.06	70.74	47.2	73.49	102.68	39.7
LAS VEGAS MINNEAPOLIS	1300	48.80	72.24	48.0	74.66	104.87	40.5
MINNEAPOLIS SAN DIEGO	1532	55.78	80.66	44.6	85.83	119.08	38.8
MINNEAPOLIS SEATTLE	1398	51.43	81.53	58.5	78.76	119.09	51.2
CHICAGO SPOKANE, WASH.	1508	55.02	79.92	45.3	84.62	117.99	39.4
HOUSTON LAS VEGAS	1229	46.72	69.66	49.1	71.40	100.50	40.8
MINNEAPOLIS SAN FRANCISCO	1587	57.30	80.66	40.8	88.20	119.08	35.0
BOSTON MIAMI	1258	47.53	69.98	47.2	72.67	101.59	39.8
DALLAS NEW YORK	1363	50.51	75.32	49.1	77.33	110.01	42.3
CHICAGO PHOENIX	1445	52.66	78.54	49.1	80.68	114.71	42.2

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS LOS ANGELES	1248	$ 47.27	$ 69.66	47.4%	$ 72.26	$100.50	39.1%
DALLAS SAN FRANCISCO	1493	54.76	79.18	44.6	84.23	116.90	38.8
CHICAGO LAS VEGAS	1521	55.49	80.66	45.4	85.37	119.08	39.5
NEW ORLEANS SAN FRANCISCO	1915	66.25	97.80	47.6	103.34	144.57	39.9
DALLAS PORTLAND, ORE.	1637	57.79	84.59	46.4	89.60	124.88	39.4
HOUSTON SAN FRANCISCO	1647	58.05	87.33	50.4	90.01	128.93	43.2
DALLAS SEATTLE	1681	59.01	87.96	49.1	91.51	130.02	42.1
LOS ANGELES NEW ORLEANS	1658	58.34	87.22	49.5	90.45	128.93	42.5
SEATTLE ST. LOUIS	1710	59.83	89.44	49.5	92.82	132.21	42.4
CHICAGO SAN DIEGO	1729	60.40	91.66	51.8	93.72	135.49	44.6
DENVER NEW YORK	1627	57.46	84.59	47.2	89.07	124.88	40.2
CHICAGO PORTLAND, ORE.	1748	60.96	93.22	52.9	94.62	137.79	45.6
ATLANTA LOS ANGELES	1934	66.91	98.54	47.3	104.40	145.66	39.5
CHICAGO SEATTLE	1730	60.42	91.66	51.7	93.76	135.49	44.5

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
CHICAGO LOS ANGELES	1740	$ 60.76	$ 91.66	50.9%	$ 94.29	$135.49	43.7%
CHICAGO SAN FRANCISCO	1853	64.39	91.66	42.4	100.37	135.49	35.0
LOS ANGELES TAMPA	2153	71.01	106.66	50.2	111.25	160.74	44.5
LOS ANGELES PITTSBURGH	2124	70.08	108.14	54.3	109.77	161.94	47.5
CLEVELAND LOS ANGELES	2046	67.49	103.72	53.7	105.61	154.36	46.2
DETROIT SAN FRANCISCO	2086	68.85	101.27	47.1	107.79	151.65	40.7
ATLANTA SAN FRANCISCO	2141	70.61	106.66	51.1	110.61	159.73	44.4
LOS ANGELES WASH., D. C.	2288	74.59	115.54	54.9	116.91	174.88	49.6
MIAMI SAN FRANCISCO	2589	83.64	124.63	49.0	126.20	191.15	51.5
NEW YORK SEATTLE	2408	78.67	121.67	54.6	118.55	184.97	56.0
PHILADELPHIA SAN FRANCISCO	2526	81.87	119.23	45.6	123.35	182.06	47.6
BOSTON SAN FRANCISCO	2703	87.19	126.67	45.3	131.71	194.28	47.5
LOS ANGELES PHILADELPHIA	2396	77.38	119.23	54.1	121.88	181.27	48.7
BOSTON LOS ANGELES	2600	84.03	126.63	50.7	126.82	194.22	53.2

 APPENDIX VII

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
NEW YORK SAN FRANCISCO	2574	$ 83.14	$121.67	46.3%	$125.43	$186.61	48.8%
LOS ANGELES NEW YORK	2453	79.76	121.67	52.5	120.20	185.78	54.6
ANCHORAGE SEATTLE	1448	54.58	95.87	75.7	85.29	130.00	52.4
SAN FRANCISCO HAWAII	2408	74.02	106.56	44.0	113.29	190.00	67.7
LOS ANGELES HAWAII	2573	76.97	106.56	38.4	117.74	190.00	61.4
PORTLAND, ORE. HAWAII	2603	71.28	106.56	49.5	108.14	190.00	75.7
SEATTLE HAWAII	2677	73.32	106.56	45.3	110.62	190.00	71.8
ANCHORAGE CHICAGO	2846	106.10	171.24	61.4	164.39	248.00	50.9
FAIRBANKS NEW YORK	3278	120.45	185.44	54.0	185.72	264.00	42.2
DALLAS HAWAII	3785	111.12	167.10	50.4	170.48	264.00	54.9
CHICAGO HAWAII	4248	113.62	162.55	43.1	172.78	299.00	73.1
NEW YORK HAWAII	4974	164.48	206.72	25.7	253.38	343.00	35.4

ESTIMATED AND ACTUAL AIRLINE FARES FOR 110 CITY-PAIR MARKETS IN 1973

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
BOSTON BURLINGTON	182	$ 19.31	$ 20.69	7.1%	$ 28.36	$ 28.59	.8%
HARTFORD WASH., D. C.	319	22.71	27.18	19.7	33.40	37.39	11.9
KANSAS CITY, MO SPRINGFIELD	145	19.01	17.50	-7.9	28.00	24.31	-13.2
CLEVELAND DETROIT	94	18.63	15.12	-18.8	27.59	20.99	-23.9
NORFOLK PHILADELPHIA	215	20.08	20.75	3.3	29.36	28.68	- 2.3
BALTIMORE BOSTON	370	24.19	29.34	21.3	35.52	40.67	14.5
HARTFORD NEW YORK	107	18.88	15.18	-19.6	27.95	21.09	-24.5
BALTIMORE NEW YORK	179	19.63	19.10	- 2.7	28.76	26.39	- 8.2
EL PASO PHOENIX	346	23.35	28.77	23.2	34.34	39.58	15.2
NEW YORK SYRACUSE	197	19.72	19.96	1.2	28.85	27.58	- 4.4
NEW YORK ROCHESTER	252	21.27	22.34	5.0	31.29	30.73	- 1.8
BOSTON PHILADELPHIA	274	21.73	25.59	17.8	31.97	35.20	10.1
CHICAGO LOUISVILLE	277	21.80	25.59	17.4	32.07	35.20	9.8
LAS VEGAS LOS ANGELES	227	20.34	21.55	5.9	29.74	29.78	0.1

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
DALLAS HOUSTON	222	$ 20.23	$ 21.55	6.5%	$ 29.58	$ 29.78	0.7%
CHICAGO ST. LOUIS	256	21.35	22.34	4.7	31.40	30.73	- 2.1
MIAMI TAMPA	199	20.16	19.89	- 1.3	29.67	27.49	- 7.3
BUFFALO NEW YORK	289	22.04	25.59	16.1	32.42	35.20	8.6
CHICAGO CLEVELAND	312	22.55	27.18	20.6	33.16	37.39	12.8
NEW YORK PITTSBURGH	329	22.94	27.98	22.0	33.73	38.48	14.1
BOSTON NEW YORK	191	19.70	19.10	-3.1	28.83	26.39	- 8.5
NEW YORK WASH., D. C.	215	20.08	20.69	3.0	29.36	28.59	- 2.6
CHICAGO DETROIT	238	20.56	21.48	4.5	30.07	29.69	- 1.3
CHICAGO MINNEAPOLIS	344	23.31	28.77	23.4	34.29	39.58	15.4
EUGENE SAN FRANCISCO	441	25.54	32.50	27.2	38.14	45.05	18.1
HARTFORD DETROIT	540	29.11	38.47	32.2	43.77	53.81	22.9
HOUSTON KANSAS CITY	643	32.35	44.39	37.2	48.71	62.66	28.6
HARTFORD PITTSBURGH	406	24.52	30.92	26.1	36.56	42.86	17.2

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
MINNEAPOLIS ST. LOUIS	448	$ 25.74	$ 33.29	29.3%	$ 38.45	$ 46.14	20.0%
JACKSONVILLE PHILADELPHIA	749	35.51	48.92	37.8	53.59	69.21	29.1
CHICAGO MEMPHIS	485	27.51	36.13	31.3	41.30	50.53	22.4
BOSTON PITTSBURGH	496	27.83	36.91	32.6	41.78	51.63	23.6
BOSTON DETROIT	623	31.77	42.07	32.4	47.82	59.38	24.2
ATLANTA WASH., D. C.	540	29.11	39.32	35.1	43.77	55.00	25.7
BALTIMORE CHICAGO	613	31.48	40.52	28.7	47.38	57.19	20.7
HARTFORD CHICAGO	777	36.35	49.56	36.3	54.90	70.27	28.0
BOSTON WASH., D. C.	406	24.52	30.20	23.1	36.56	41.85	14.5
CLEVELAND NEW YORK	410	24.63	31.71	28.7	36.74	43.95	19.6
CHICAGO WASH., D. C.	591	30.82	40.52	31.5	46.35	57.19	23.4
CHICAGO PHILADELPHIA	675	33.30	44.28	33.0	50.18	62.65	24.8
SAN FRANCISCO SEATTLE	671	33.19	45.05	35.8	50.01	63.74	27.5
DETROIT NEW YORK	489	27.63	36.13	30.8	41.48	50.53	21.8

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK CHICAGO	721	$ 34.66	$ 47.37	36.7%	$ 52.29	$ 67.02	28.2%
ATLANTA NEW YORK	755	35.68	48.79	36.7	53.86	69.17	28.4
DALLAS MINNEAPOLIS	850	38.74	54.19	39.9	58.38	76.83	31.6
DENVER MEMPHIS	880	39.64	54.90	38.5	59.76	78.05	30.6
CHICAGO SAN ANTONIO	1041	44.56	63.20	41.8	67.36	90.08	33.7
BALTIMORE MIAMI	946	41.65	57.98	39.2	62.87	82.42	31.1
BOSTON TAMPA	1183	49.54	69.33	40.0	75.01	100.03	33.4
HARTFORD MIAMI	1194	49.91	69.33	38.9	75.59	100.03	32.3
CHICAGO NEW ORLEANS	831	37.58	53.42	42.2	56.47	75.73	34.1
ATLANTA BOSTON	946	41.65	58.75	41.1	62.87	83.51	32.8
CLEVELAND MIAMI	1083	45.92	64.34	40.1	69.47	92.26	32.8
CHICAGO HOUSTON	932	41.20	58.75	42.6	62.18	83.51	34.3
CHICAGO TAMPA	1006	43.46	60.89	40.1	65.66	86.79	32.2
DALLAS WASH., D. C.	1161	48.84	68.50	40.2	73.93	98.83	33.7

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
BOSTON CHICAGO	860	$ 39.02	$ 54.06	38.5%	$ 58.81	$ 76.85	30.7%
LOS ANGELES SEATTLE	959	42.02	59.36	41.3	63.44	84.61	33.4
CHICAGO MIAMI	1188	49.68	69.33	39.5	75.23	100.03	33.0
MIAMI NEW YORK	1092	46.23	65.10	40.8	69.96	93.36	33.4
MINNEAPOLIS PHOENIX	1276	49.75	72.67	46.1	76.97	105.49	37.0
LAS VEGAS MINNEAPOLIS	1300	50.47	74.18	47.0	78.11	107.68	37.9
MINNEAPOLIS SAN DIEGO	1532	58.53	82.58	41.1	90.91	121.91	34.1
MINNEAPOLIS SEATTLE	1398	53.54	83.53	56.0	82.99	122.00	47.0
CHICAGO SPOKANE, WASH.	1508	57.72	81.78	41.7	89.61	120.73	34.7
HOUSTON LAS VEGAS	1229	48.29	71.60	48.3	74.66	103.31	38.4
MINNEAPOLIS SAN FRANCISCO	1587	60.30	82.58	37.0	93.71	121.91	30.1
BOSTON MIAMI	1258	49.14	71.92	46.4	76.00	104.40	37.4
DALLAS NEW YORK	1363	52.45	76.72	46.3	81.25	112.05	37.9
CHICAGO PHOENIX	1445	55.04	80.46	46.2	85.37	117.52	37.7

APPENDIX VIII

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
DALLAS LOS ANGELES	1248	$ 48.87	$ 71.60	46.5%	$ 75.57	$103.31	36.7
DALLAS SAN FRANCISCO	1493	57.23	81.04	41.6	88.84	119.63	34.7
CHICAGO LAS VEGAS	1521	58.15	82.58	42.0	90.31	121.91	35.0
NEW ORLEANS SAN FRANCISCO	1915	69.33	100.28	44.6	107.65	148.23	37.7
DALLAS PORTLAND, ORE.	1637	60.59	86.25	42.4	93.85	127.34	35.7
HOUSTON SAN FRANCISCO	1647	60.79	89.24	46.8	94.15	131.75	39.9
DALLAS SEATTLE	1681	61.73	89.87	45.6	95.62	132.84	38.9
LOS ANGELES NEW ORLEANS	1658	61.09	89.13	45.9	94.63	131.75	39.2
SEATTLE ST. LOUIS	1710	62.53	91.35	46.1	96.87	135.03	39.4
CHICAGO SAN DIEGO	1729	62.97	93.57	48.6	97.56	138.31	41.8
DENVER NEW YORK	1627	60.31	87.02	44.3	93.41	128.47	37.5
CHICAGO PORTLAND, ORE.	1748	63.50	93.57	47.4	98.38	138.31	40.6
ATLANTA LOS ANGELES	1934	69.94	101.02	44.4	108.61	149.32	37.5
CHICAGO SEATTLE	1730	63.00	93.57	48.5	97.60	138.31	41.7

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
CHICAGO LOS ANGELES	1740	$ 63.28	$ 93.57	47.9%	$ 98.03	$138.31	41.1%
CHICAGO SAN FRANCISCO	1853	67.70	93.56	38.2	105.12	138.30	31.6
LOS ANGELES TAMPA	2153	75.97	109.17	43.7	115.60	164.51	42.3
LOS ANGELES PITTSBURGH	2124	75.10	110.65	47.3	114.24	165.70	45.0
CLEVELAND LOS ANGELES	2046	72.81	106.20	45.9	110.72	158.04	42.7
DETROIT SAN FRANCISCO	2086	73.98	103.25	39.6	112.52	154.62	37.4
ATLANTA SAN FRANCISCO	2141	75.65	109.17	44.3	115.10	163.48	42.0
LOS ANGELES WASH., D. C.	2288	80.02	118.11	47.6	121.86	178.77	46.7
MIAMI SAN FRANCISCO	2589	85.87	127.72	48.7	131.57	195.90	48.9
NEW YORK SEATTLE	2408	81.42	124.71	53.2	124.71	189.60	52.0
PHILADELPHIA SAN FRANCISCO	2526	84.66	121.75	43.8	129.79	185.91	43.2
BOSTON SAN FRANCISCO	2703	88.18	129.21	46.5	135.04	198.18	46.8
LOS ANGELES PHILADELPHIA	2396	81.99	121.75	48.5	124.65	185.10	48.5
BOSTON LOS ANGELES	2600	86.17	129.20	49.9	132.03	198.17	50.1

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK SAN FRANCISCO	2574	$ 85.58	$124.71	45.7%	$131.12	$191.28	45.9%
LOS ANGELES NEW YORK	2453	82.74	124.71	50.7	126.77	190.43	50.2
ANCHORAGE SEATTLE	1448	57.97	98.49	69.9	89.17	141.00	58.1
SAN FRANCISCO HAWAII	2408	77.28	109.53	41.7	117.96	190.00	61.1
LOS ANGELES HAWAII	2573	79.84	109.53	37.2	121.64	190.00	56.2
PORTLAND, ORE. HAWAII	2603	82.60	109.53	32.6	126.31	190.00	50.4
SEATTLE HAWAII	2677	84.05	109.53	30.3	128.59	190.00	47.8
ANCHORAGE CHICAGO	2846	78.40	171.24	118.4	118.19	248.00	109.8
FAIRBANKS NEW YORK	3278	119.44	189.22	58.4	183.56	276.00	50.4
DALLAS HAWAII	3785	120.36	170.14	41.4	185.13	285.00	53.9
CHICAGO HAWAII	4248	112.99	188.75	67.1	171.12	319.00	86.4
NEW YORK HAWAII	4974	131.05	226.59	72.9	199.37	375.00	88.1

ESTIMATED AND ACTUAL AIRLINE FARES FOR 110 CITY-PAIR MARKETS IN 1974

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
BOSTON BURLINGTON	182	$ 22.26	$ 22.21	-0.2%	$ 31.90	$ 30.66	- 3.9%
HARTFORD WASH., D. C.	319	26.59	30.75	15.6	38.35	42.24	10.2
KANSAS CITY, MO SPRINGFIELD	145	21.79	18.73	-14.1	31.28	25.97	-17.0
CLEVELAND DETROIT	94	21.33	16.20	-24.1	30.17	22.46	-26.9
NORFOLK PHILADELPHIA	215	23.17	23.06	- 0.5	33.15	31.82	- 4.0
BALTIMORE BOSTON	370	28.33	33.03	16.6	40.84	45.72	11.9
HARTFORD NEW YORK	107	21.65	16.94	-21.7	31.17	23.50	-24.6
BALTIMORE NEW YORK	179	22.59	20.43	- 9.5	32.34	28.20	-12.8
EL PASO PHOENIX	346	27.33	32.44	18.7	39.43	44.56	13.0
NEW YORK SYRACUSE	197	22.71	22.21	- 2.2	32.47	30.66	- 5.6
NEW YORK ROCHESTER	252	24.73	24.75	- 0.1	35.63	34.00	- 4.6
BOSTON PHILADELPHIA	274	25.38	28.97	14.1	36.58	39.79	8.8
CHICAGO LOUISVILLE	277	25.43	28.97	13.9	36.65	39.79	8.6
LAS VEGAS LOS ANGELES	227	23.54	23.90	1.5	33.70	32.99	- 2.1

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES			FIRST CLASS FARES		
		ESTIMATED FARES	ACTUAL FARES	MARK UP	ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS HOUSTON	222	$ 23.38	$ 23.31	-0.3%	$ 33.46	$ 32.18	- 3.8%
CHICAGO ST. LOUIS	256	24.85	24.75	- 0.4	35.80	34.00	- 5.0
MIAMI TAMPA	199	23.21	21.37	- 7.9	33.39	29.50	-11.7
BUFFALO NEW YORK	289	25.76	28.97	12.5	37.13	39.79	7.2
CHICAGO CLEVELAND	312	26.39	30.75	16.5	38.06	42.24	11.0
NEW YORK PITTSBURGH	329	26.86	31.59	17.6	38.75	43.40	12.0
BOSTON NEW YORK	191	22.66	20.43	- 9.9	32.43	28.20	-13.0
NEW YORK WASH., D. C.	215	23.17	22.21	- 4.1	33.15	30.66	- 7.5
CHICAGO DETROIT	238	23.84	23.06	- 3.3	34.14	31.82	- 6.8
CHICAGO MINNEAPOLIS	344	27.29	32.44	18.9	39.37	44.56	13.2
EUGENE SAN FRANCISCO	441	29.88	36.47	22.0	43.66	50.49	15.6
HARTFORD DETROIT	540	34.01	42.82	25.9	49.97	59.79	19.7
HOUSTON KANSAS CITY	643	37.85	50.04	32.2	55.74	70.49	26.5
HARTFORD PITTSBURGH	406	28.75	34.70	20.7	41.95	48.03	14.5

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
MINNEAPOLIS ST. LOUIS	448	$ 30.09	$ 37.31	24.0%	$ 43.97	$ 51.64	17.4%
JACKSONVILLE PHILADELPHIA	749	41.57	54.83	31.9	61.35	77.43	26.2
CHICAGO MEMPHIS	485	32.14	40.33	25.5	47.15	56.32	19.4
BOSTON PITTSBURGH	496	32.48	41.16	26.7	47.66	57.47	20.6
BOSTON DETROIT	623	37.13	47.37	27.6	54.65	66.74	22.1
ATLANTA WASH., D. C.	540	34.01	44.48	30.8	49.97	62.11	24.3
BALTIMORE CHICAGO	613	36.78	45.73	24.3	54.13	64.42	19.0
HARTFORD CHICAGO	777	42.71	55.51	30.0	63.10	78.55	24.5
BOSTON WASH., D. C.	406	28.75	34.70	20.7	41.95	48.03	14.5
CLEVELAND NEW YORK	410	28.86	35.64	23.5	42.11	49.33	17.1
CHICAGO WASH., D. C.	591	35.99	45.73	27.0	52.94	64.42	21.7
CHICAGO PHILADELPHIA	675	38.86	49.91	28.4	57.26	70.48	23.1
SAN FRANCISCO SEATTLE	671	38.85	50.73	30.6	57.25	71.64	25.1
DETROIT NEW YORK	489	32.27	40.33	25.0	47.35	56.32	18.9

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	COACH CLASS FARES ACTUAL FARES	COACH CLASS FARES MARK UP	FIRST CLASS FARES ESTIMATED FARES	FIRST CLASS FARES ACTUAL FARES	FIRST CLASS FARES MARK UP
NEW YORK CHICAGO	721	$ 40.65	$ 53.19	30.8%	$ 59.98	$ 75.11	25.2%
ATLANTA NEW YORK	755	41.91	54.69	30.5	61.88	77.39	25.1
DALLAS MINNEAPOLIS	850	45.70	60.73	32.9	66.46	85.94	29.3
DENVER MEMPHIS	880	46.83	61.74	31.9	68.14	87.60	28.6
CHICAGO SAN ANTONIO	1041	52.85	70.71	33.8	77.11	100.58	30.4
BALTIMORE MIAMI	946	49.24	65.10	32.2	71.73	92.36	28.8
BOSTON TAMPA	1183	59.14	78.12	32.1	86.52	112.45	30.0
HARTFORD MIAMI	1194	59.60	78.12	31.1	87.20	112.45	29.0
CHICAGO NEW ORLEANS	831	44.32	59.60	34.5	64.31	84.34	31.1
ATLANTA BOSTON	946	49.24	65.91	33.9	71.73	93.51	30.4
CLEVELAND MIAMI	1083	54.54	71.91	31.8	79.65	102.89	29.2
CHICAGO HOUSTON	932	48.71	65.91	35.3	70.94	93.51	31.8
CHICAGO TAMPA	1006	51.47	68.28	32.7	75.05	97.12	29.4
DALLAS WASH., D. C.	1161	58.24	76.52	31.4	85.16	110.14	29.3

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
BOSTON CHICAGO	860	$ 46.04	$ 60.12	30.6%	$ 66.97	$ 85.29	27.4%
LOS ANGELES SEATTLE	959	49.74	66.56	33.8	72.48	94.67	30.6
CHICAGO MIAMI	1188	59.39	78.12	31.6	86.89	112.45	29.4
MIAMI NEW YORK	1092	54.92	72.72	32.4	80.21	104.05	29.7
MINNEAPOLIS PHOENIX	1276	60.46	81.65	35.0	91.28	118.23	29.5
LAS VEGAS MINNEAPOLIS	1300	61.42	83.25	35.5	92.76	120.54	30.0
MINNEAPOLIS SAN DIEGO	1532	71.02	93.24	31.3	107.55	137.25	27.6
MINNEAPOLIS SEATTLE	1398	64.90	94.06	44.9	98.10	137.02	39.7
CHICAGO SPOKANE, WASH.	1508	70.12	91.66	30.7	106.16	134.93	27.1
HOUSTON LAS VEGAS	1229	58.59	80.53	37.4	88.39	115.92	31.1
MINNEAPOLIS SAN FRANCISCO	1587	72.99	93.24	27.7	110.58	137.25	24.1
BOSTON MIAMI	1258	59.71	80.85	35.4	90.11	117.07	29.9
DALLAS NEW YORK	1363	63.63	86.02	35.2	96.16	125.31	30.3
CHICAGO PHOENIX	1445	66.58	90.09	35.3	100.68	131.24	30.3

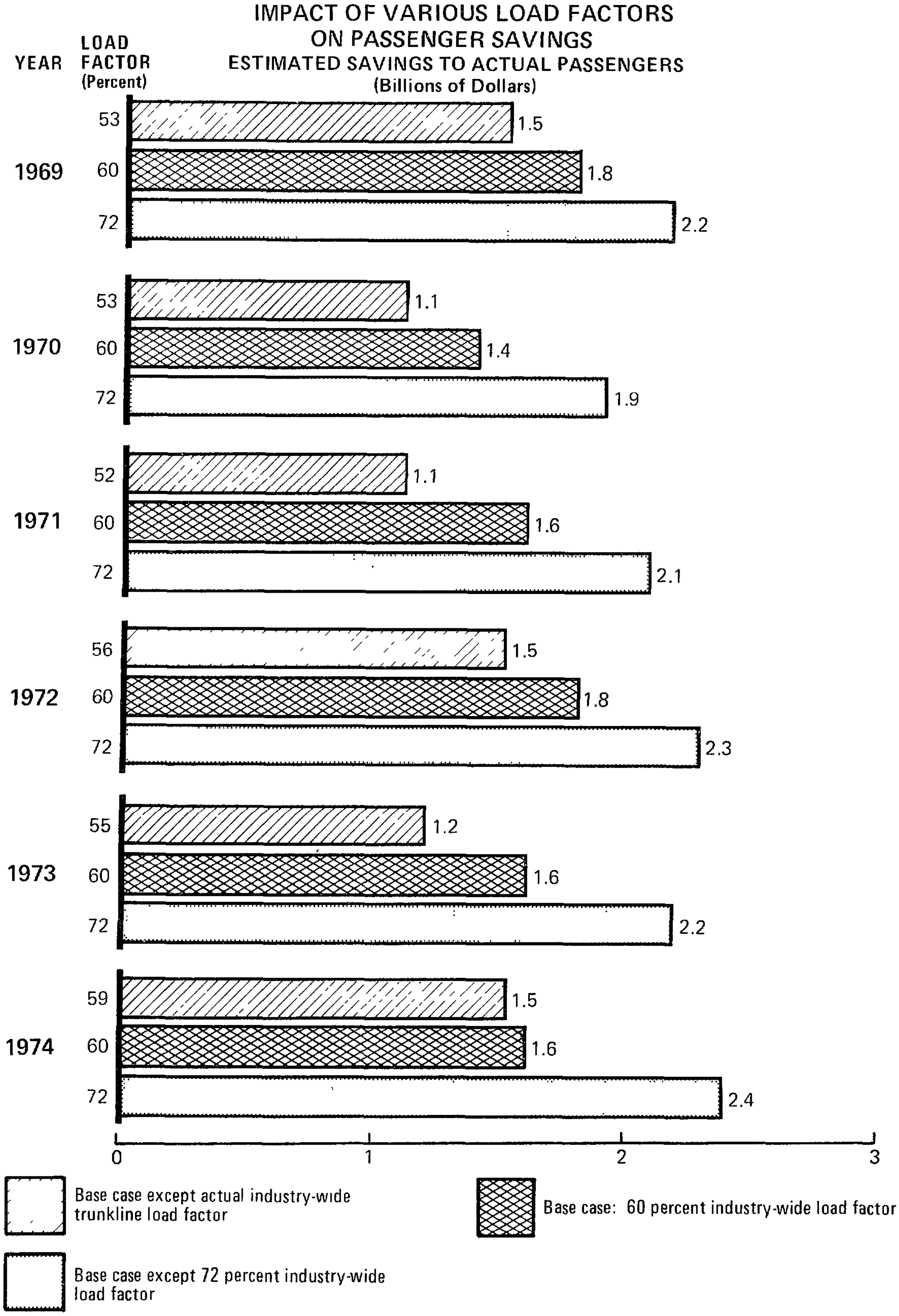
CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
DALLAS LOS ANGELES	1248	$ 59.37	$ 80.53	35.6%	$ 89.60	$115.92	29.4%
DALLAS SAN FRANCISCO	1493	69.61	90.87	30.6	105.37	133.77	26.9
CHICAGO LAS VEGAS	1521	70.56	93.24	32.1	106.84	137.25	28.5
NEW ORLEANS SAN FRANCISCO	1915	81.53	113.12	38.8	122.96	166.72	35.6
DALLAS PORTLAND, ORE.	1637	71.61	88.86	24.1	107.81	130.80	21.3
HOUSTON SAN FRANCISCO	1647	71.94	100.42	39.6	108.31	147.82	36.5
DALLAS SEATTLE	1681	72.97	101.08	38.5	109.87	148.98	35.6
LOS ANGELES NEW ORLEANS	1658	72.22	100.30	38.9	108.72	147.82	36.0
SEATTLE ST. LOUIS	1710	73.83	102.66	39.0	111.17	151.30	36.1
CHICAGO SAN DIEGO	1729	74.37	105.10	41.3	111.97	154.90	38.3
DENVER NEW YORK	1627	71.28	97.97	37.4	107.31	144.21	34.4
CHICAGO PORTLAND, ORE.	1748	74.99	105.10	40.2	112.92	154.90	37.2
ATLANTA LOS ANGELES	1934	82.15	113.91	38.7	123.91	167.88	35.5
CHICAGO SEATTLE	1730	74.40	105.10	41.3	112.02	154.90	38.3

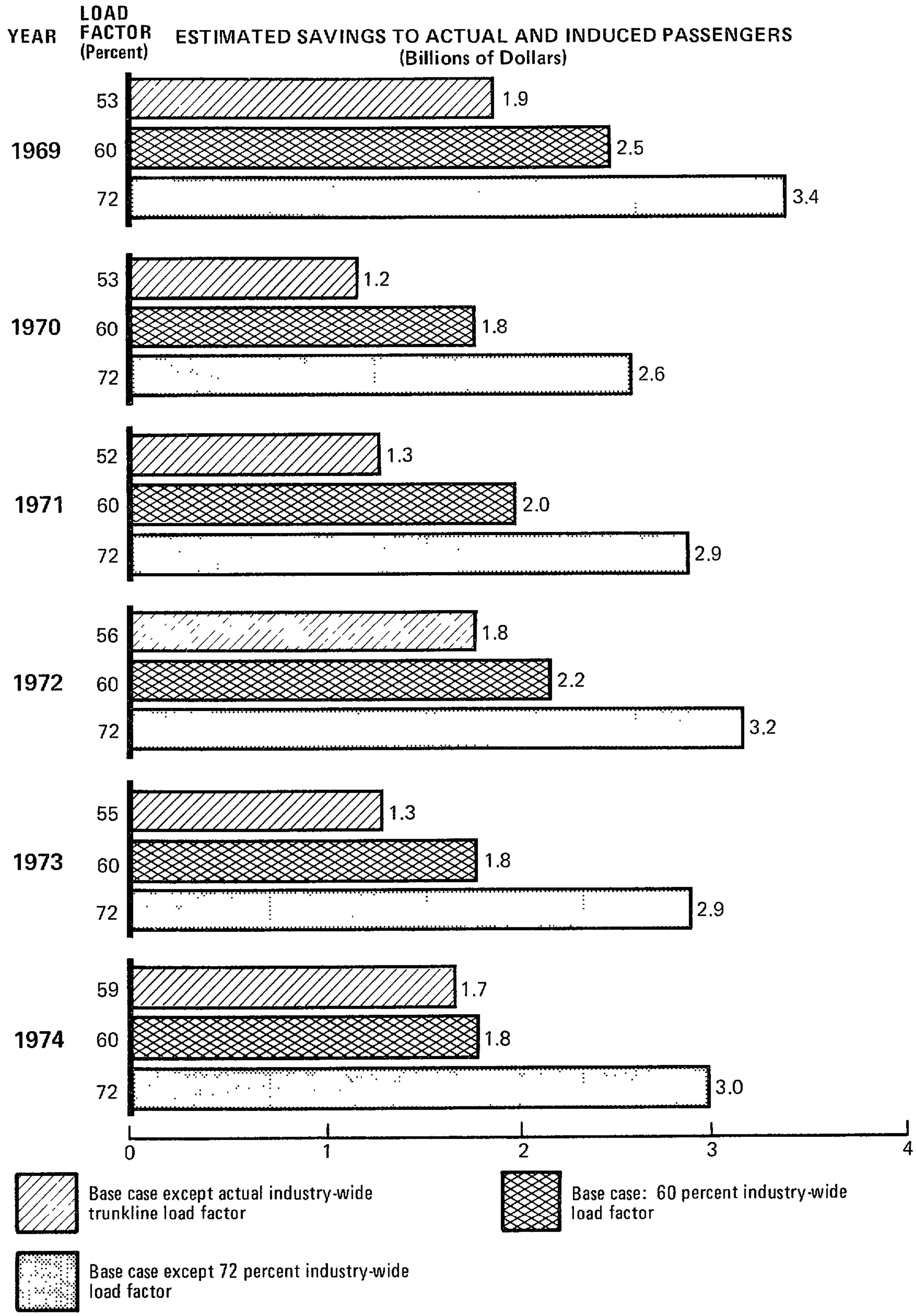
APPENDIX IX

CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
CHICAGO LOS ANGELES	1740	$ 74.73	$105.10	40.7%	$112.52	$154.90	37.7%
CHICAGO SAN FRANCISCO	1853	79.50	105.16	32.3	119.88	154.98	29.3
LOS ANGELES TAMPA	2153	89.69	122.46	36.5	136.03	183.93	35.2
LOS ANGELES PITTSBURGH	2124	88.65	124.04	39.9	134.42	185.15	37.7
CLEVELAND LOS ANGELES	2046	85.82	119.42	39.1	130.08	177.18	36.2
DETROIT SAN FRANCISCO	2086	87.21	116.09	33.1	132.21	173.28	31.1
ATLANTA SAN FRANCISCO	2141	89.30	122.46	37.1	135.43	182.80	35.0
LOS ANGELES WASH., D. C.	2288	94.50	132.77	40.5	143.42	200.27	39.6
MIAMI SAN FRANCISCO	2589	101.08	142.34	40.8	154.82	217.51	40.5
NEW YORK SEATTLE	2408	94.71	139.93	47.7	144.94	211.99	46.3
PHILADELPHIA SAN FRANCISCO	2526	101.16	136.71	35.1	155.24	207.99	34.0
BOSTON SAN FRANCISCO	2703	108.00	145.59	34.8	164.00	222.48	35.7
LOS ANGELES PHILADELPHIA	2396	94.33	136.71	44.9	144.35	207.10	43.5
BOSTON LOS ANGELES	2600	101.56	145.52	43.3	155.57	222.37	42.9

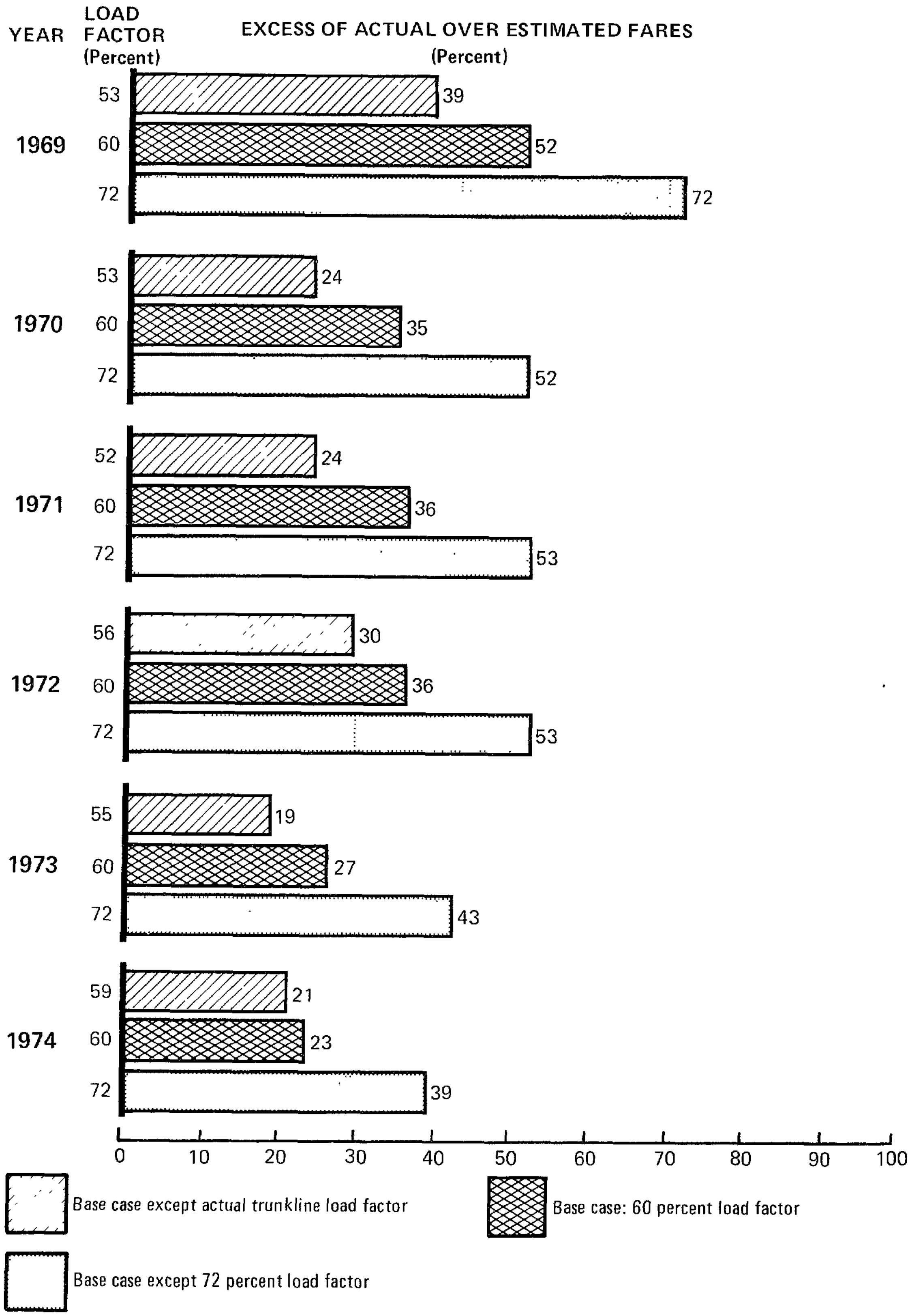
CITY-PAIR MARKETS	DISTANCE (MILES)	COACH CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP	FIRST CLASS FARES ESTIMATED FARES	ACTUAL FARES	MARK UP
NEW YORK SAN FRANCISCO	2574	$100.60	$139.93	39.1%	$154.08	$213.83	38.8%
LOS ANGELES NEW YORK	2453	96.26	139.93	45.4	147.34	212.90	44.5
ANCHORAGE SEATTLE	1448	76.29	107.82	41.3	114.71	148.00	29.0
SAN FRANCISCO HAWAII	2408	92.12	121.53	31.9	137.60	195.50	42.1
LOS ANGELES HAWAII	2573	88.23	121.53	37.7	131.79	195.50	48.3
PORTLAND, ORE. HAWAII	2603	93.11	121.53	30.5	138.94	195.50	40.7
SEATTLE HAWAII	2677	95.50	121.53	27.2	143.21	195.50	36.5
ANCHORAGE CHICAGO	2846	113.87	181.63	59.5	172.88	257.50	48.9
FAIRBANKS NEW YORK	3278	178.97	200.95	12.3	279.17	280.00	0.3
DALLAS HAWAII	3785	151.22	187.66	24.1	232.78	293.50	26.1
CHICAGO HAWAII	4248	123.91	208.87	68.6	182.27	328.50	80.2
NEW YORK HAWAII	4974	174.94	250.46	43.2	267.39	386.50	44.5

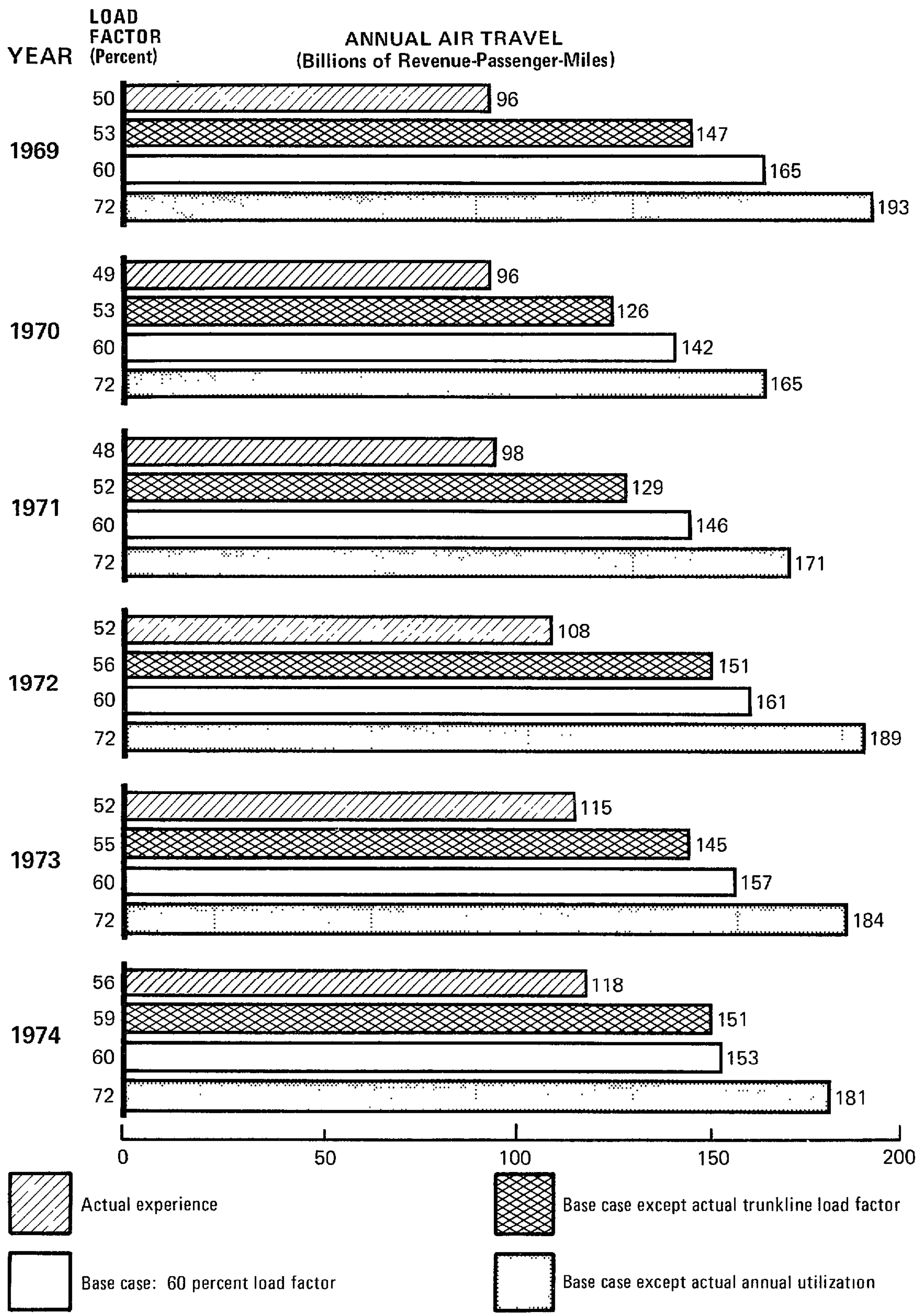
APPENDIX X

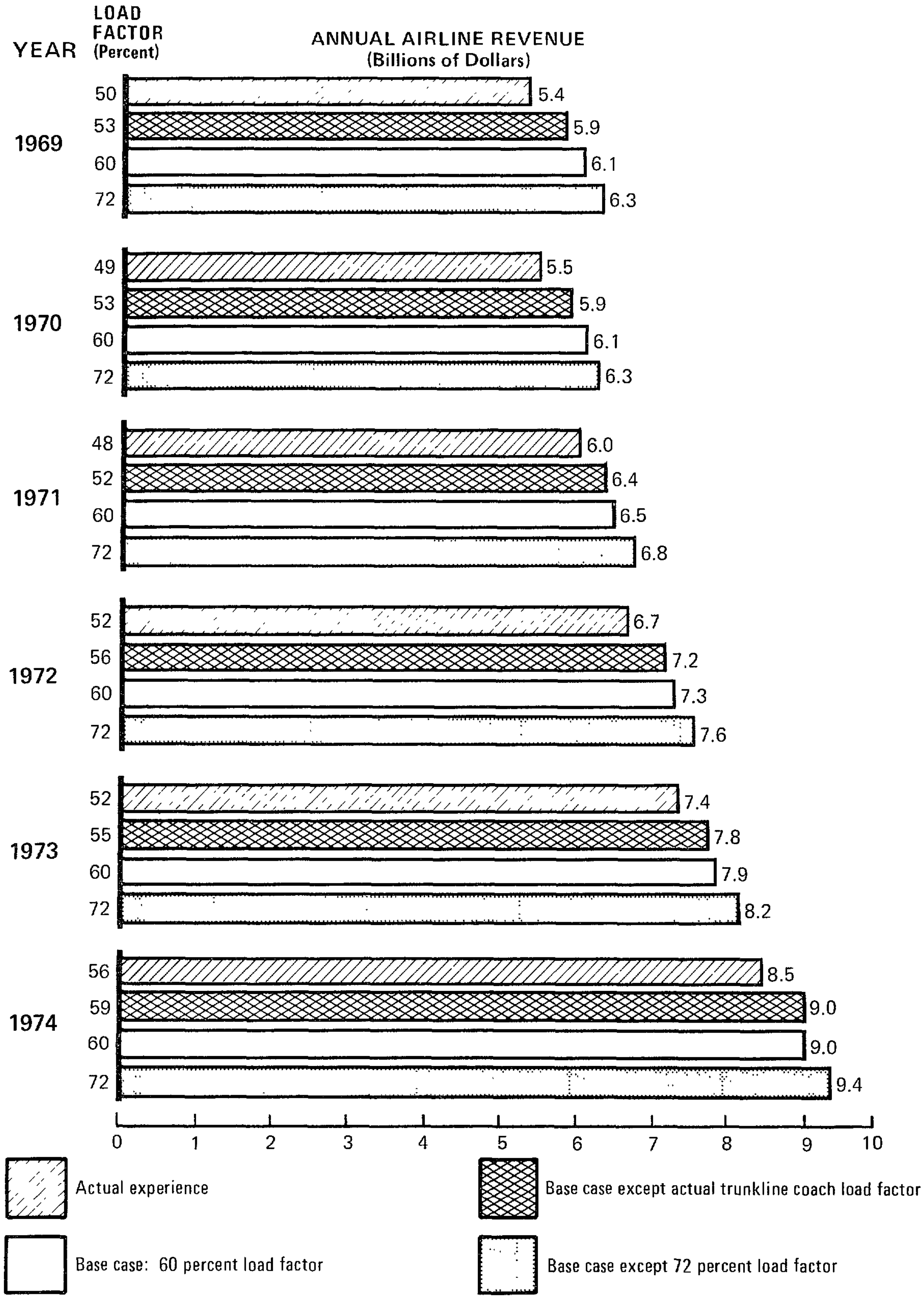

IMPACT OF VARIOUS LOAD FACTORS
ON PASSENGER SAVINGS
ESTIMATED SAVINGS TO ACTUAL PASSENGERS
(Billions of Dollars)
YEAR
LOAD FACTOR (Percent)
1969
53
1.5
60
1.8
72
2.2
1970
53
1.1
60
1.4
72
1.9
1971
52
1.1
60
1.6
72
2.1
1972
56
1.5
60
1.8
72
2.3
1973
55
1.2
60
1.6
72
2.2
1974
59
1.5
60
1.6
72
2.4
0
1
2
3
Base case except actual industry-wide trunkline load factor
Base case: 60 percent industry-wide load factor
Base case except 72 percent industry-wide load factor


YEAR
LOAD FACTOR (Percent)
ESTIMATED SAVINGS TO ACTUAL AND INDUCED PASSENGERS
(Billions of Dollars)
1969
53
60
72
1.9
2.5
3.4
1970
53
60
72
1.2
1.8
2.6
1971
52
60
72
1.3
2.0
2.9
1972
56
60
72
1.8
2.2
3.2
1973
55
60
72
1.3
1.8
2.9
1974
59
60
72
1.7
1.8
3.0
0
1
2
3
4
Base case except actual industry-wide trunkline load factor
Base case: 60 percent industry-wide load factor
Base case except 72 percent industry-wide load factor

APPENDIX X

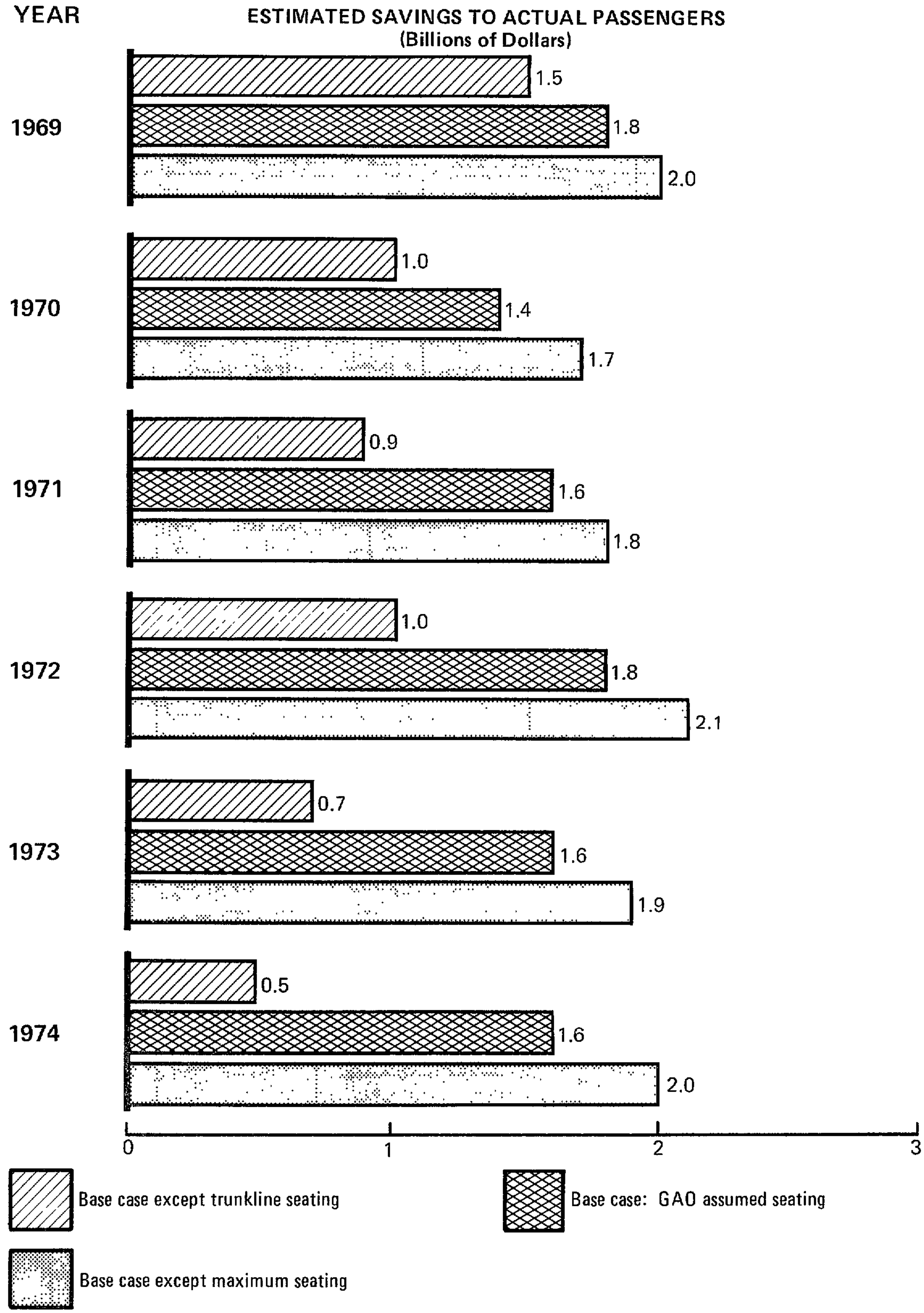

YEAR
LOAD FACTOR (Percent)
EXCESS OF ACTUAL OVER ESTIMATED FARES (Percent)
1969
53
39
60
52
72
72
1970
53
24
60
35
72
52
1971
52
24
60
36
72
53
1972
56
30
60
36
72
53
1973
55
19
60
27
72
43
1974
59
21
60
23
72
39
0
10
20
30
40
50
60
70
80
90
100
Base case except actual trunkline load factor
Base case: 60 percent load factor
Base case except 72 percent load factor

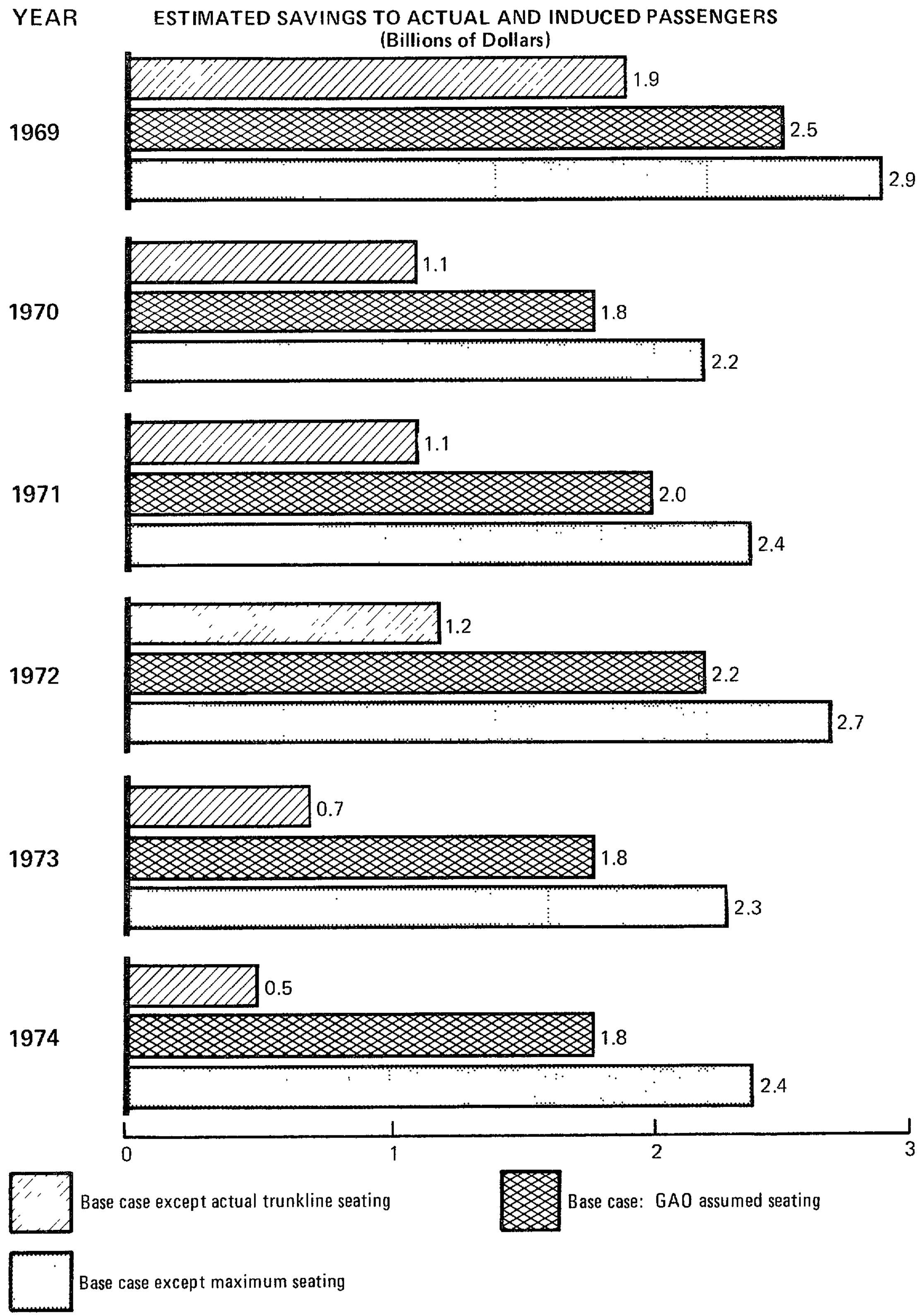

YEAR
LOAD FACTOR (Percent)
ANNUAL AIR TRAVEL
(Billions of Revenue-Passenger-Miles)
1969
50
96
53
147
60
165
72
193
1970
49
96
53
126
60
142
72
165
1971
48
98
52
129
60
146
72
171
1972
52
108
56
151
60
161
72
189
1973
52
115
55
145
60
157
72
184
1974
56
118
59
151
60
153
72
181
0
50
100
150
200
Actual experience
Base case except actual trunkline load factor
Base case: 60 percent load factor
Base case except actual annual utilization

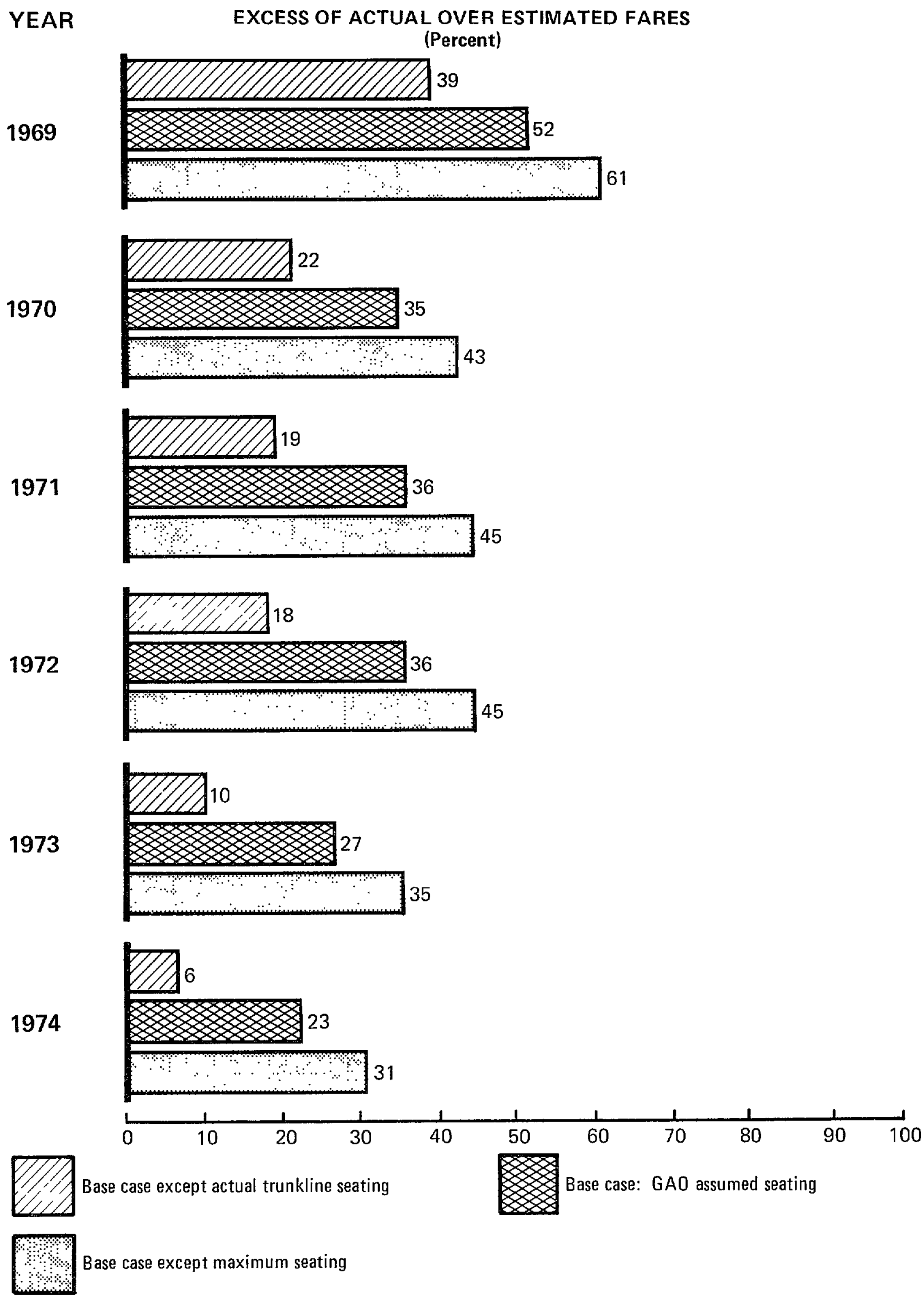


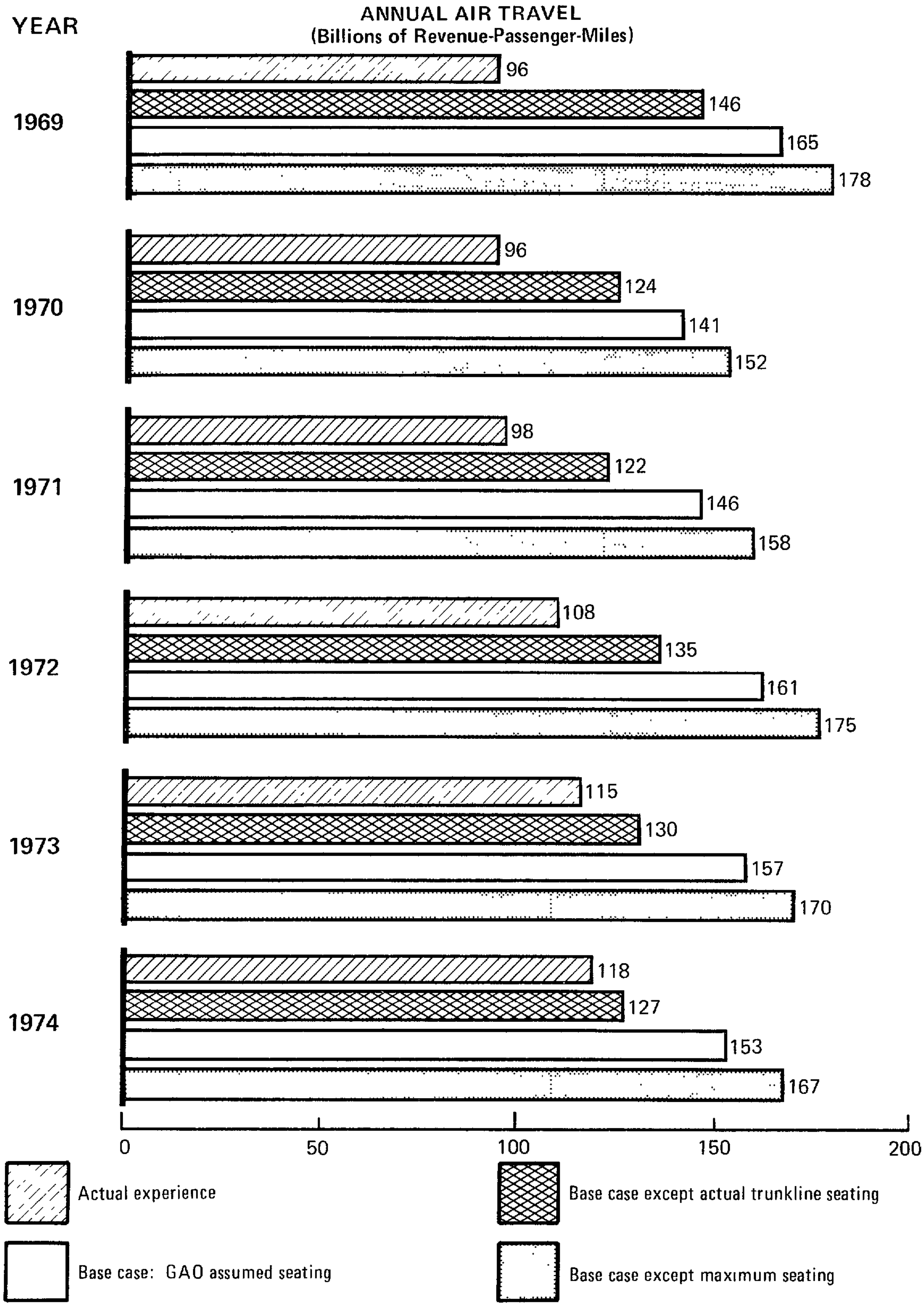
YEAR
LOAD FACTOR (Percent)
ANNUAL AIRLINE REVENUE (Billions of Dollars)
1969
50 5.4
53 5.9
60 6.1
72 6.3
1970
49 5.5
53 5.9
60 6.1
72 6.3
1971
48 6.0
52 6.4
60 6.5
72 6.8
1972
52 6.7
56 7.2
60 7.3
72 7.6
1973
52 7.4
55 7.8
60 7.9
72 8.2
1974
56 8.5
59 9.0
60 9.0
72 9.4
0 1 2 3 4 5 6 7 8 9 10
Actual experience
Base case except actual trunkline coach load factor
Base case: 60 percent load factor
Base case except 72 percent load factor

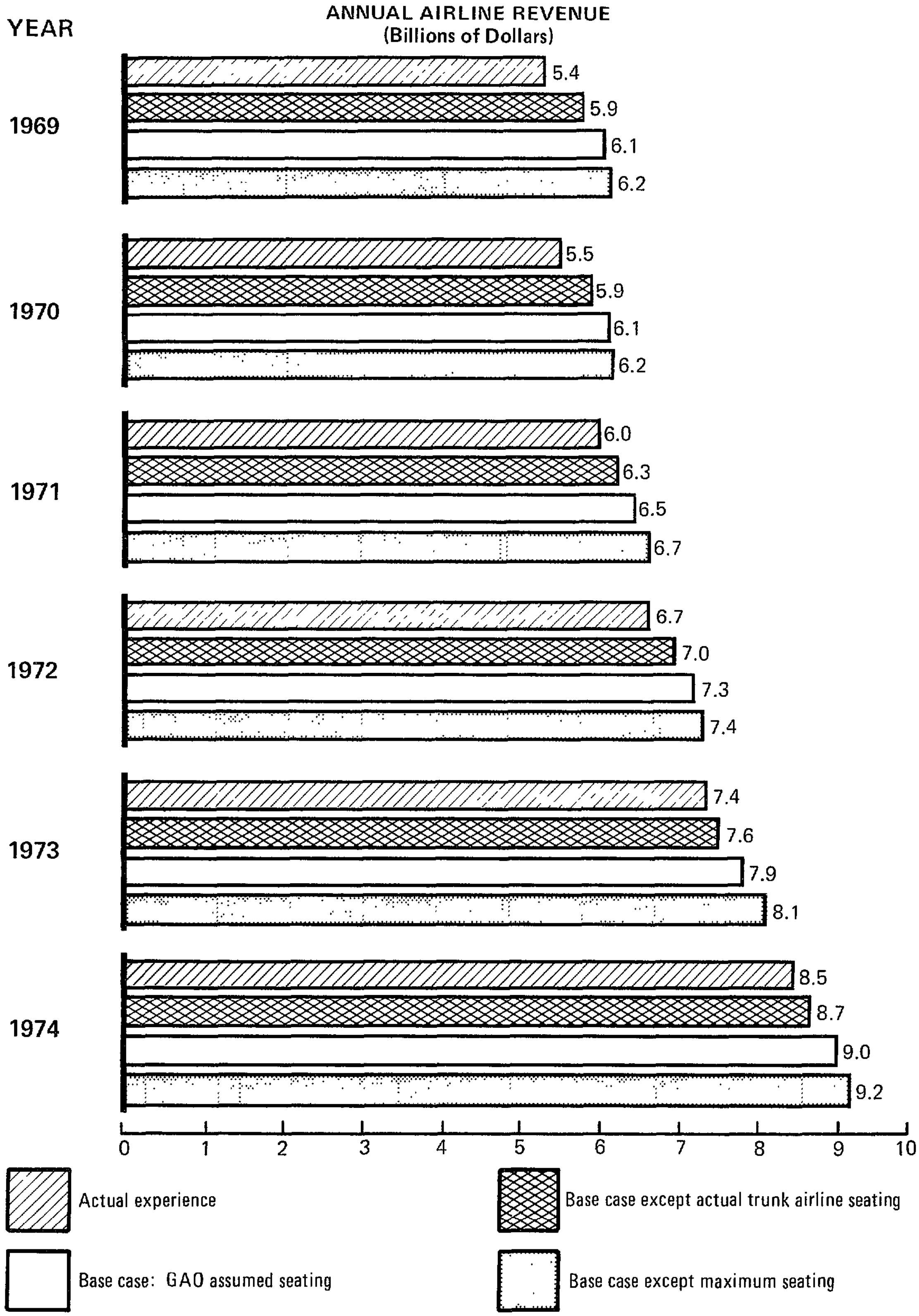
IMPACT OF AIRCRAFT SEATING ON PASSENGER SAVINGS



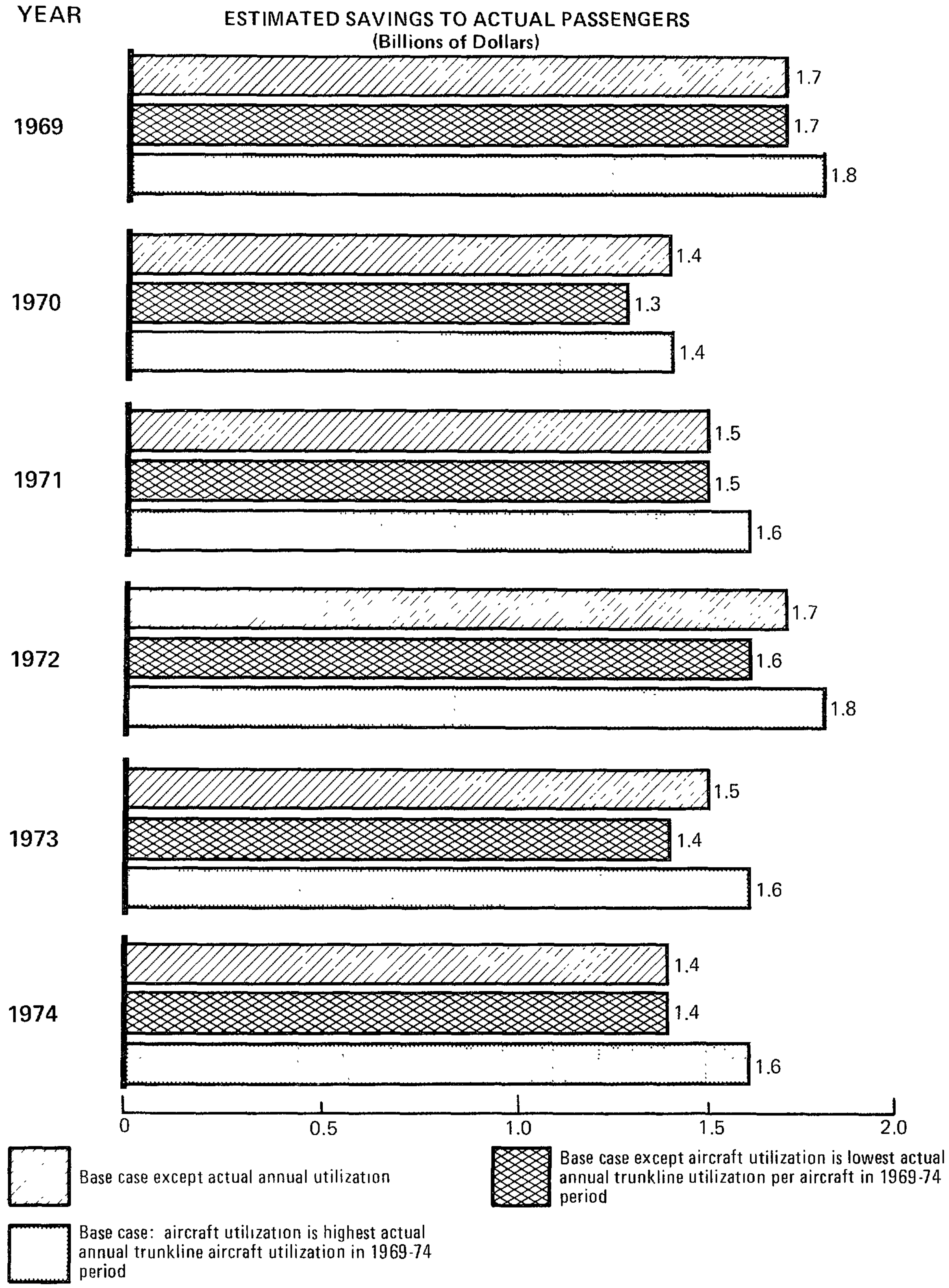

YEAR
ESTIMATED SAVINGS TO ACTUAL AND INDUCED PASSENGERS
(Billions of Dollars)
1969
1.9
2.5
2.9
1970
1.1
1.8
2.2
1971
1.1
2.0
2.4
1972
1.2
2.2
2.7
1973
0.7
1.8
2.3
1974
0.5
1.8
2.4
0
1
2
3
Base case except actual trunkline seating
Base case: GAO assumed seating
Base case except maximum seating

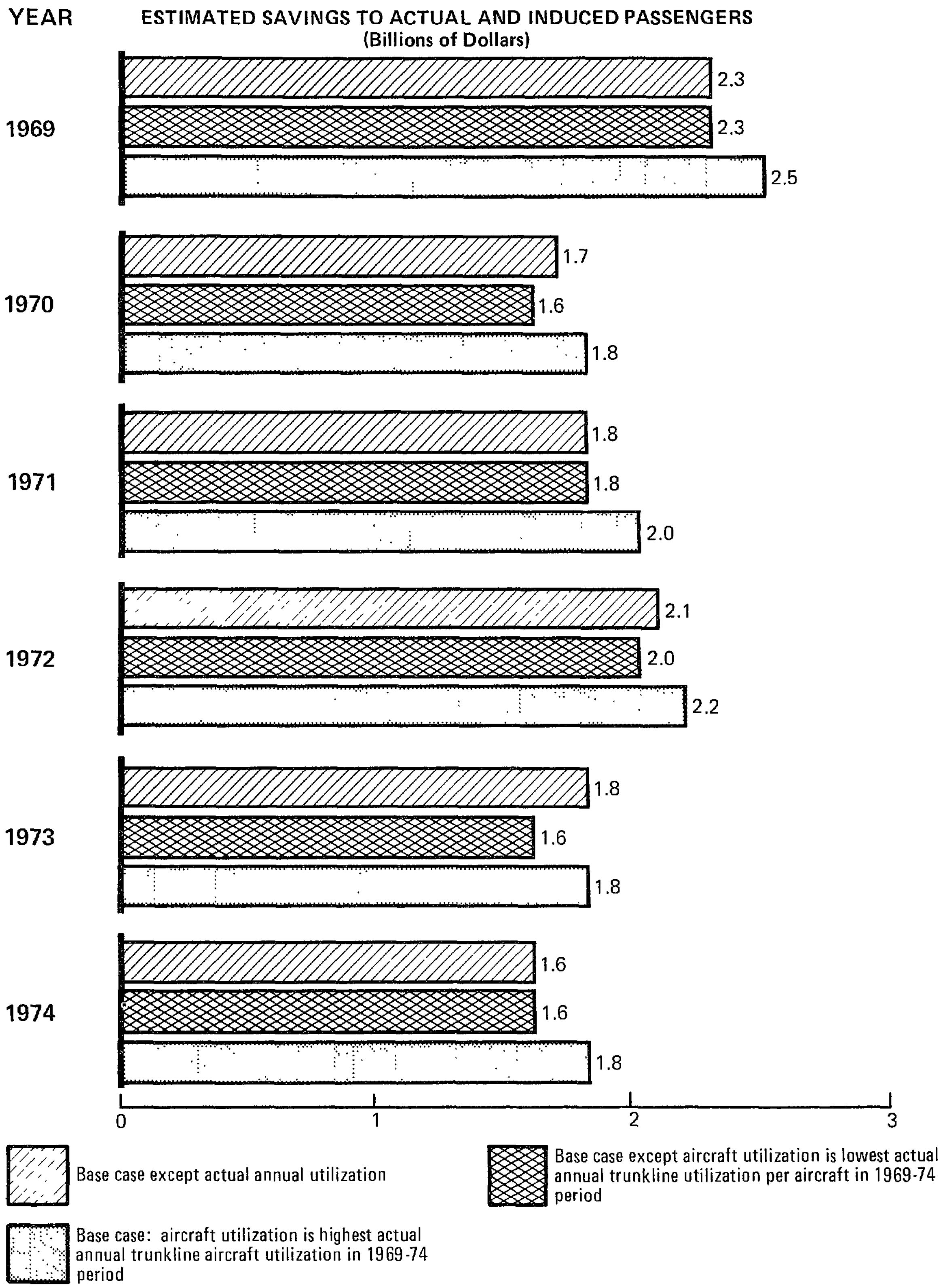

YEAR
EXCESS OF ACTUAL OVER ESTIMATED FARES
(Percent)
1969
39
52
61
1970
22
35
43
1971
19
36
45
1972
18
36
45
1973
10
27
35
1974
6
23
31
0 10 20 30 40 50 60 70 80 90 100
Base case except actual trunkline seating
Base case: GAO assumed seating
Base case except maximum seating

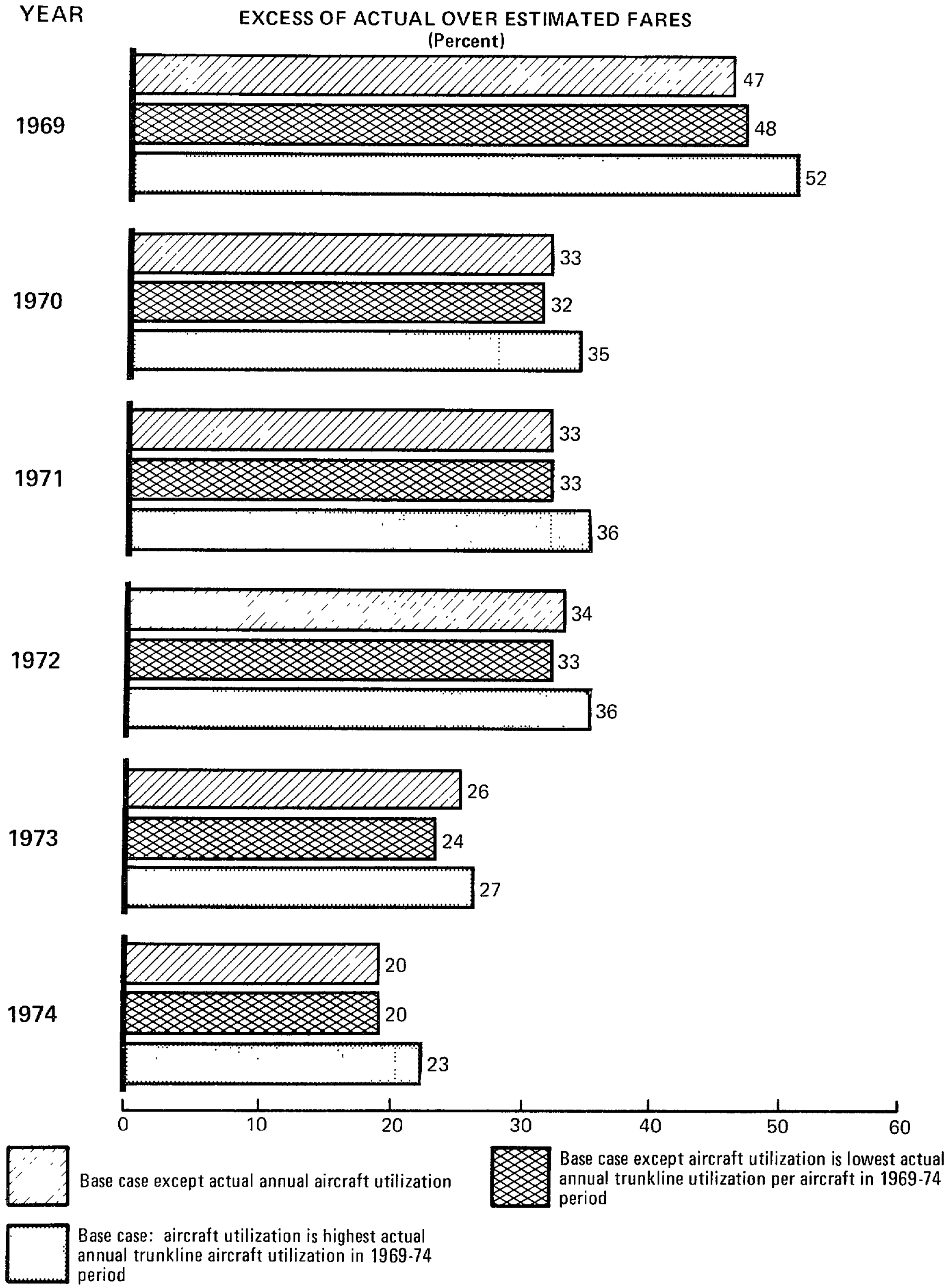

YEAR
ANNUAL AIR TRAVEL
(Billions of Revenue-Passenger-Miles)
1969
96
146
165
178
1970
96
124
141
152
1971
98
122
146
158
1972
108
135
161
175
1973
115
130
157
170
1974
118
127
153
167
0
50
100
150
200
Actual experience
Base case except actual trunkline seating
Base case: GAO assumed seating
Base case except maximum seating

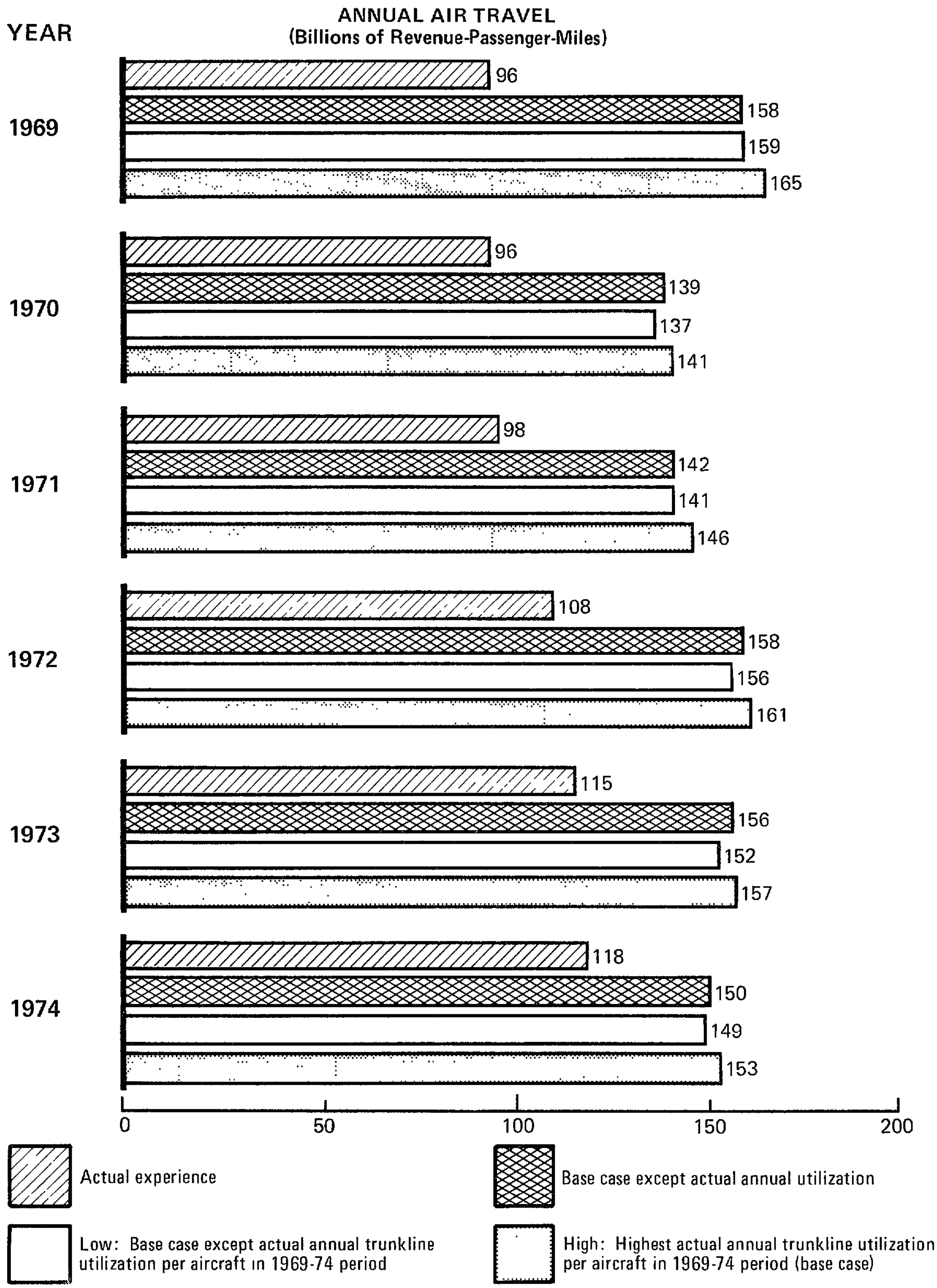

YEAR
ANNUAL AIRLINE REVENUE
(Billions of Dollars)
1969
5.4
5.9
6.1
6.2
1970
5.5
5.9
6.1
6.2
1971
6.0
6.3
6.5
6.7
1972
6.7
7.0
7.3
7.4
1973
7.4
7.6
7.9
8.1
1974
8.5
8.7
9.0
9.2
0 1 2 3 4 5 6 7 8 9 10
Actual experience
Base case except actual trunk airline seating
Base case: GAO assumed seating
Base case except maximum seating

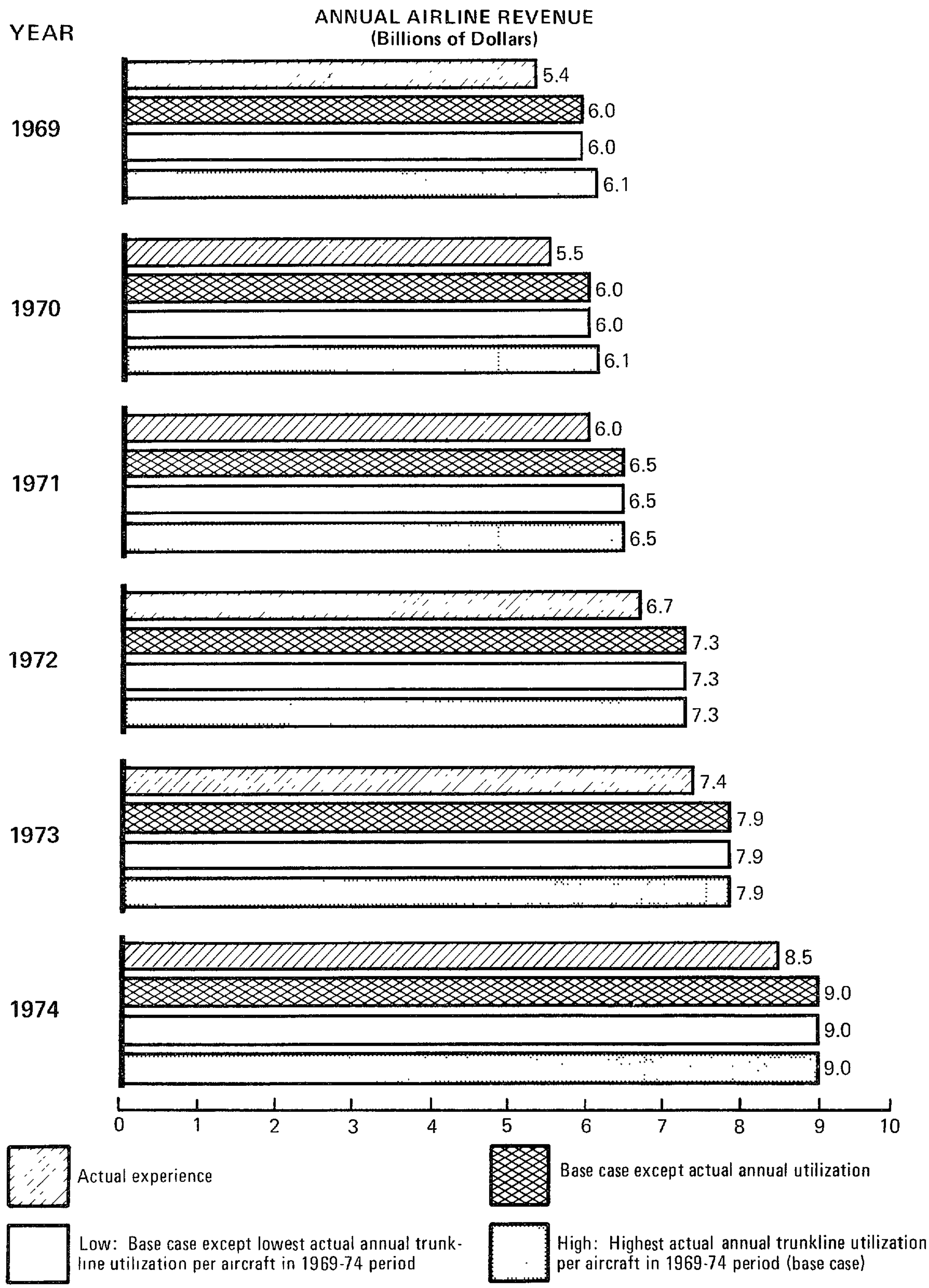
IMPACT OF ANNUAL AIRCRAFT UTILIZATION ON PASSENGER SAVINGS



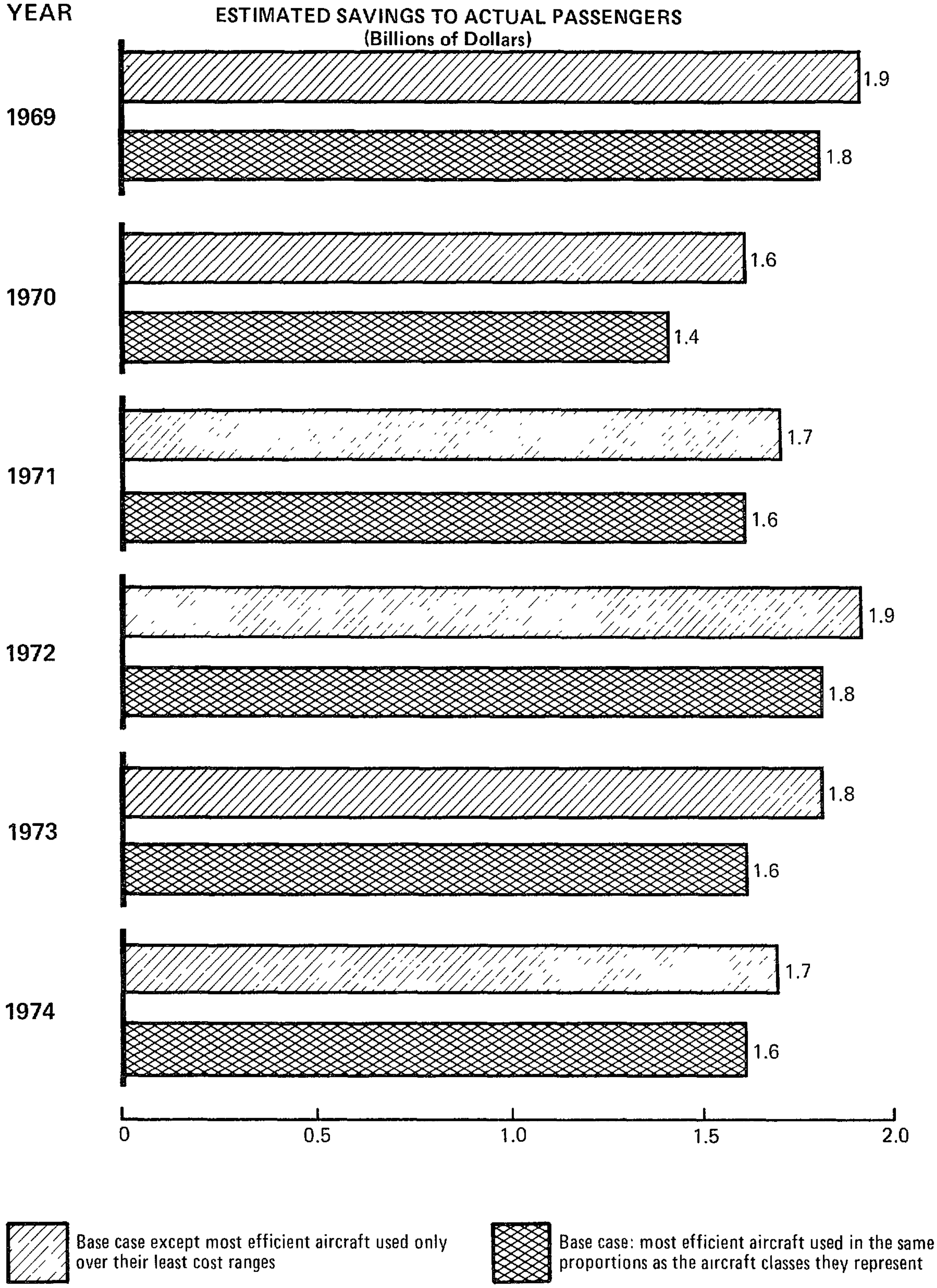

YEAR
ESTIMATED SAVINGS TO ACTUAL AND INDUCED PASSENGERS
(Billions of Dollars)
1969
2.3
2.3
2.5
1970
1.7
1.6
1.8
1971
1.8
1.8
2.0
1972
2.1
2.0
2.2
1973
1.8
1.6
1.8
1974
1.6
1.6
1.8
0
1
2
3
Base case except actual annual utilization
Base case except aircraft utilization is lowest actual annual trunkline utilization per aircraft in 1969-74 period
Base case: aircraft utilization is highest actual annual trunkline aircraft utilization in 1969-74 period

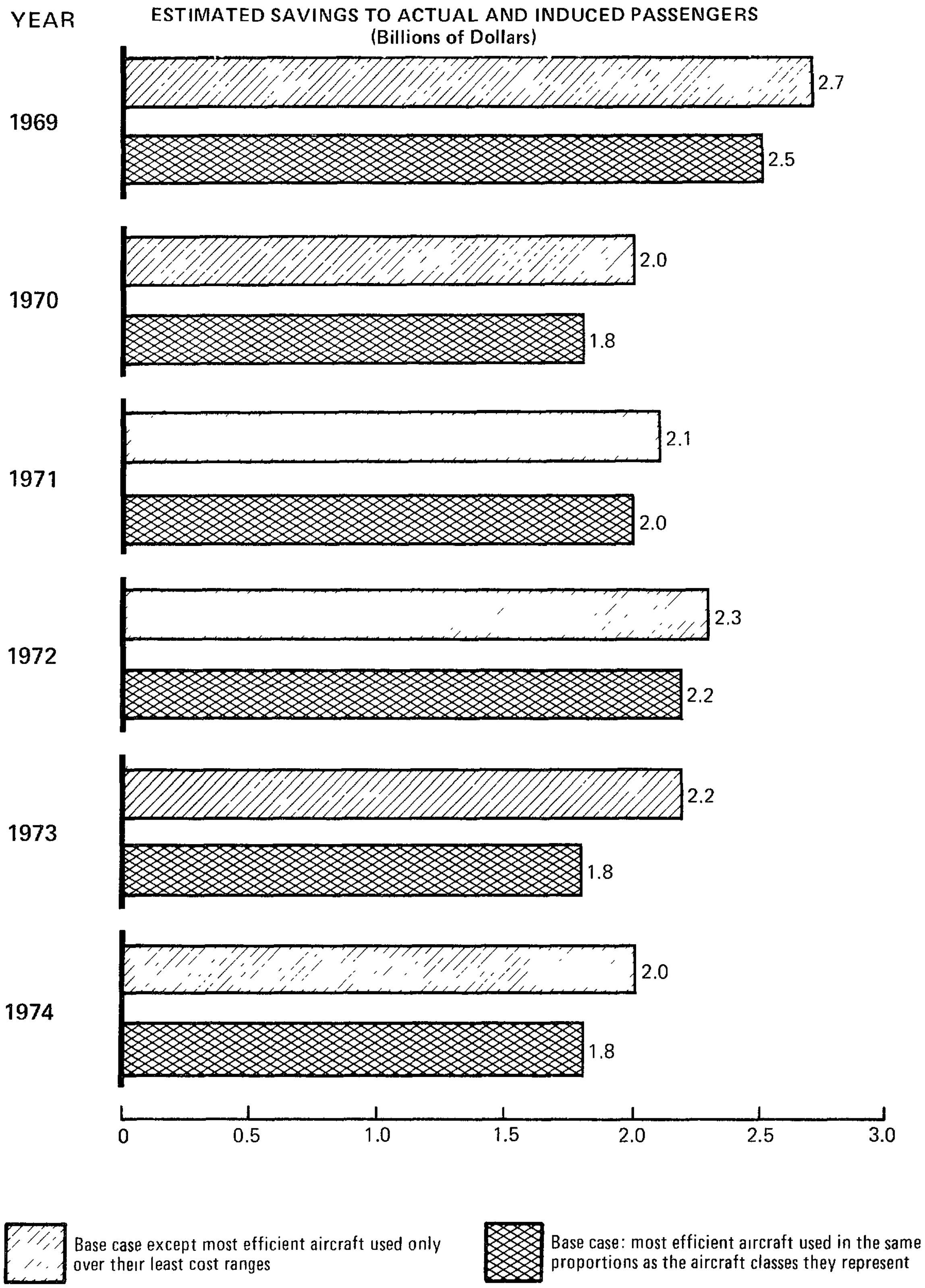

YEAR
EXCESS OF ACTUAL OVER ESTIMATED FARES
(Percent)
1969
47
48
52
1970
33
32
35
1971
33
33
36
1972
34
33
36
1973
26
24
27
1974
20
20
23
0
10
20
30
40
50
60
Base case except actual annual aircraft utilization
Base case except aircraft utilization is lowest actual annual trunkline utilization per aircraft in 1969-74 period
Base case: aircraft utilization is highest actual annual trunkline aircraft utilization in 1969-74 period

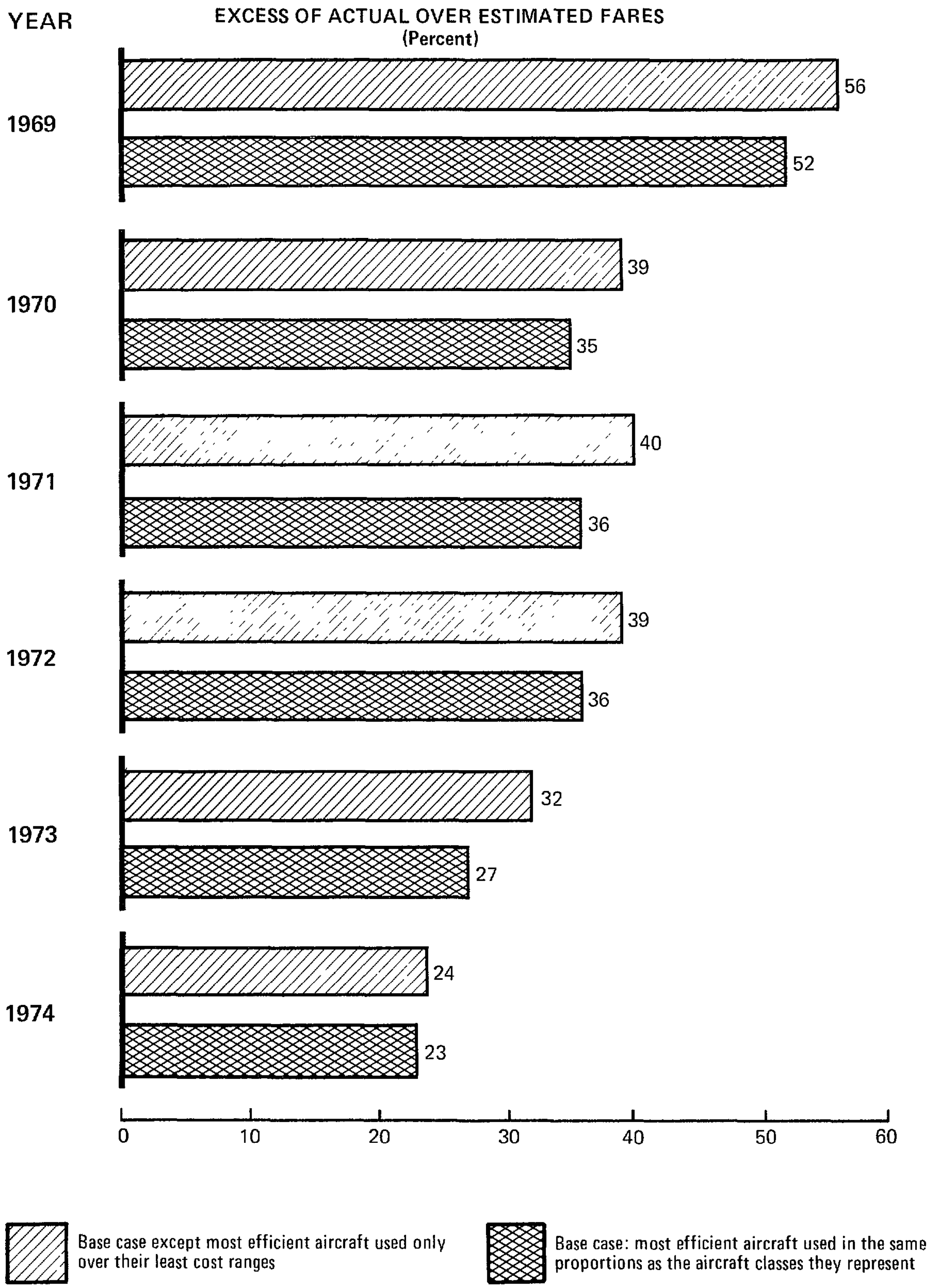

YEAR
ANNUAL AIR TRAVEL
(Billions of Revenue-Passenger-Miles)
1969
96
158
159
165
1970
96
139
137
141
1971
98
142
141
146
1972
108
158
156
161
1973
115
156
152
157
1974
118
150
149
153
0
50
100
150
200
Actual experience
Base case except actual annual utilization
Low: Base case except actual annual trunkline utilization per aircraft in 1969-74 period
High: Highest actual annual trunkline utilization per aircraft in 1969-74 period (base case)


YEAR
ANNUAL AIRLINE REVENUE
(Billions of Dollars)
1969
5.4
6.0
6.0
6.1
1970
5.5
6.0
6.0
6.1
1971
6.0
6.5
6.5
6.5
1972
6.7
7.3
7.3
7.3
1973
7.4
7.9
7.9
7.9
1974
8.5
9.0
9.0
9.0
0
1
2
3
4
5
6
7
8
9
10
Actual experience
Base case except actual annual utilization
Low: Base case except lowest actual annual trunkline utilization per aircraft in 1969-74 period
High: Highest actual annual trunkline utilization per aircraft in 1969-74 period (base case)

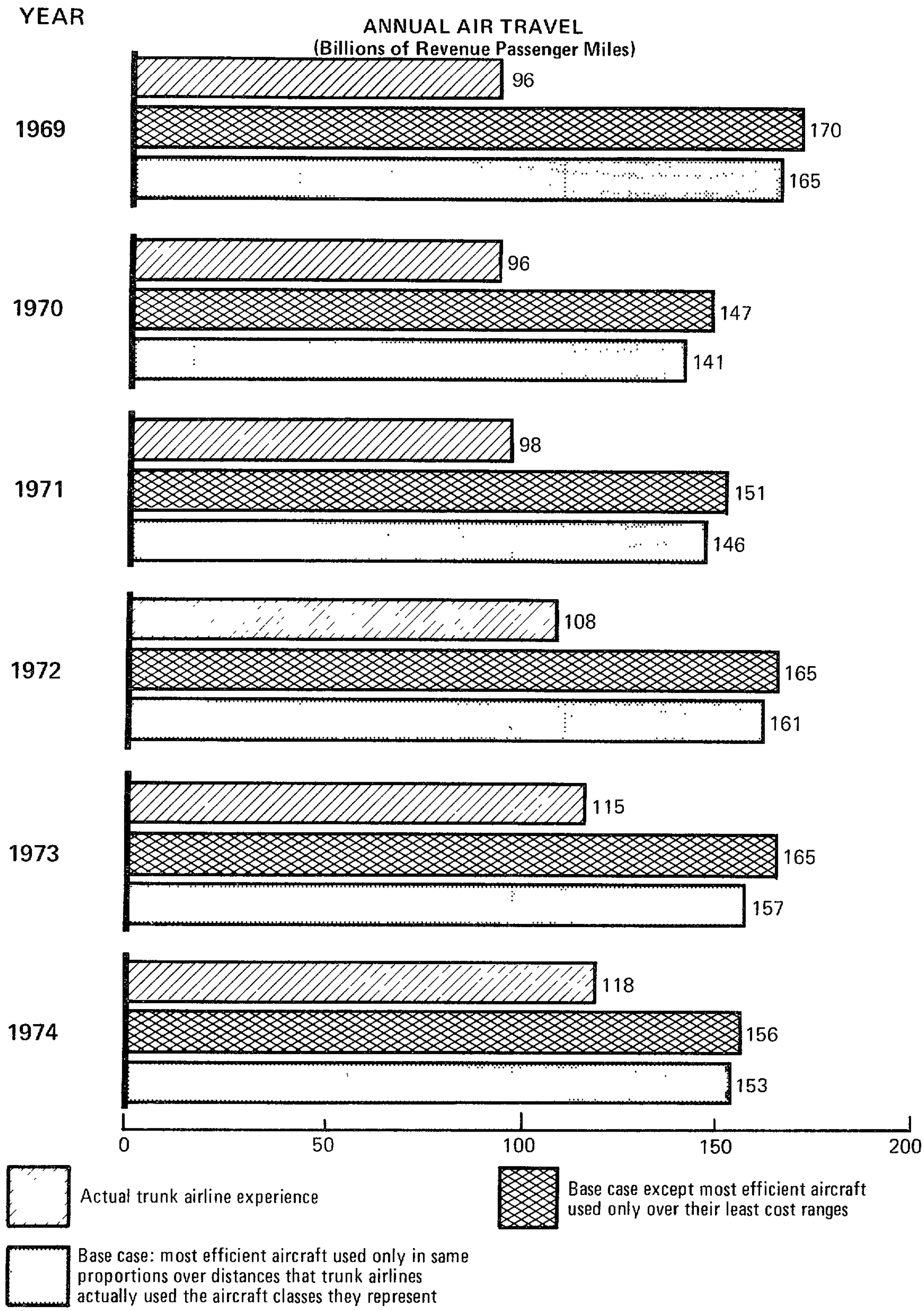
IMPACT OF "MOST-EFFICIENT-AIRCRAFT" ASSUMPTION ON PASSENGER SAVINGS

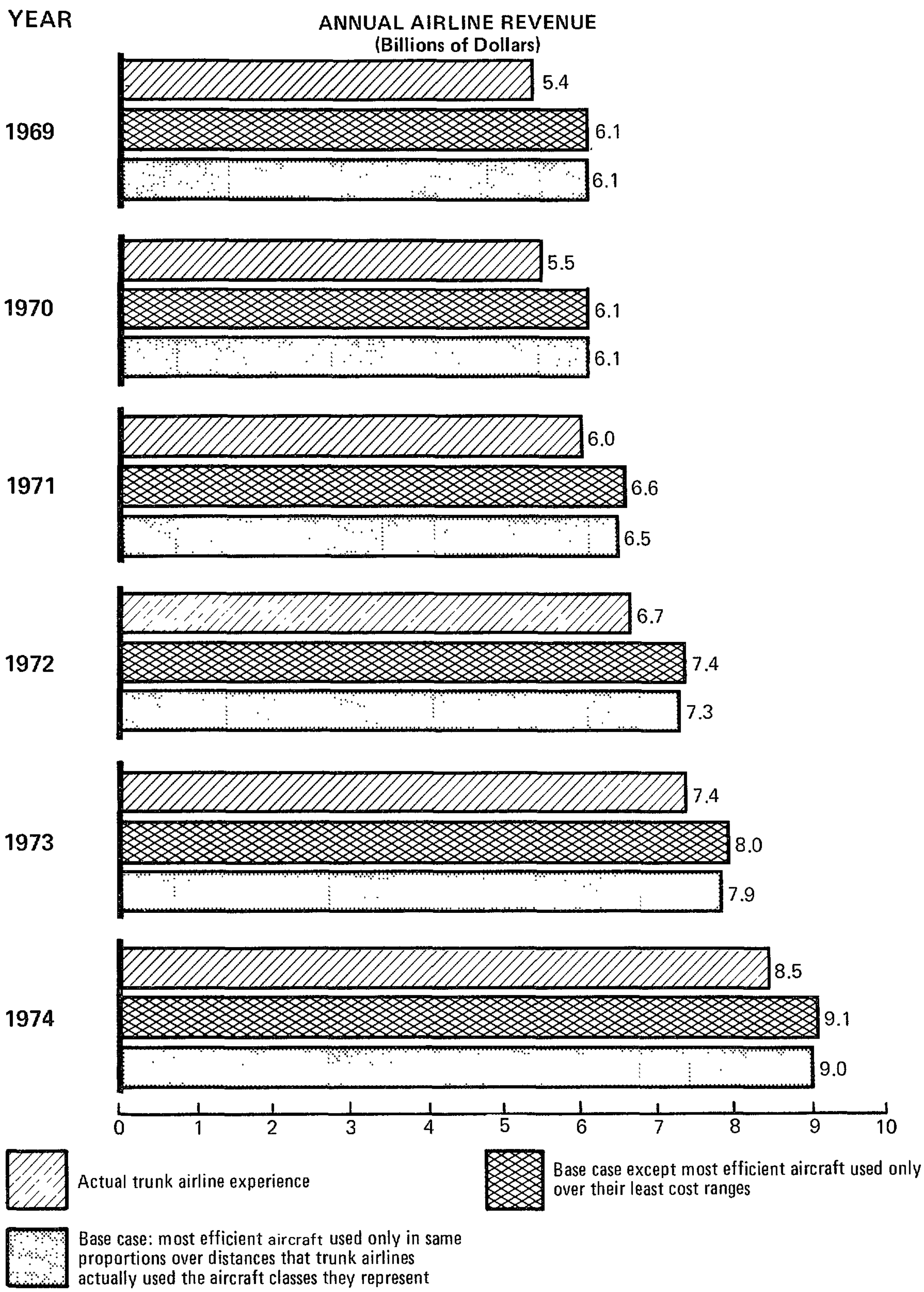



YEAR
ESTIMATED SAVINGS TO ACTUAL AND INDUCED PASSENGERS
(Billions of Dollars)
1969
2.7
2.5
1970
2.0
1.8
1971
2.1
2.0
1972
2.3
2.2
1973
2.2
1.8
1974
2.0
1.8
0
0.5
1.0
1.5
2.0
2.5
3.0
Base case except most efficient aircraft used only over their least cost ranges
Base case: most efficient aircraft used in the same proportions as the aircraft classes they represent

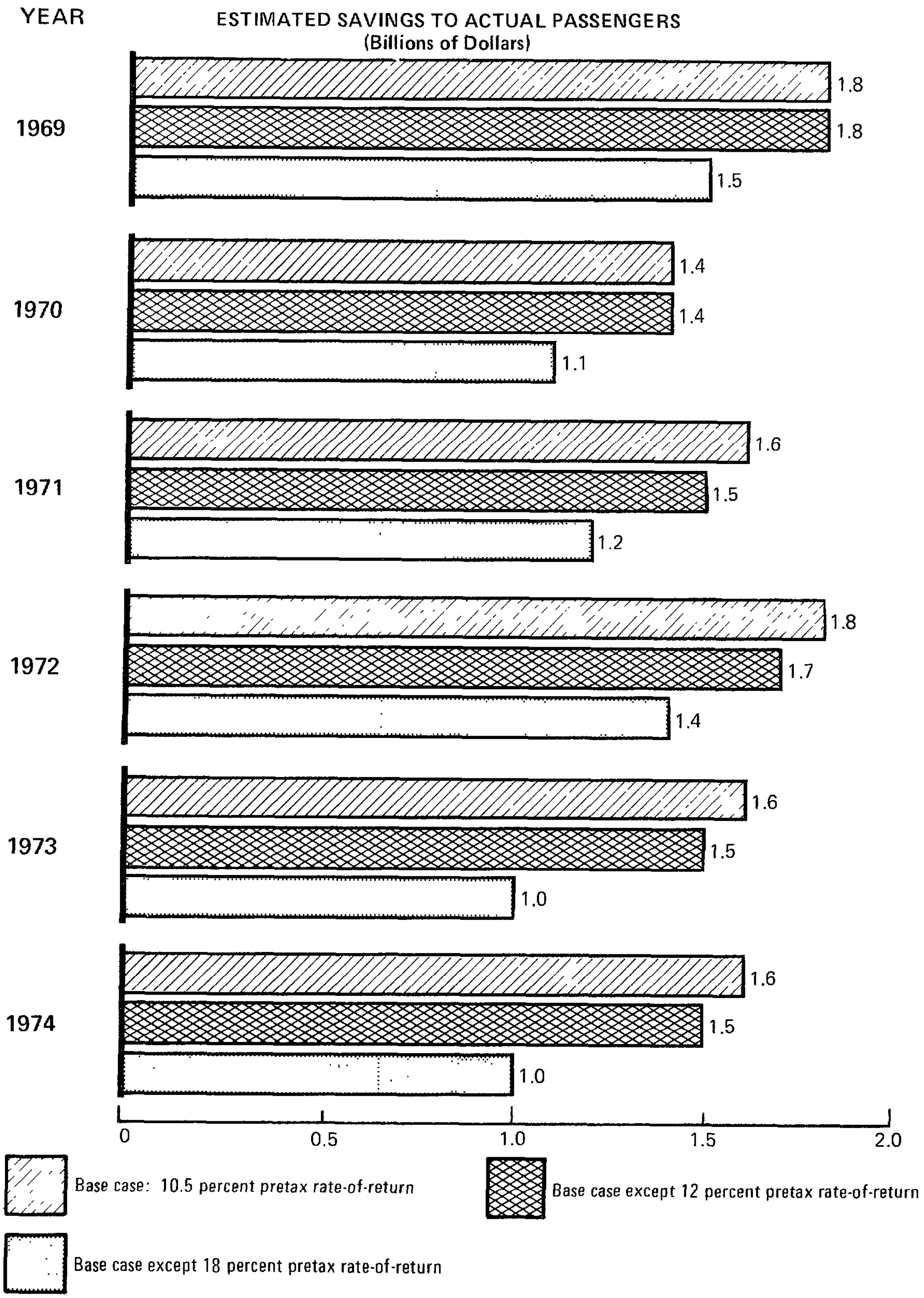

YEAR
EXCESS OF ACTUAL OVER ESTIMATED FARES
(Percent)
1969
56
52
1970
39
35
1971
40
36
1972
39
36
1973
32
27
1974
24
23
0
10
20
30
40
50
60
Base case except most efficient aircraft used only over their least cost ranges
Base case: most efficient aircraft used in the same proportions as the aircraft classes they represent

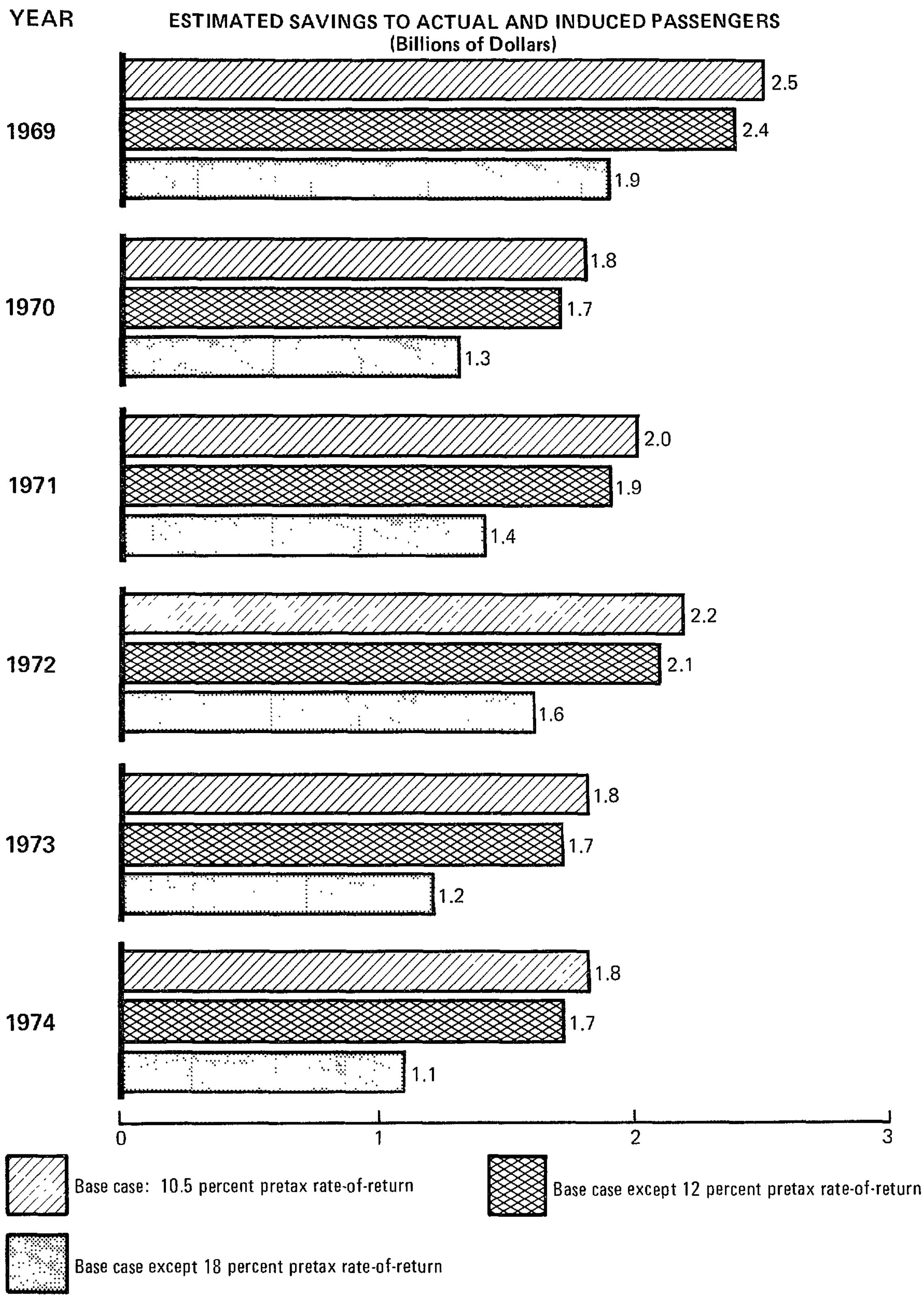
APPENDIX XIII

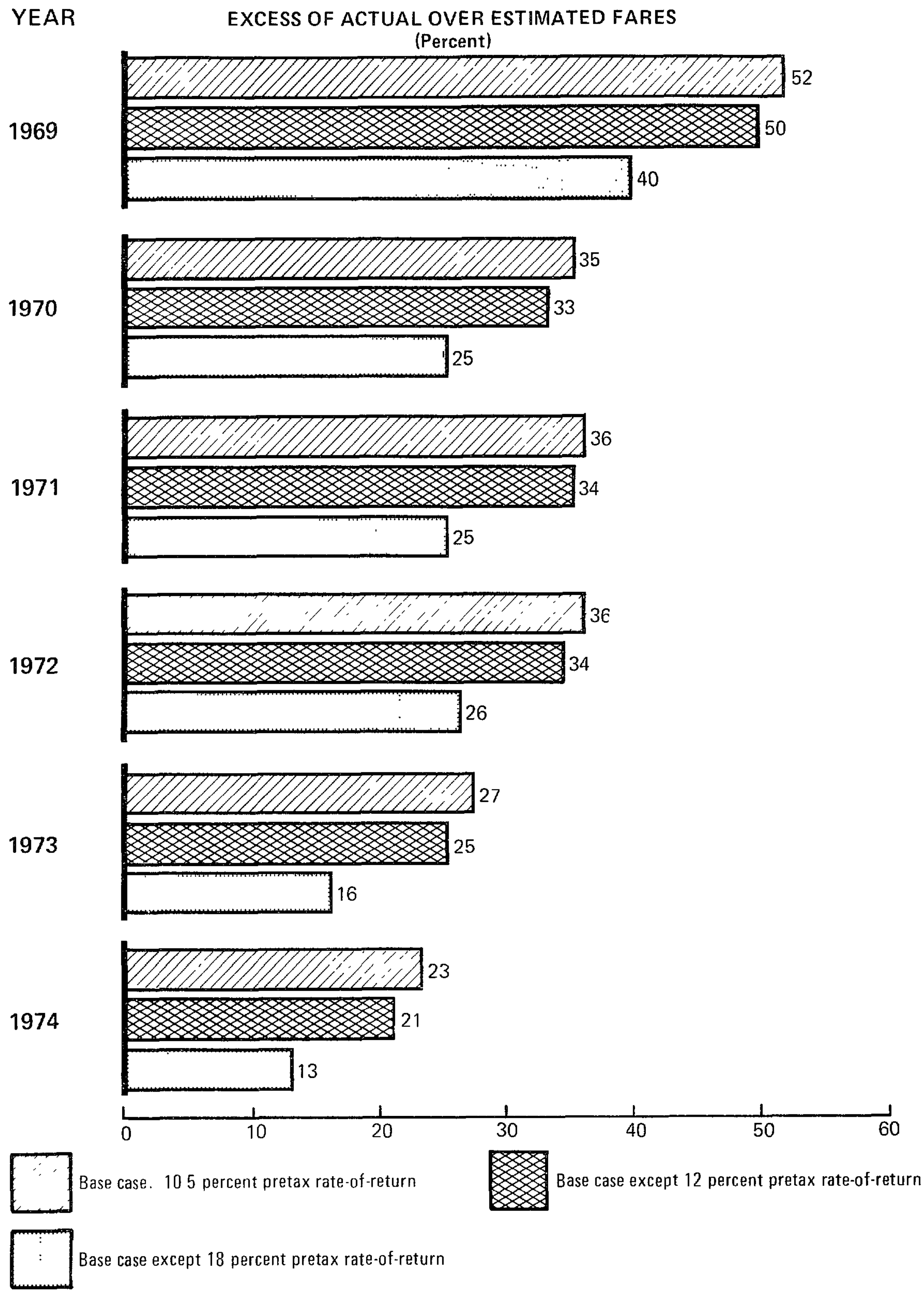



YEAR
ANNUAL AIRLINE REVENUE
(Billions of Dollars)
1969
5.4
6.1
6.1
1970
5.5
6.1
6.1
1971
6.0
6.6
6.5
1972
6.7
7.4
7.3
1973
7.4
8.0
7.9
1974
8.5
9.1
9.0
0 1 2 3 4 5 6 7 8 9 10
Actual trunk airline experience
Base case except most efficient aircraft used only over their least cost ranges
Base case: most efficient aircraft used only in same proportions over distances that trunk airlines actually used the aircraft classes they represent

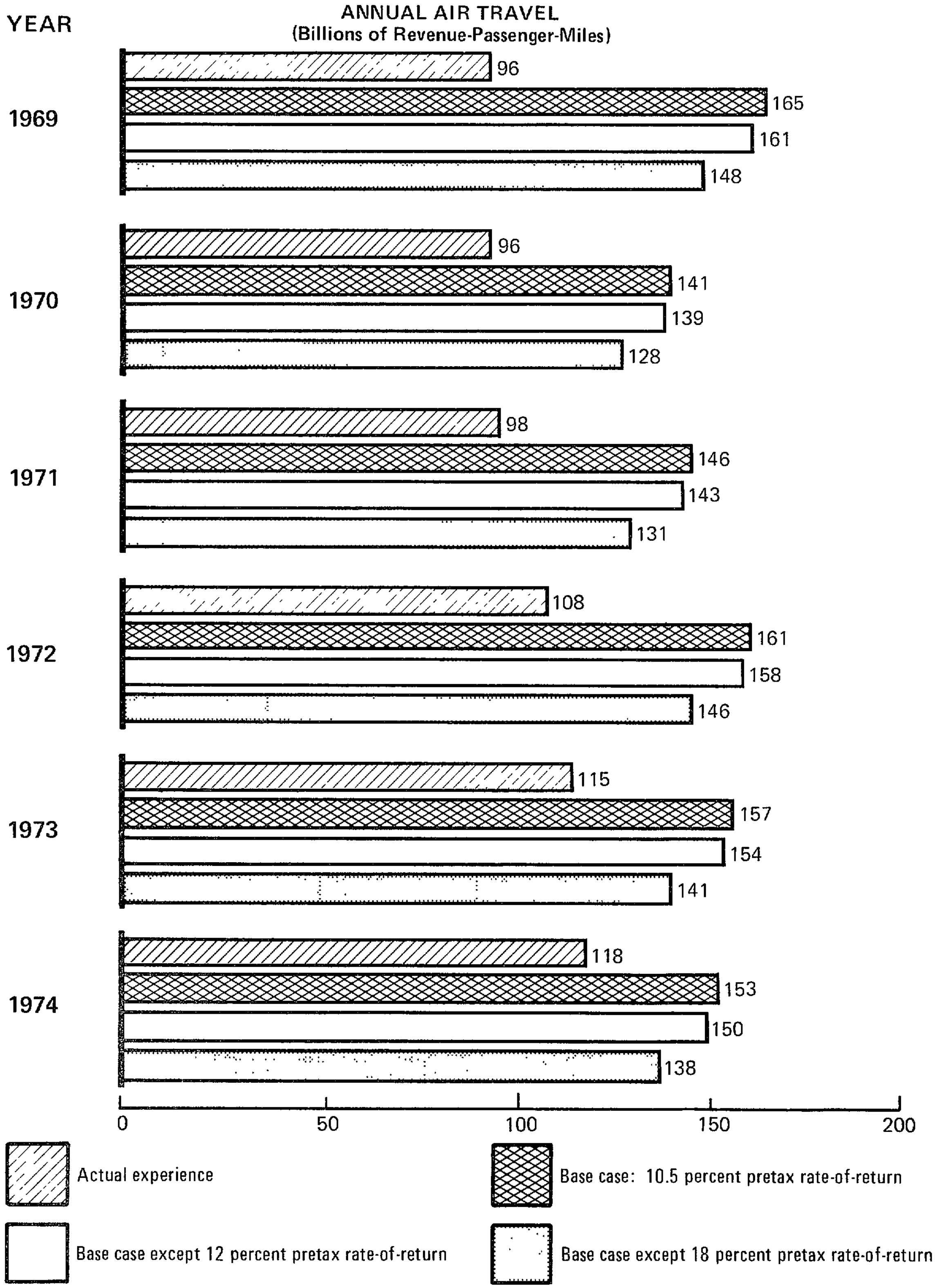
IMPACT OF VARIOUS RATES-OF-RETURN ON PASSENGER SAVINGS

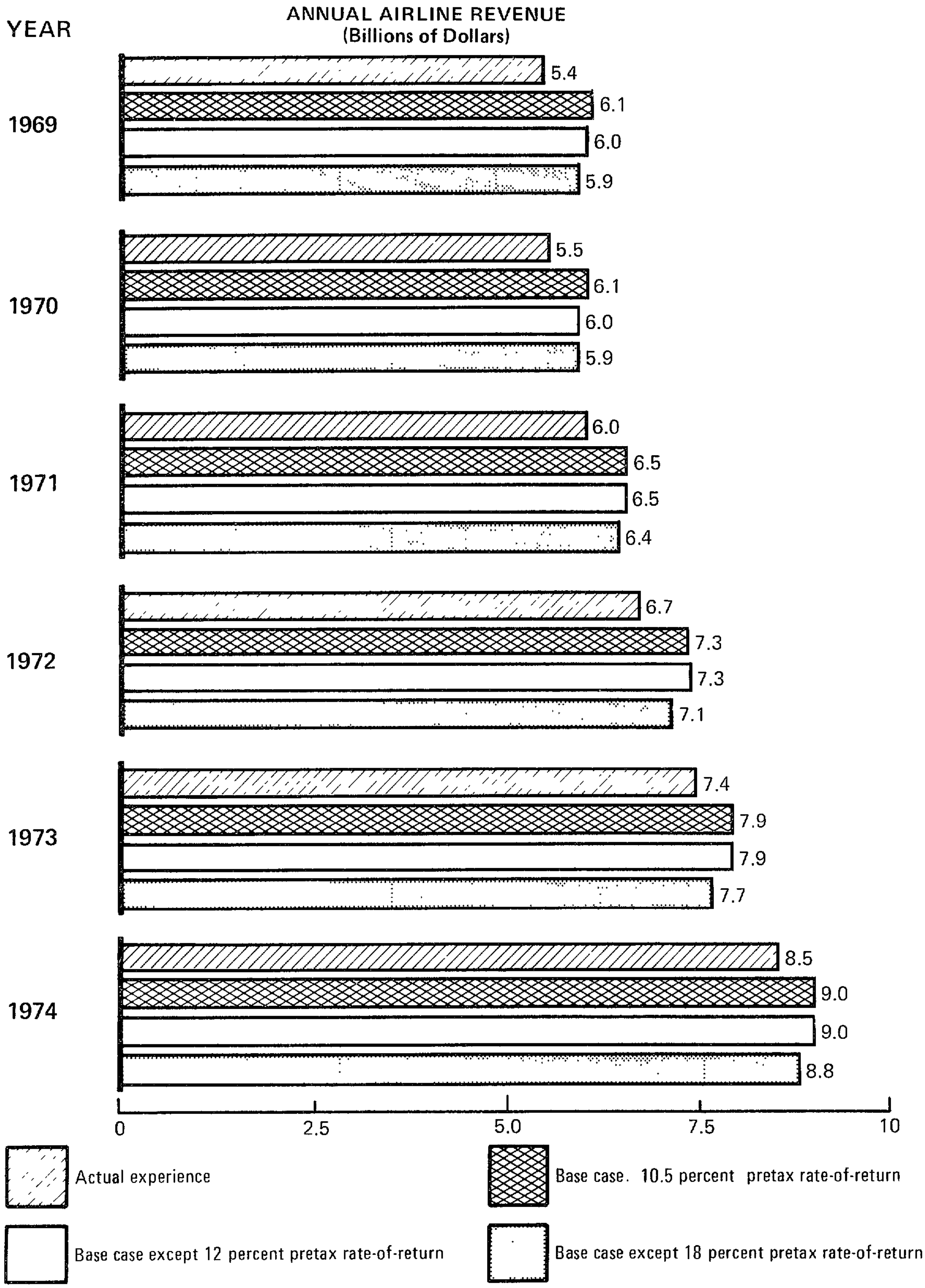


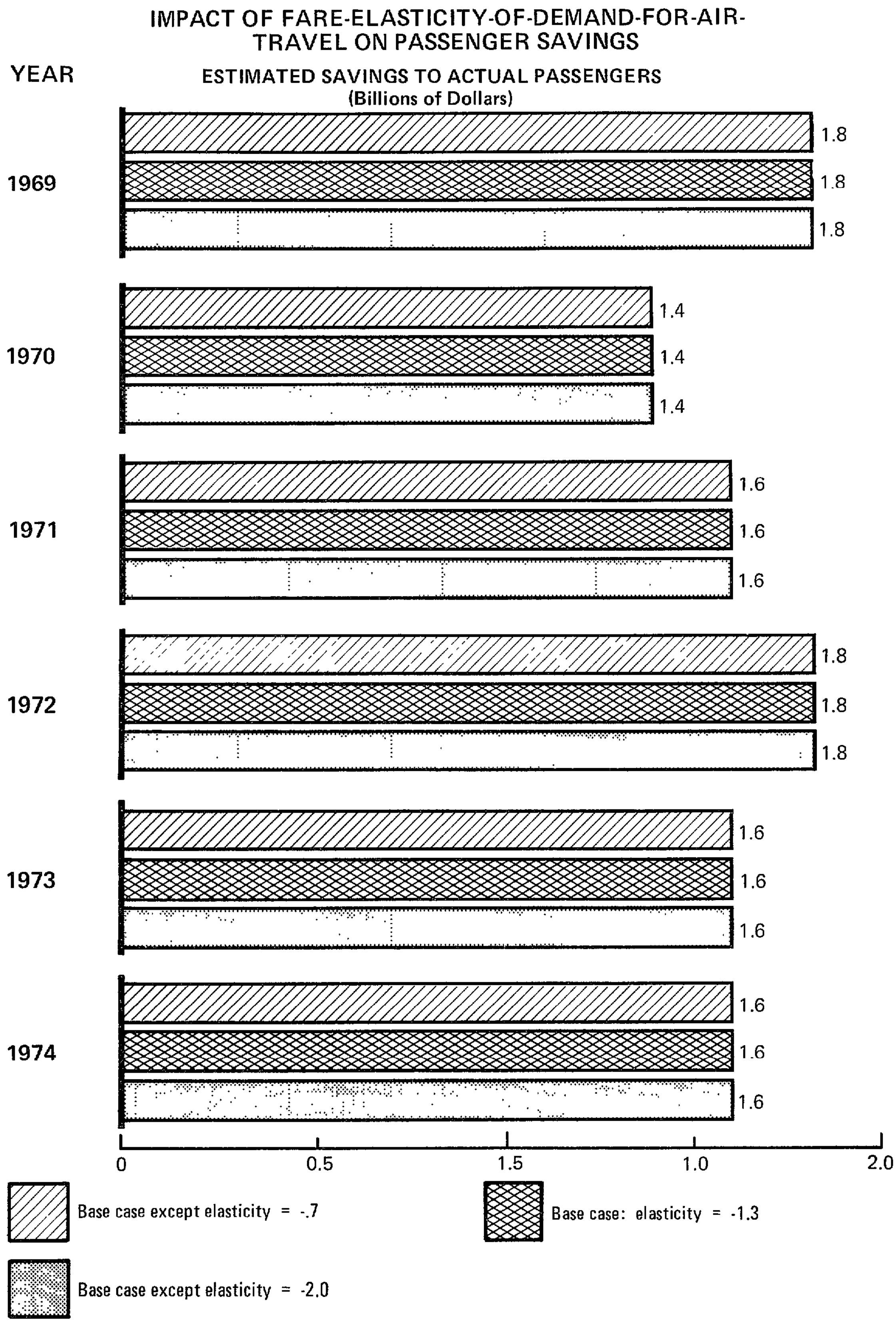

YEAR
ESTIMATED SAVINGS TO ACTUAL AND INDUCED PASSENGERS
(Billions of Dollars)
1969
2.5
2.4
1.9
1970
1.8
1.7
1.3
1971
2.0
1.9
1.4
1972
2.2
2.1
1.6
1973
1.8
1.7
1.2
1974
1.8
1.7
1.1
0
1
2
3
Base case: 10.5 percent pretax rate-of-return
Base case except 12 percent pretax rate-of-return
Base case except 18 percent pretax rate-of-return

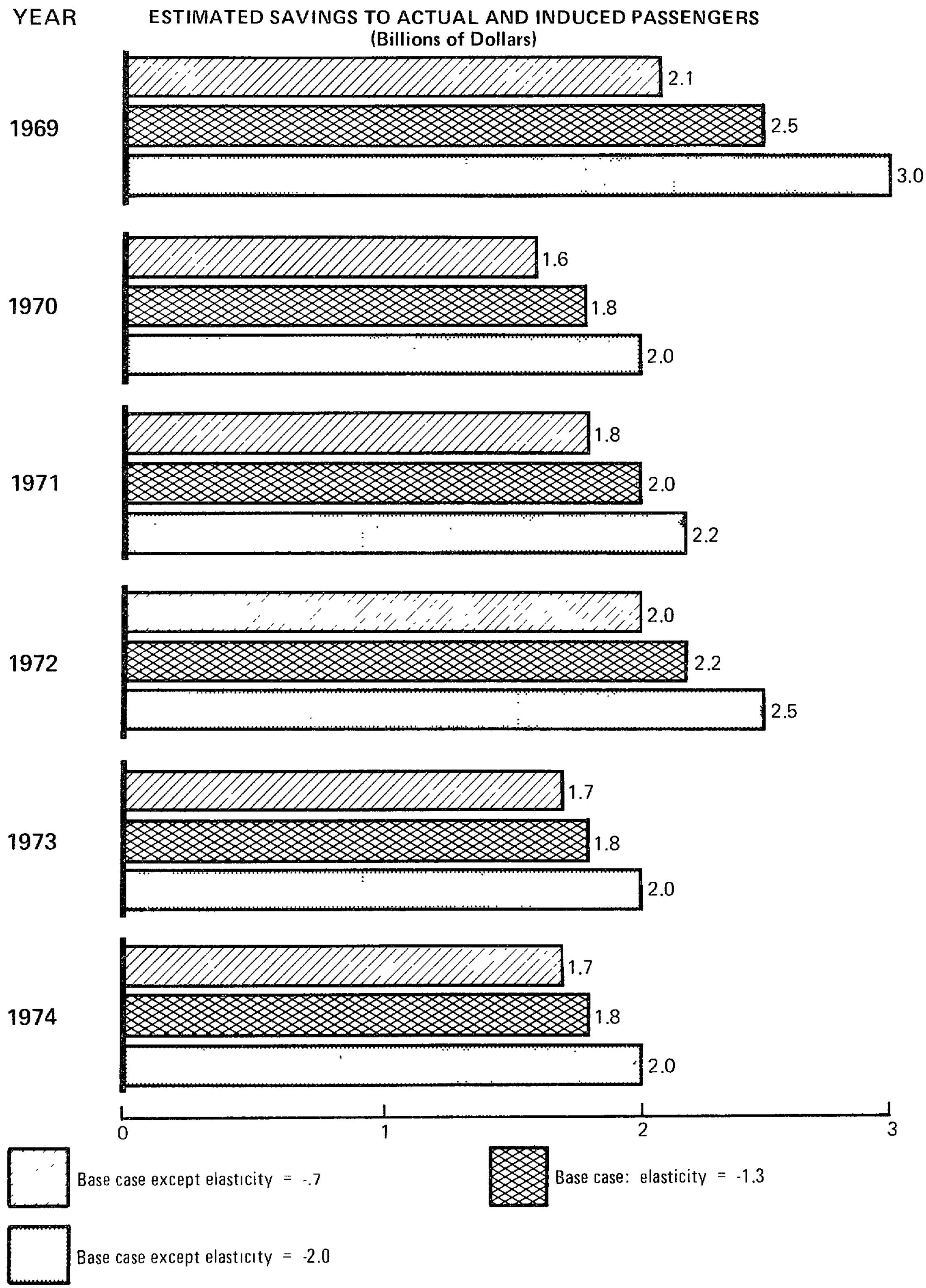

YEAR
EXCESS OF ACTUAL OVER ESTIMATED FARES
(Percent)
1969
52
50
40
1970
35
33
25
1971
36
34
25
1972
36
34
26
1973
27
25
16
1974
23
21
13
0
10
20
30
40
50
60
Base case. 10 5 percent pretax rate-of-return
Base case except 12 percent pretax rate-of-return
Base case except 18 percent pretax rate-of-return

APPENDIX XIV

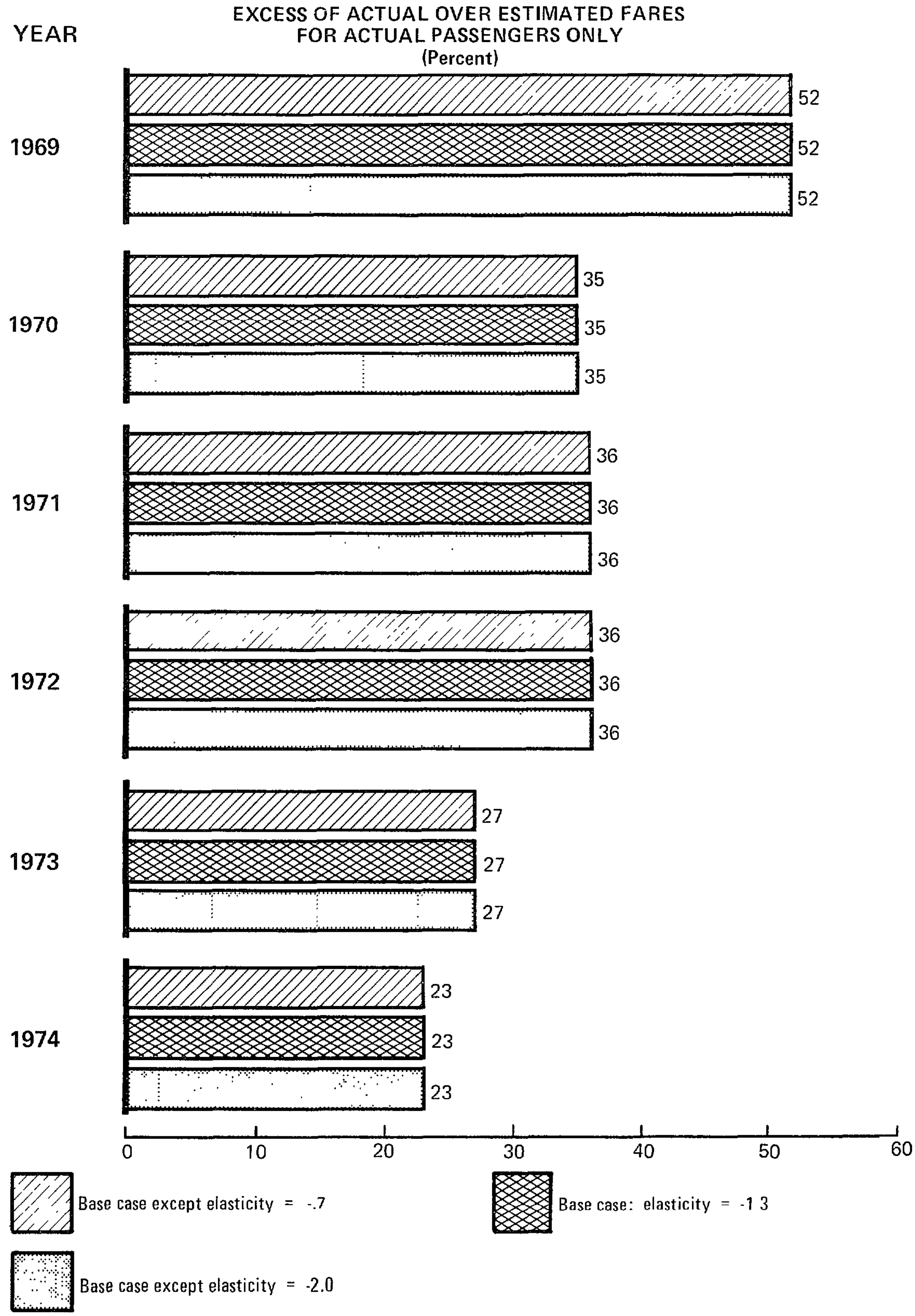



YEAR
ANNUAL AIRLINE REVENUE
(Billions of Dollars)
1969
5.4
6.1
6.0
5.9
1970
5.5
6.1
6.0
5.9
1971
6.0
6.5
6.5
6.4
1972
6.7
7.3
7.3
7.1
1973
7.4
7.9
7.9
7.7
1974
8.5
9.0
9.0
8.8
0
2.5
5.0
7.5
10
Actual experience
Base case. 10.5 percent pretax rate-of-return
Base case except 12 percent pretax rate-of-return
Base case except 18 percent pretax rate-of-return

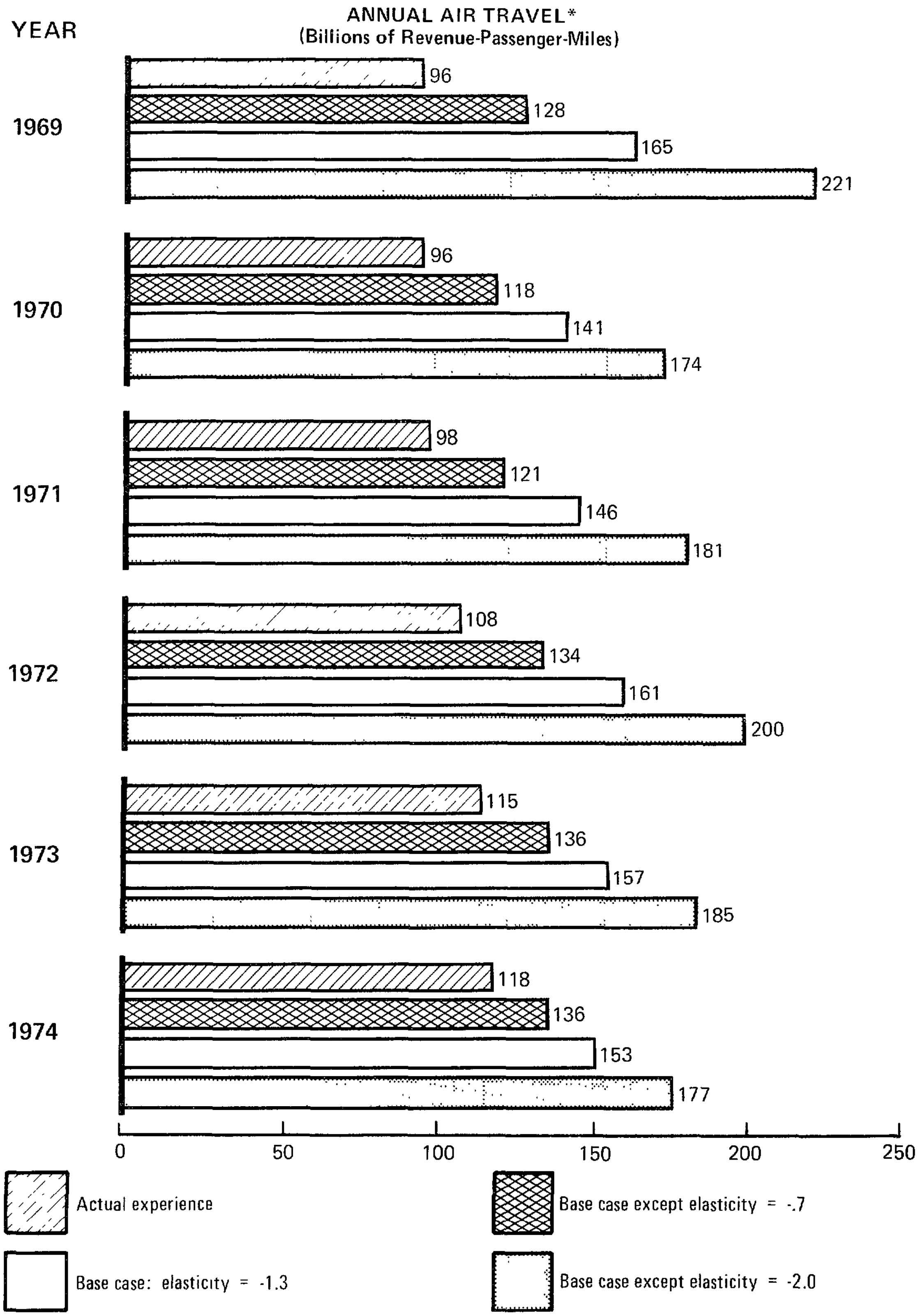

IMPACT OF FARE-ELASTICITY-OF-DEMAND-FOR-AIR-TRAVEL ON PASSENGER SAVINGS
YEAR
ESTIMATED SAVINGS TO ACTUAL PASSENGERS
(Billions of Dollars)
1969
1.8
1.8
1.8
1970
1.4
1.4
1.4
1971
1.6
1.6
1.6
1972
1.8
1.8
1.8
1973
1.6
1.6
1.6
1974
1.6
1.6
1.6
0
0.5
1.5
1.0
2.0
Base case except elasticity = -.7
Base case: elasticity = -1.3
Base case except elasticity = -2.0



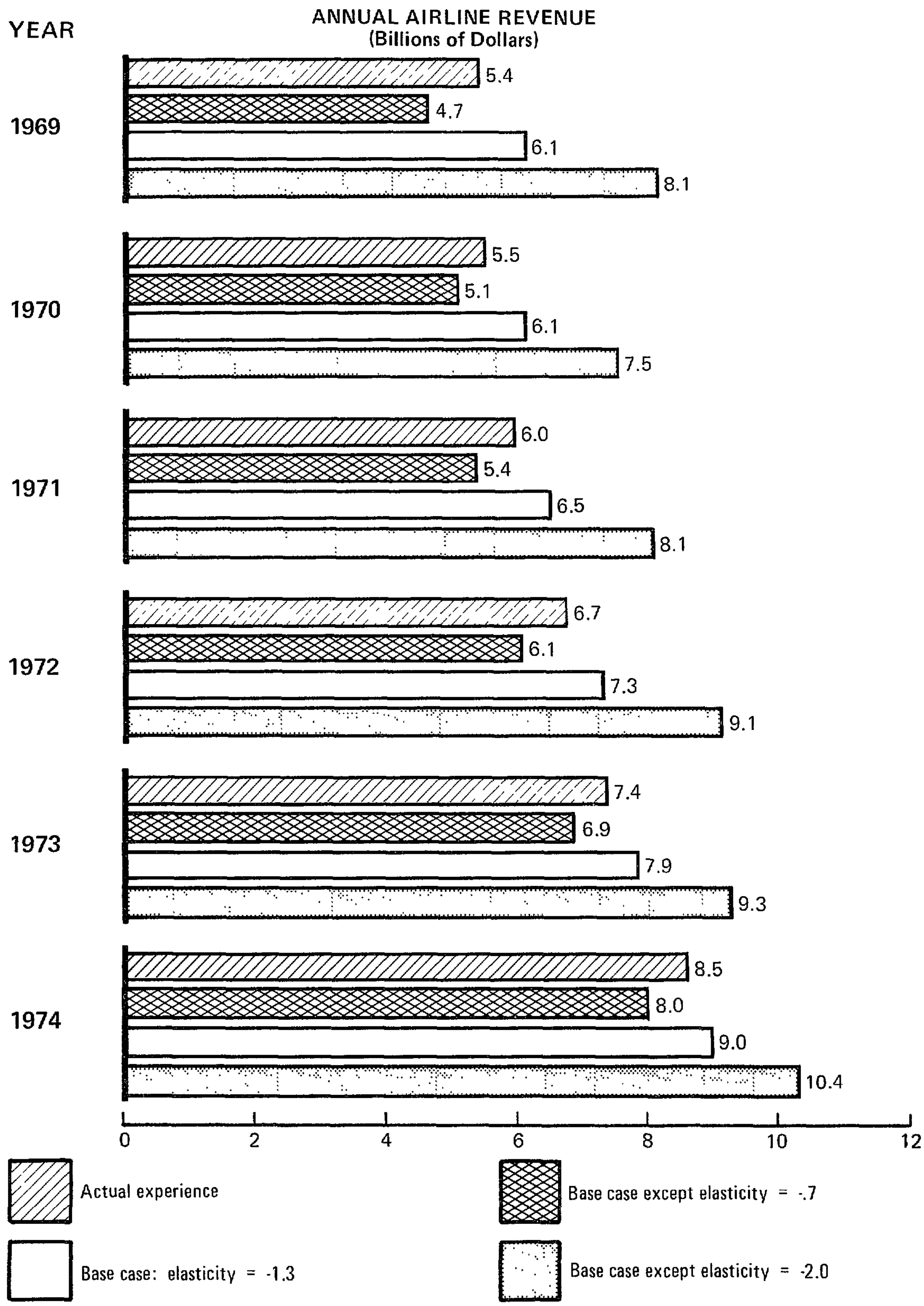
YEAR
ESTIMATED SAVINGS TO ACTUAL AND INDUCED PASSENGERS
(Billions of Dollars)
1969
2.1
2.5
3.0
1970
1.6
1.8
2.0
1971
1.8
2.0
2.2
1972
2.0
2.2
2.5
1973
1.7
1.8
2.0
1974
1.7
1.8
2.0
0
1
2
3
Base case except elasticity = -.7
Base case: elasticity = -1.3
Base case except elasticity = -2.0


YEAR
EXCESS OF ACTUAL OVER ESTIMATED FARES
FOR ACTUAL PASSENGERS ONLY
(Percent)
1969
52
52
52
1970
35
35
35
1971
36
36
36
1972
36
36
36
1973
27
27
27
1974
23
23
23
0
10
20
30
40
50
60
Base case except elasticity = -.7
Base case: elasticity = -1 3
Base case except elasticity = -2.0

APPENDIX XV



*Composed of actual travelers and additional travelers induced by lower fares


YEAR
ANNUAL AIRLINE REVENUE
(Billions of Dollars)
1969
5.4
4.7
6.1
8.1
1970
5.5
5.1
6.1
7.5
1971
6.0
5.4
6.5
8.1
1972
6.7
6.1
7.3
9.1
1973
7.4
6.9
7.9
9.3
1974
8.5
8.0
9.0
10.4
0
2
4
6
8
10
12
Actual experience
Base case except elasticity = -.7
Base case: elasticity = -1.3
Base case except elasticity = -2.0

STATEMENTS OF QUALIFICATIONS OF EXPERTS

WHO COMMENTED ON THIS REPORT

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S.M., Economics, Massachusetts Institute of Technology, 1969.
B.A., Economics, Reed College, 1967.

Publications: "Airport Costs and Congestion, "American Economist 14 (Spring, 1970), pp. 47-53.

"The Economics of Passenger Trains," Journal of Business 44 (April, 1971), pp. 148-174.

"Airline Regulation and Market Performance," Bell Journal of Economics and Management Science 3 (Autumn, 1972), pp. 399-424.

"Railroad Costs, Returns to Scale, and Excess Capacity," Review of Economics and Statistics 56 (May, 1974), pp. 201-208.

Published Working Papers, Monographs, etc.

"Regulation and Modal Market Shares in Long-haul Freight Transport: An International Comparison," Department of Economics Working Paper #47, University of California, Berkeley, December 1973; revised July, 1974. Submitted Journal of Law and Economics.

The Full Costs of Urban Transport, Volume III: Automobile Costs and Final Intermodal Cost Comparisons, Monograph #21, Institute of Urban and Regional Development, University of California, August, 1975.

APPENDIX XVI

"On the Economic Impact of Railroad Freight Regulation," presented at the Industrial Organization Workshop, University of Chicago, May, 1975.

"On the Environmental Costs of the Various Transportation Modes," processed, Institute of Urban and Regional Development, University of California, February 1974 (with Kenneth A. Small).

Resource Allocation in Intercity Passenger Transportation Ph. D. Dissertation, M.I.T., August, 1971.

On the Welfare Impact of Urban Residential Property Taxation, S.M. thesis, M.I.T. February, 1969.

Railroad Cost Functions: An Empirical Study, B.A. thesis, Reed College, May 1967.

STATEMENT OF QUALIFICATIONS

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Education: Ph.D., Business Economics, University of California, Los Angeles, 1968.
M.S., General Administration, Columbia University, 1955.
B.S., Business, Engineering, Antioch College, 1950.

Publications: Books:

Airline Regulation in America: Effects and Imperfections (Baltimore: The Johns Hopkins Press, 1970), pp. xvi, 352.

Patterns of Performance, Vol. 3 of "The Ineffective Soldier, Lessons for Management and the Nation," junior coauthor under Eli Ginzberg (New York: Columbia University Press, 1959), pp. xix, 340.

Articles:

"Producer Protection, Prior Market Structure, and the Effects of Government Regulation," Journal of Law and Economics, Vol. XV, No. 1 (April 1972), pp. 151-76.

"Airline Capacity Agreements: Correcting a Regulatory Imperfection," Journal of Air Law and Commerce, Vol. 39, No. 2 (Spring 1973), pp. 179-213.

"Air Transportation Markets: Definitional Confusion," Journal of Air Law and Commerce, Vol. 41, No. 1 (Winter 1975), pp. 33-56.

Published Conference Papers

"Competition--A Two-Edged Sword in Improving Air Transportation Performance?" in John De S. Coutinho, Chm., Transportation: A Service (New York: New York Academy of Sciences, 1967), pp. 153-68.

APPENDIX XVI

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"New Departures for Regulation," in Federal Bar Association, Air Transportation Regulation (Wash., D.C.: Federal Publications, Inc., 1972), pp. N-1 to N-16.

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STATEMENT OF QUALIFICATIONS

GEORGE W. DOUGLAS

Present position: President
Southwest Econometrics, Inc.

Education: Ph.D., Economics, Yale University, 1967
M.A., Economics, Yale University, 1963
B.A., Physics, Yale University, 1960

Publications:

Book

Economic Regulation of Domestic Air Transport: Theory and Policy (with James C. Miller III) Brookings, 1974.

Articles:

"Regulation of the U.S. Airline Industry: An Interpretation." in Perspectives in Federal Transportation Policy, James C. Miller III ed., American Enterprise Institute, 1975.

"Quality Competition, Equilibrium and Efficiency in the Price Constrained Airline Market" (with James C. Miller, III) American Economic Review, September 1974.

"The CAB's Domestic Passenger Fare Investigation" (with James C. Miller, III) The Bell Journal of Economics and Management Science, Spring 1974.

"Excess Capacity and Fares in North Atlantic Air Transport," Proceedings of the International Conference on Transportation Research, Transportation Research Forum, 1973 (copyright 1974).

"Price Regulation and Optimal Service Standards: the Taxicab Market," Journal of Transport Economics and Policy, May 1972.

"Quality Competition and the Structure of Airline Fares," Proceedings of the Transportation Research Forum, Vol. XII, No. 1 (1971). Reprinted in MIT/NASA Workshop, Airline Systems Analysis, July 1972.

"Risk in the Equity Markets: An Empirical Appraisal of Market Efficiency," Yale Economic Essays, Vol. 9 (Spring 1969).

Papers Read:

"Equilibrium in a Deregulated Air Transport Market," Seminar on Problems of Regulation and Public Utilities, Dartmouth College, August 21, 1972.

"A Review of Selected Aspects of the Supersonic Transport Program," Southern Economic Association, November 14, 1969.

Book Reviews:

Ernest W. Williams, ed. The Future of American Transportation in The Antitrust Bulletin, 1974.

Lewis M. Schneider, The Future of the U.S. Domestic Air Freight Industry, in the Southern Economic Journal, 41, 1 (1974).

Testimony (written and oral unless noted):

Before the U.S. Senate Administrative Practices Subcommittee, (Investigation of Airline regulation), February 6, 1975.

Before the Civil Aeronautics Board, CAB Docket 22908, Exhibit DOT-T-5 (Capacity Reduction Agreements Case) April 25, 1974.

Before the Civil Aeronautics Board, CAB Docket 24353, Exhibit DOT-T-1 (Mainland U.S. - Puerto Rico/Virgin Island Fares) July 21, 1972.

Before the Civil Aeronautics Board, CAB Docket 21866-9, Exhibit DOT-T-3 (Fare Structure Investigation) May 17, 1971. (written only)

Before the Civil Aeronautics Board, CAB Docket 21866-7, (Load Factor Standards Investigation), Exhibit DOT-RT-2, September 22, 1970. (written only)

Before the North Carolina Public Utilities Commission, (Extended Area Telephone Service Investigation) March 15, 1971. (oral only)

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STATEMENT OF QUALIFICATIONS

GEORGE C. EADS

Present position: Executive Director of the National Commission on Supplies and Shortages, a temporary study commission composed of four Members of Congress, four Senior Administration officials, and five individuals from the private sector. This commission is scheduled to report to the President and to the Congress on December 31, 1976, on a variety of materials-related issues.

Education: Ph.D., Economics, Yale University, 1968
M.A., Economics, Yale University, 1965
B.A., Economics, University of Colorado, 1964

Publications:

"A Long-Run Cost Function for the Local Service Airline Industry: An Experiment in Nonlinear Estimation," (with Marc Nerlove and William Raduchel), The Review of Economics and Statistics (August 1969), pp. 258-270.

Review of Mahlon Straszheim, The International Airline Industry in The Journal of Political Economy (July/August 1970), pp. 795-798.

"Statistical Biases in Aggregate Time Series of the Demand for Air Travel," (with Philip Verleger), Proceedings, Business and Economic Statistics Section, American Statistical Association (December 1970), pp. 120-126.

"Governmental Support of Advanced Civilian Technology--Power Reactors and the Supersonic Transport," (with Richard R. Nelson), Public Policy (Summer, 1971), pp. 405-427.

Review of Alfred R. Kahn, The Economics of Regulation in The Bell Journal of Economics and Management Science (Autumn, 1971), pp. 678-682.

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"The Effect of Regulation on the Cost Performance and Growth Strategies of the Local Service Airlines," Journal of Air Law and Commerce (Winter 1972), pp. 1-34.

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Review of Z. Griliches and A. Ringstad, Economics of Scale and the Form of the Production Function in The Journal of Political Economy (January/February, 1973), pp. 243-244.

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"Airline Capacity Limitation Controls: Public Vice or Public Virtue"? The American Economic Review (May 1974), pp. 365-371.

"Railroad Diversification: Where Lies the Public Interest"? The Bell Journal of Economics and Management Science (Autumn, 1974), pp. 595-613.

"Economists Versus Regulators," in James C. Miller, III, ed., Perspectives on Federal Transportation Policy, Washington: The American Enterprise Institute for Public Policy Research (1974), pp. 101-109.

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"Competition in the Domestic Airline Industry: Too Much or Too Little?" in Almarin Phillips, ed., _Promoting Competition in Regulated Industries_, Washington: The Brookings Institution (1975), pp. 13-54.

Unpublished Papers and Reports:

"Price Discrimination and the Elasticity of Demand: The Case of Air Travel," Harvard Institute of Economic Research, Discussion Paper Number 72 (April 1969).

"Economic theory As An Aid To Regulatory Agency Decisionmaking: The Capacity Reduction Agreements Case," presented at The XXII International Meeting of The Institute of Management Sciences, Kyoto, Japan (July 26, 1975).

CIVIL AERONAUTICS BOARD
WASHINGTON, D.C. 20428

June 30, 1976

IN REPLY REFER TO. B-60-64

Mr. Henry Eschwege
Director
Resources and Economic
Development Division
General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

The Chairman has asked me to thank you for the opportunity to comment on the GAO draft report entitled "Impact of Increased Efficiencies on Air Fares and Travel" and has further requested that I furnish you with the staff's observations on the study. Essentially, the draft report concludes that the airlines could obtain substantial efficiencies by increasing load factors, aircraft seating densities, and aircraft utilization, and employing optimum equipment types. These efficiencies would, according to the draft report, result in savings between $1.5 and $2 billion annually to the traveling public. On the basis of this analysis, GAO concludes that the Board should work towards the achievement of the kinds of efficiencies assumed in its study, either under its existing legislative authority or by seeking appropriate legislative changes.

We would be in general agreement with the draft report to the extent that it recommends that the Board work towards the achievement of a more efficient air transportation system. However, the report is, we believe, deficient in its failure to recognize the actions which the Board has, in fact, taken along these lines, both in the exercise of the Board's current legislative authority, as well as in the Board's regulatory reform legislative program. Moreover, we believe that the level of savings predicted in the draft report from operations under the assumed conditions is speculative and inflated.

With respect to the Board's actions under its present legislative authority, we believe that the draft report should take cognizance of the very substantial adjustments which the Board makes to the carriers' operating results for ratemaking purposes. Specifically, in employing

Mr. Henry Eschwege (2)

standards developed in the Domestic Passenger Fare Investigation, the Board predicates passenger fares on standard, full-fare load factors, in order to eliminate the effect of excess capacity upon the passenger fare level. Moreover, in calculating passenger load factors, the Board assumes optimum seating densities, including the substitution of 9 and 10-abreast coach seating for wide-bodied aircraft in lieu of the 8 and 9-abreast seating which is currently employed by the airlines. The Board also adjusts the carriers' aircraft utilization in cases where actual utilization appears inadequate. The combined result of these adjustments resulted in a saving of approximately $750 million to the domestic air traveler in 1975. Although these standards are not mentioned in the report, it is interesting to note that the draft report does indirectly provide documentation for the impact of the implementation of these standards, since the differences between the actual fare level and the "increased efficiency fare level" significantly diminish from 1969 to 1974.

The report also fails to take account of the Board's proposed regulatory reform program. This is a detailed proposal, the substance of which was submitted to the Congress in April of this year and was supplemented by detailed proposed legislative amendments this month. Copies of these documents are enclosed herewith. As indicated in these documents, the Board has taken the position that a substantial relaxation of regulatory controls would, inter alia, result in a more efficient air transportation system. We believe that the report should take note of the Board's program.

Finally, we are concerned with the draft report's conclusion that air fares could be reduced from present levels by several billion dollars a year through operating efficiencies, i.e., improvement of load factors, seating densities and utilization rates, and the use of the most efficient aircraft type for each market. The draft report assumes that optimum values for each of these factors can be achieved in every market throughout the domestic system -- an assumption which we believe is not realistic. The system we have today is not a composite of mutually independent markets, but a complex and inter-connected network designed to maximize traffic flows and, accordingly, profits throughout. An example is that the vast majority of short-haul traffic, perhaps as high as 75 percent, is connecting to some more distant destination. To rigorously apply a combination of GAO's optimum assumptions to this segment of the system could severely constrain the ability of this traffic to move.

Mr. Henry Eschwege (3)

The level of savings to the consumer that is developed in the study from superimposing optimum conditions on the entire domestic trunk system is also a source of concern to us. For example, during calendar 1974 it is stated that the consumer could have saved $1.9 billion if the optimum fares constructed in this report were in effect. This level of savings is, in our opinion, overstated. For example, the report assumes the elimination of all first-class service, and counts the difference between first-class and coach fares as a savings to the traveling public. Moreover, the rate of return found reasonable for the airline industry under free market conditions appears too low to attract capital in a competitive marketplace. It is actually lower than current interest rates. In addition, the Board's staff has found several mechanical deficiencies that also overstate savings. The net result of the above is to reduce 1974 savings from $1.9 billion as computed in the study to about $400 million, or by roughly 80 percent. We are certain that there are other factors that weigh both in favor and against the level of computed savings, but time does not allow further analysis.

Enclosed you will find the detailed comments of the Board's staff. If you have any questions concerning these comments, please contact the undersigned.

We hope that in finalizing the report you will find our comments constructive and include them, to the extent possible, in any revision you may wish to make.

Sincerely,

Arthur H. Simms
Director
Bureau of Economics

Enclosures

Staff Comments
"Impact of Increased Efficiency on Air Fares and Travel"

Introduction

The staff is in agreement with the general conclusion of this study that air fares should reflect an efficient industry governed to the extent possible by competitive market conditions. This is evidenced by the Board's comments on regulatory reform and the Federal Aviation Act of 1975 presented to the appropriate committees of both the U.S House of Representatives and U.S. Senate where it stated:

> "Economic regulation should be redirected so domestic air transport is, in time, essentially governed by competitive market conditions. In the long-run we believe this can result in a more efficient, lower-cost system which will successfully respond to public needs for air travel."

The staff is also in agreement with the recommendations of GAO that the Board work toward the kinds of efficiencies assumed in this study. In fact, since the inception of the Domestic Passenger Fares Investigation in 1970, the Board has moved in this direction and now includes in its rate-making procedure adjustments for load factor, seating density, aircraft utilization and discount fare traffic. This has not been recognized by GAO, but certainly should be in any finalization of this study.

However, the predicate for GAO's conclusions and recommendations -- an update and sanitization of an earlier study prepared by Dr. Theodore E. Keeler entitled "Airline Regulation and Market Performance" -- contains numerous untested and, in some instances, unrealistic assumptions as well as other technical difficulties that must be made abundantly clear to the reader. While at first blush, it appears that the consumer could have saved between $1.5 and $2.0 billion annually in air fares for the period 1969-1974 had the airline industry been a replication of that depicted in this study, it must be noted that these savings are extremely sensitive to the particular assumptions imposed, as well as to the definitions and procedures followed.1/ For example, savings of $1.9 billion computed by GAO for 1974 are reduced by almost 80 percent to about $400 million if only corrected for quantifiable deficiencies.

There follows a detailed comparison of the Board's rate-making adjustments to those espoused by GAO as well as the staff's comments on assumptions and procedures used in the study.

Standards Recommended By GAO and Those of the Board

Included in the Board's computation of the rate-making rate of return, as stated above, are adjustments for load factor, seating density, aircraft utilization and discount fare traffic. A discussion of each and their impact is set forth below.

Load Factor

In Phase 6B of the Domestic Passenger Fares Investigation the Board set a long-term standard load factor of 55 percent for determining overall revenue need together with a standard variable by distance (averaging 55 percent) for determining the fare structure. The purpose of this

1/ The sensitivity analysis performed by GAO demonstrates the impact of the assumptions and should be given far greater weight in the final product.

standard is to ensure that the consumer does not bear the burden of excess capacity. A comparison of the Board's standard with that assumed in this study is shown below.

	Standard Load Factor	
Midpoint Mileage	CAB	GAO/Keeler
100	56.3	60.0
200	57.2	"
300	57.6	"
400	57.6	"
500	57.6	"
700	57.2	"
1000	56.9	"
1300	56.2	"
1600	54.7	"
1900	53.5	"
2200	52.2	"
2500	50.4	"
2800	48.8	"
Average	55.0	60.0

The Board's standard by mileage block and in total is applicable to aggregate operations of aircraft serving all city-pairs within a given mileage block. GAO's standard, however, is applicable to each city-pair in each mileage block with the constraints that DC-9-30 aircraft will operate only in the 0-340 mile interval, B-727-200 aircraft will operate only in the 341-900 mile interval, and DC-8-61 aircraft will operate only in markets over 900 miles.

Since the Domestic Passenger Fares Investigation, the structure of the airline industry has changed markedly. Fuel prices have more than doubled and the need to conserve fuel has become paramount. Accordingly, the Board has docketed a re-examination of domestic load factors to determine whether the current standard is still realistic or should be changed to reflect the changing structure of the industry. Copies of the Board's orders are attached.

Standard Seats

In Phase 6A of the above mentioned investigation the Board determined that standard seats for the purpose of rate-making would be based upon 6-abreast densities in narrow-bodied jet aircraft and 9- and 10-abreast seating in wide-bodied jet aircraft. A comparison of the Board's standard for wide-bodied aircraft with the range of seats actually provided by the carriers is shown below:

	Number of Seats		
		Actual	
Aircraft Type	Standard	High	Low
B-747	384	371	339
DC-10	276	250	209
L-1011	276	250	227

While the Board's standards allow for galley space and mixed configuration of first-class and coach seats, GAO's standards assume complete elimination of first-class service and coach densities only slightly less than the manufacturer's maximums. A small galley, equal to the space of 5 seats, is allowed by GAO in the B-727-200 and DC-8-61 aircraft. No galley space is provided in the DC-9-30 aircraft, a fact that is discussed in some detail later.

Aircraft Utilization

To ensure that the public is not burdened by the under utilization of aircraft, an adjustment is made in the Board's rate-making formula. Each carrier has been held to the level of utilization it achieved in each of its aircraft types during calendar year 1972. The effect of this adjustment is not unlike the adjustment implicit in GAO's study. A comparison of the utilization factors is shown below:

	Utilization (Blk. Hrs./Day)		
	CAB		
Aircraft Type	High	Low	GAO
DC-9-30	10.43	9.48	9.03
B-727-200	10.82	7.42	9.39
DC-8-61	10.90	8.56	11.34

Most Efficient Aircraft

The Board does not directly impose a specific standard for the most efficient aircraft. However, the pressures on costs created by the above adjustments for load factor, seats and utilization provide incentives to the carriers to make the most efficient use of their aircraft as possible. The incentives here created have been further strengthened by the current and recent-past fuel situation.

The most efficient aircraft type criterion used by GAO is a standard of perfection and one that is practically impossible to meet at any given point in time. Further comment on this can be found in the section concerning the assumptions of the GAO study.

Impact of Board Imposed Standards

The savings to the public generated by the Board's imposed standards can best be seen by comparing rate of return on an actual basis and as adjusted:

Rate of Return	Domestic Trunks 48-State Operations Calendar 1975
Actual	2.41%
Adjusted For:	
Utilization	2.72
Load Factor and Seats	5.38
Discount Fares	9.20

Thus, the rate of return used for rate-making purposes reflects an increase of .31 percentage points for adjustments of utilization and 2.66 points for adjustments of load factor and seats. An additional 3.82 points is added by a discount fare d sallowance. This adjustment, not included among the recommendations of GAO, is designed to ensure that the normal fare payer does not cross-subsidize the carriage of discount fare traffic. The cumulative impact of these adjustments is a $750 million saving to the consumer.

It is interesting to note that the spread between reported revenue and the "increased efficiency" revenue estimated in this study narrows considerably over the period 1969-1974. From an excess of 46 percent in 1969, reported revenue is shown to be only 28 percent in excess by 1974. A major explanation of this 18 percentage point reduction is the standards now imposed by the Board in determining air fares.

Assumptions of The GAO/Keeler Study

The basic assumptions of this study -- high load factors, dense seating, high aircraft utilization and use of the most efficient aircraft type -- appear reasonable when considered individually or when applied in isolation to one particular market. However, the ability to obtain a combination of these over every domestic route is remote.

The domestic route system is a complex and interconnected network of many diverse markets. As such, to obtain a combination of the above assumptions in every market situation is not a simple task. For example, in thinly traveled markets it may be possible to obtain high load factors in densely configured aircraft, but not at the utilization rates assumed in this report. Further, in these same markets, the use of

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the most efficient aircraft as dictated by GAO may constrain the ability to achieve high load factors. That is, smaller aircraft that more closely match the demand in lightly traveled markets would not be available since their unit costs would be higher than those of the most efficient aircraft as assumed by GAO. These are but a few examples, and many more could be cited. However, they are sufficient to shed considerable doubt on the ability of the industry to generate optimum operations on all segments of an integrated system.

More detailed comments on each of the assumptions of this study follow below.

Load Factor

A basic premise of the Keeler study and GAO's update is that a sixty percent passenger load factor could have been obtained in all domestic trunk markets if free market conditions had prevailed during the 1969-1974 period. This assumption is based upon the experience of PSA for 1959-1970 and Southwest for 1974 and 1975.

Apparently Keeler had no difficulty in making a direct load factor correlation between an isolated short-haul, point to point, densely traveled, sometimes monopolistic airline and a multi-company, varied haul, integrated system. Though GAO raised some questions regarding this assumption by stating that while "the California experience ... may not be representative of long-run price competitive airline industry experience", they felt that the results of operations in the intrastate Texas markets during 1974 and 1975 could justify retention of the 60 percent load factor assumption. GAO apparently gives little weight to the fact that Southwest operates a monopoly on an airport-

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to-airport basis. The real problem, however, does not pertain to the basis for establishing the sixty percent load factor standard, but to the ability of the carriers to obtain this level over their system while adhering to the constraints imposed by the study on aircraft selection, seating density, and aircraft utilization.

The fact that only three aircraft types are employed leaves management no flexibility to serve markets with other aircraft of more optimum size and cost characteristics. That is, markets that could be more economically served by smaller or larger aircraft would be penalized by the selection of only the three types. Less dense markets would suffer through frequency reduction and possible loss of traffic to other modes of transportation. More densely traveled markets would pay through a surplus of departures and unneeded congestion. The problems that the constraints on aircraft selection generate are even more evident when considering the introduction of wide-bodied aircraft during the first year of this study. Whereas GAO would only allow operations of aircraft with 110, 153, and 239 seats, the trunk carriers during 1974 had available a variety of aircraft with seats ranging from 67 to 370 per plane.

A second factor which constrains the achievement of a straight sixty percent load factor is the assignment of each aircraft type to specific mileage blocks. Keeler's plan would effectively eliminate all through plane service from secondary cities to distant points. Under his assumption, the short segment from the secondary point to the hub would be performed by a DC-9-30 and the segment from hub to distant hub would utilize a 727-200 or DC-8-61, thereby requiring a change of plane.

Neither Keeler nor GAO made any attempt to quantify the increased reservation and sales and traffic servicing expense (passenger, baggage, and cargo) that would result from additional deplaning and enplaning caused by reductions in through plane service.

The following chart displays a representative sample of the common carrier flight scheduling practice of building load factors for long-haul operations by providing through plane service with large equipment from secondary cities to hubs.

Carrier	Flight #	Itinerary
United	59	Richmond $\xrightarrow{\text{94 mi.}}$ Washington $\xrightarrow{\text{2288 mi.}}$ Los Angeles
American	73	Rochester $\xrightarrow{\text{244 mi.}}$ Cleveland $\xrightarrow{\text{2053 mi.}}$ Los Angeles
Eastern	11	Boston $\xrightarrow{\text{44 mi.}}$ Providence $\xrightarrow{\text{143 mi.}}$ New York $\xrightarrow{\text{1097 mi.}}$ Miami
TWA	99	Philadelphia $\xrightarrow{\text{134 mi.}}$ Washington $\xrightarrow{\text{2288 mi.}}$ Los Angeles

This produces lower load factors in the short-haul but compensates by increasing long-haul load factors. Secondary cities are thereby receivers of more frequent and less time consuming block-to-block service. It also provides local passengers on the first segment additional service frequency. This process would not be possible under GAO's assumptions.

The third condition which makes the sixty percent load factor unrealistic is the extremely high aircraft utilization rates assumed. GAO diverted from Keeler's methodology here and selected the highest utilization rate for each aircraft type experienced during the years 1969 to 1974. This assumes that there is no inter-relationship among aircraft types. Changing routes, aircraft mix, purchases, retirements, length of haul, traffic growth, maintenance, charters, and positioning flights are all contributing factors to aircraft utilization for a given period of time. Therefore, the dynamic nature of these factors does not allow individual aircraft utilization rates to be selected from differing years. Additionally, GAO selected utilization rates from a data base that reflect actual operations over a greater variety of stage lengths (especially longer stage lengths) than have been considered optimum under GAO's own criteria. The result is that an aircraft is placed into average daily service for longer than is perhaps physically possible. For instance, based upon (a) GAO's assumptions of a DC-9-30 being utilized in all markets of 0 to 340 miles, (b) average passenger trip distance of 266.2 miles, (c) average aircraft stop and cruise times, and (d) a turnaround time of forty minutes between flights, the average aircraft would be employed in revenue service an astounding average of 18.4 hours (ground and air time) per day. Beside physical capabilities, a utilization rate this high becomes more untenable when considering the curfews which exist at many metropolitan airports. A review of PSA's current time tables shows that all regular flights are scheduled between 7 a.m. and 9 p.m. This is only a 14 hour period for <u>all</u> airline operations. PSA's individual aircraft utilization is even less because all planes are not used every hour or every working day (especially weekends).

When utilization rates are as high as indicated here, excess capacity is provided at off peak hours. It is hard to imagine that short-haul passengers would be willing to travel at four in the morning or at midnight as would be necessary to achieve a sixty percent load factor at the utilization rates assumed. It would also be difficult to accommodate all passengers at peak periods because of the inability to substitute aircraft types during prime time.

We again wish to emphasize that a 60 percent, system-wide load factor is probably both reasonable and attainable if management has the flexibility to match capacity and its use to the demand of every market. It is only when management's flexibility is limited by conditions like those imposed in the GAO study that a 60 percent load factor becomes difficult if not impossible to achieve while, at the same time, providing sufficient service to meet all passenger demand.

Most Efficient Aircraft Type

Under the Keeler and GAO methodology, all operations are carried out by what are labeled "the most efficient" plane types; the DC-9-30, for short-haul, the B-727-200 for medium-haul and the DC-8-61 for long-haul. How each trunk carrier could be operating the most efficient plane types at one point in time is left unanswered. In the real world, the possibility of this happening seems remote. Just as in other competitive industries today, and for various reasons, all firms do not have the same or the very latest in equipment.

The three aircraft types selected for the Keeler/GAO model are second and third generation regular-bodied turbofans. The DC-9-30 followed the DC-9-10, the B-727-200 followed the B-727-100 and the DC-8-61 followed the DC-8-10, 20, 30, and 50. The three aircraft types selected built upon and profited from the operating experience of predecessor aircraft. If carriers had not purchased first generation turbofans, the "more efficient" second and third generation equipment would not have been developed.

Purchase of aircraft is usually a long-term commitment. The only way all carriers in the industry could have the latest equipment is if they sold "old" and purchased new equipment every couple of years. This would put such a glut on the market that the excess two and three year old planes would probably be sold at a loss, a loss that would have to be absorbed by the paying passenger or the stockholders.

Use of only the three "most efficient" plane types in the Keeler/GAO model seems, therefore, an unrealistic assumption and seriously understates the cost of producing airline service under a deregulated environment.

Rate of Return on Capital

To derive an applicable rate of return on capital for the airlines under competitive market conditions, Keeler concluded that the pretax airline rate should equal that of an all-corporation, long-run, historic average. In reviewing Keeler's work, GAO accepted these definitions and conclusions but found errors which lowered the pretax estimate of return on capital from 12 to 10.5 percent. The major question here is

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not whether either percentage is the correct all-corporation long-run average, but if this average would be applicable to the airlines in a free market situation. The all-corporation average is just that; a center point of a spectrum which reflects the average rate of numerous industries (comprised of companies providing services, producing goods, and in some cases both), varying degrees of regulation, contrasting debt to equity relationships, and differing levels of risk and competition. Further, this average is constructed over the 27 year period 1939 through 1966 where inflation was generally under control and interest rates were low. It is, therefore, not representative of today's world where inflation is a major problem and interest rates themselves are higher than the long-run average return used in this report. Thus the conclusion that the airline rate in a free market situation would approximate or equal this average is not realistic. The very nature of the airline industry (cyclical, oligopolistic, capital intensive, etc.) leads one to believe that the rate of return required to attract capital would be considerably higher than this average. This theory was supported by various rate of return studies in Phase 8 of the Board's <u>Domestic Passenger Fares Investigation</u>. In those studies the <u>after-tax</u> rate of return ranged from 10.5 to 13.5 percent based upon "optimum" debt to equity ratios, interest on debt approximating 6 percent, and a cost of equity of approximately 16 percent.

The 12 percent after-tax return found most appropriate for regulated airlines in the Phase 8 decision of the Domestic Passenger Fare Investigation is equivalent to a 15 to 20 percent pre-tax return depending on the assumption made regarding the effective tax rate. The argument could be made that, for a deregulated airline industry, a 15 to 20 percent pretax return might have to be increased to attract capital because of the greater risk involved to the investor. If an 18 to 24 percent pre-tax return is required, the "savings" to the passenger under deregulation, which GAO has developed, would be cut by between $300 and $900 million. (See page 31 of GAO study.)

Further, GAO has understated total aircraft investment due to unrealistically high assumptions of load factors, seating densities and utilization rates. Considering that it usually takes approximately two to five years from the date when an individual aircraft is ordered to the day it is placed in service, Keeler and GAO are saying that they have the ability to predict future passenger traffic with such precision that they can order capacity consistent with a 60 percent load factor at the optimum utiliztion rates assumed.

All of these factors produce an understatement (in terms of investment and related return) of the aircraft which are needed by the trunk carriers to carry the current level of revenue passenger traffic.

Consumer Savings

GAO concludes that the consumer would have saved between $1.5 and $2.0 billion annually had average fares been equal to those determined in this study. The savings are markedly overstated, however, even if one accepts many of the hypothetical assumptions of the report. Among the more important reasons are: (1) "forced savings" imputed for first-class travel; (2) an incorrect combination of total trip fares and flight basis passengers; (3) the application of 48-State fares to 50-State passengers; (4) the omission of added costs through inferior quality of service; and, (5) miscalculation of stewardess expense.

"Forced Savings" From First-Class Travel

The savings in this study reflect the difference between: (1) the sum of actual first-class and coach revenues received by the trunk airlines for each year 1969-1974; and (2) the revenue that would have been received had all passengers (first-class and coach) used the "increased efficiency" fares developed in this report. Thus, included in total savings are "forced savings" from first-class travelers assuming they used the "increased efficiency' fares.

This seems to us an erroneous use of statistics. To impute "forced savings" for first-class travelers from a cheaper and lower quality service is like arguing that a person who purchases a Cadillac could have saved thousands of dollars by buying a Volkswagon. It is not a meaningful calculation. There is a unique and distinct demand for first-class service, just as there is for Cadillacs, and this demand will be satisfied whether the system is as presently conceived or in any other form. Therefore, it would appear that the "forced savings" attributed to first-class travel must be removed from GAO's statistics before meaningful comparisons can be made.

The error resulting from including the "forced savings" of first-class travel is shown below:

	Savings ($ Bil.)		Savings (%)	
Year	GAO	As Revised	GAO	As Revised
1969	$1.6	$1.4	46	41
70	1.5	1.2	38	30
71	1.7	1.4	40	33
72	1.8	1.5	38	31
73	2.0	1.6	36	30
74	1.9	1.6	28	24

Dollar savings are, therefore, reduced by $200 to $400 million or 4 to 8 percentage points. The revision is based upon the assumption that all passengers (both first-class and coach) moving in each of the years used actual coach fares. Though more logical than the assumptions of GAO, the correct procedure would have been to develop optimum costs and fares for first-class and coach separately and derive savings for each class.

Total Trip Fares and Flight Basis Passengers

Passenger savings are computed by GAO for each year in the study as follows:

(1) the ratio of actual revenues reported by the carriers to "estimated" actual revenue developed by GAO is computed;

(2) "increased efficiency" revenues developed by GAO are adjusted by this ratio; and,

(3) savings are then defined as the difference between overall revenues reported by the carriers and "increased efficiency" revenues as adjusted.

An example of this procedure for calendar 1972 is shown below:

Revenue ($ Bil.)	Calendar 1972
Actual	
Reported	$6.7
"Estimated"	6.8
Ratio	0.98529
"Increased Efficiency"	
Unadjusted	$4.9
Above Ratio	0.98529
Adjusted	$4.8
Savings	$1.9

Any error in GAO's "estimated" actual revenue, therefore, is translated by this procedure to both the adjusted "increased efficiency" revenue and savings.

Average fares used to compute "estimated" actual revenue are developed from: (a) published coach fares: (b) first-class fares estimated at a ratio of 1.3 times the appropriate coach fare; (c) first-class and coach revenue passenger-miles as a percent of total; (d) first-class and coach discount fare dilution factors from Phase 9 of the DPFI; and, (e) across-the-board fare changes that occurred during the period. They can be defined, therefore, as total trip fares. That is, they are based upon weighted average costs of non-stop, multi-stop and connecting O & D trips.

Passenger aggregates by mileage block used with these fares to estimate actual revenue, however, are on a flight basis. That is, passengers moving beyond the destination of a given flight are not included in the mileage block of the origin and destination of the flight. The impact here is to overstate the number of passengers in the short- and intermediate-haul and understate those in the long-haul.

For example, a passenger originating in New York destined for Los Angeles but connecting in Chicago would show up twice in a flight basis matrix of passengers--in the New York-Chicago mileage block and in the Chicago-Los Angeles mileage block. But in a total trip matrix of passengers he would appear once in the mileage block of his true O & D-- New York-Los Angeles.

Total trip fares combined with flight basis passengers, overstate actual revenue since each connecting passenger is charged the costs of at least an additional departure and a line-haul rate that is higher than that of his true O & D. For example, during calendar 1974, the origin and destination trip length of all connecting passengers was 1050 miles but the flight stage trip length was only 532 miles. GAO's methodology would charge the connecting passenger on average for two 532 mile trips (a conservative assumption that each connecting trip has two legs) whereas the correct procedure would have been to charge him for one 1050 mile trip. As calculated by GAO the fare for a 1050 mile trip is about $72 while that of a 532 mile trip is about $45. Accordingly, revenue received from connecting passengers is overstated by 25 percent (2 x $45 ÷ $72) and, since connecting passengers represent 30 percent of total travel, total revenue is overstated by roughly 7.5 percent. This would amount to a $600 million reduction in 1974 revenues as computed by GAO before validation and a $500 million reduction in associated savings after validation.

48-State and 50-State Passengers

A definitional inconsistency exists between the fares and passengers used to derive "estimated" actual revenue. Fares are 48-State. That is, the city-pairs used and the changes in normal fares adjusted for over the period are for the 48-State, rate-making entity. Passengers, on the other hand, are 50-State for all years except 1969. They contain operations of the 48-States, Mainland-Hawaii, Mainland-Alaska and Alaska-Hawaii.

Mainland-Hawaii passengers, the most substantial part of the added traffic, move in the "2400 mile and over" mileage block at substantially lower fares than their 48-State counterparts.[1/] Accordingly, by applying 48-State fares to these passengers, revenue is overstated.

During calendar year 1974, for example, 3.8 million passengers moved between the Mainland and Hawaii generating $401.4 million of revenue. This produces an average fare of about $106. GAO, on the other hand, assumed that these passengers would have paid a fare equivalent to that computed for the New York-Los Angeles market of $143.83 generating approximately $549 million of revenue. Thus, GAO's estimate of revenue before validation and savings after validation is overstated by about $148 million. This bias exists to a similar extent in each of the other years except 1969.

Omission of Added Costs Through Less Service

The dollars of savings assume that all passengers carried during the years 1969-1974 would have moved at the lower fares constructed in this study. But for this to occur under the constraints imposed on load factor, seating densities, utilizations and aircraft usage, frequency and convenience of service would have been substantially inferior to that actually provided.

1/ The breakdown of 50-State traffic by percentage for calendar 1975 is:

Entity	Percent of Total
48-State	92
Mainland-Hawaii	7
Other	1

Each traveler using the airways places some value on his time. The businessman places a premium value on his time, while the pleasure traveler may value his time less. No matter which, however, the less frequent schedules and delays associated with the assumptions of this study have a definite cost to the consumer. Such costs should have been estimated by GAO and offset against the derived savings.

Dr. George W. Douglas and Dr. James C. Miller III, in their recent book entitled, Economic Regulation of Domestic Air Transport: Theory and Policy, performed an exercise similar to that of this study but with one major exception. Savings generated by an optimum fare structure are offset by the costs associated with reductions of service. They conclude that the consumer during 1969 paid excess fares ranging from approximately $366 to $538 million. For this additional price, however, the consumer purchased reductions of delay time through superior service--valued approximately at $118 million at an assumed value of time of $10 per hour and $182 million at a value of time of $5 per hour. Thus, the costs of additional service could range from 22 to 50 percent of the excess fares paid to support this service.

Had GAO's computed savings been offset by the costs of less frequent service, similar to the percentages derived above, the results would have been far different. The $1.5 to $2.0 billion range would have been markedly lower.

Miscalculation of Stewardess Expense

The costing technique used by GAO in this report duplicates, for the most part, that of the Board. Many of the cost inputs, in fact, were provided by the Board's staff. One of these--the ratio of stewardesses to available seats--has been misinterpreted and misapplied by GAO.

The number of stewardesses assigned to a particular aircraft type in the Board's costing methodology is based upon the ratio of stewardesses to available seats. For coach service, the ratio is one stewardess for every 45 seats. GAO misinterpreted this as one stewardess for every 45 passengers. Accordingly, GAO has understated both the number of stewardesses and their associated costs by 40 percent.

Aircraft Type	Number of Stewardesses GAO	Number of Stewardesses CAB	Percent Understatement of Number and Costs
DC-9-30	1.47	2.44	40%
B-727-200	2.04	3.40	"
DC-8-61	3.19	5.31	"

The impact on total expense is an understatement of about two percent, since stewardess expenses are approximately five percent of total expenses. Thus, in 1974 for example, GAO's "increased efficiency" revenues are understated and savings overstated by about $150 million.

Summary

The savings to the consumer computed by GAO would be considerably lower if adjusted for the quantifiable deficiencies discussed herein and adjusted to reflect a more reasonable rate of return. For example, as shown in the following table, the savings for 1974 would have totaled about $402 million or only 21 percent of the $1.9 billion estimated by GAO.

	Calendar 1974
GAO Savings ($ Mil.)	$1900
Reduced for:	
(1) "Forced Savings" - First Class	300
(2) Mixing Total Trip Fares and Flight Basis Passengers	500
(3) Mixing 48-State Fares and 50-State Traffic	148
(4) Miscalculation of Stewardess Expense	150
(5) An 18 Percent Pre Tax Rate of Return	400
Savings as Adjusted ($ Mil.)1/	$ 402

These adjustments do not include many items that cannot be quantified within the time constraints of our comments. For example, the added costs to the consumer from less frequent service as postulated by the GAO assumptions are not included. Additional passenger handling costs (including food) resulting from increased passenger enplanements and deplanements have not been estimated. On the other hand, no dollar value has been placed upon the deficiencies in the passenger-mile densities used by GAO and the overstatement of passenger enplanements both of which would probably increase estimated savings. There are undoubtedly other factors that would be affected by the assumptions of this study. However, just the differences cited above are sufficient to warrant major revisions.

Differences in savings as computed by GAO and as corrected by the Board, should be similar in magnitude for each of the other years included in the study.

1/ The adjusted savings are somewhat understated since the effects of items (2) and (3) are not directly additive. They would tend to compensate each other in the mileage block affected by Mainland-Hawaii traffic. The understatement, however, should be slight.

Other Technical Comments

Several problem areas in addition to those discussed in connection with revenue and savings computations deserve comment. Included are: (1) densities assumed in the construction of estimated passengers; (2) comparison of estimated passengers to actual; (3) the application of elasticity; and (4) the need for food service in short-haul markets.

Assumed Densities

Actual passengers for each year 1969-1974 are estimated as follows: (1) the domestic trunk system is disaggregated into 42 distance/density cells;[1/] (2) the percent of non-stop revenue passenger-miles per day in each cell is computed from a sample of 257 city-pairs provided in Phase 6 of the DPFI; (3) the percentage for each density grouping within each mileage block is adjusted by the actual mileage distribution of flight basis passenger-miles; (4) the adjusted percentages are applied to each year's total revenue passenger-miles to obtain the number in each of the 42 cells; (5) the passenger-miles in each cell are divided by a weighted average first-class and coach trip length to yield estimated passengers.

Densities used in this methodology are not representative of the domestic system. The percent of revenue passenger-miles per day generated in each of the six density intervals for a given mileage are derived from a sample of 257 city-pairs provided in Phase 6 of the DPFI. Under the ground rules set down in Phase 6, this sample reflects a combination of the top 20 markets served by each carrier. The tendency here, therefore, would be to understate the percent of passenger-miles generated in

1/ A 7 x 6 matrix was developed with 7 distance intervals and 6 density intervals within each distance.

thin markets and overstate that of the more dense markets. For example, this is demonstrated by a comparison of the percent of non-stop passenger-miles by density and distance interval actually experienced during calendar 1974 to those used by GAO.

Mileage Block	Percent Non-Stop Passenger-Miles Per Day By Density 1/			
	0-300 Psgrs. Per Day		301 Plus Psgrs. Per Day	
	GAO	Actual	GAO	Actual
0-400	0.52	8.00	13.04	12.20
401-800	0.63	8.50	22.46	15.30
801-1200	1.44	7.50	18.46	10.00
1201-1600	0.79	6.20	10.55	10.30
1601-2000	0.79	2.50	13.36	5.50
2001-2400	0.51	3.40	4.23	3.31
2401 Plus	0.19	3.00	12.97	4.40
Total	4.87	39.10	95.07	61.61

The percent of revenue passengers generated in the less dense segments by the GAO methodology is therefore grossly underestimated. The net impact on "estimated" actual revenue, "increased efficiency" revenue and savings is unclear. Initially it would appear that GAO's revenue would be understated since the bias implicit here tends to understate short-haul traffic and overstate that of the long-haul. However, some correction of this was made by adjusting the percent of non-stop passenger-miles by the mileage distribution of actual flight basis passenger-miles. But whatever and in what direction the remaining bias, the deficiency should be corrected.

Actual and Estimated Passengers

A comparison of actual passenger enplanements reported by the carriers to those estimated by GAO is shown below for calendar years 1969 and 1974.

Calendar Year	Passengers Enplaned (Mil.)	
	GAO	Actual
1969	132	126
1974	155	148

1/ The percents differ from 100 due to rounding.

In both years, GAO's estimates are about 5 percent overstated. This builds an upward bias into GAO's revenue estimates. The degree of bias, however, would depend upon the location of the passenger overstatement within GAO's 42 cell matrix. Some correction procedure should also be devised for this deficiency.

Application of Elasticity

GAO has added a new feature to the study originally prepared by Dr. Keeler. That is, the numbers of new passengers that would have been induced into the air travel market by the lower fares are determined using selected price-elasticities. A technical problem exists with the application of these elasticities.

Price elasticity is defined as the ratio of a 1 percent change of price to the corresponding change of quantity (in this instance, traffic). It is the science of small changes. The application of a point estimate of elasticity to successively larger arcs of the demand curve or, stated differently, larger percentage changes of price create at least two problems: (1) an assumption of linearity; and, (2) the ambiguity of percentages changes. If we except the presumption that elasticity is linear or constant over all increments of the demand curve, a percentage problem still exists. That is, depending upon the base used to determine the change of price, where the increments are large, the changes of quantity at a given elasticity will vary substantially. Many conventions have been developed to correct this percentage problem but perhaps the most logical is the use of logarithms. This not only corrects for the percentage ambiguity but ensures that the condition of unitary elasticity (e.g. unchanging revenue regardless the change of price) is met.

The percentage problems exist in the change in traffic determined by GAO that would have resulted from its lower fares. For example, GAO shows that a 37 billion or 41.6 percent increase in passenger-miles would have resulted from the 31.5 percent reduction in average fares for 1969 assuming an elasticity of -1.3. Done correctly, however, the increase of traffic would equal about 64 percent not 41.5.1/ The proof is simple. If unitary elasticity is assumed, the GAO methodology would have produced a 31.5 percent increase in traffic, and revenue would be only 90 percent of the original amount (131.5 x 68.5 = 90.1). This is inconsistent with the definition of unitary elasticity. Using the logarithmic method, however, the change of traffic would be about 46 percent and revenue would be unchanged (146 x 68.5 = 100.0).

Food Service In Short-Haul Markets

GAO assumes that there is no need for galley space on the DC-9-30 aircraft assigned to short-haul markets (those within the "0-340 Mile" interval). This assumption is predicated upon the proposition that traffic moving in short-haul markets does not need meal service since time on-board is minimal. Indeed, if all passengers moving in the short-haul were turnaround, O & D passengers, this might be true. However, the facts are that the vast majority of these passengers, perhaps as many as 75 percent, are inter-lining or using the short stage to connect to their final destination. Further, under GAO's assumptions of aircraft use, connecting services will become even more dominant. Thus, meal service

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1/ The 64 percent is derived from the following equation: LogT = 4.6 -1.3 LogF, where T and F are expressed as indices at base 100.

might well be required for this segment of the market.

It should be noted that a contradiction exists in GAO's assumption concerning the use of the DC-9-30 aircraft. On the one hand, no galley space is allowed, but, on the other, food expense is included. The expense input is a weighted average of all food service provided the short-haul passenger including that of meals.

 APPENDIX XVII

OFFICE OF THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

ASSISTANT SECRETARY
FOR ADMINISTRATION

July 20, 1976

Mr. Henry Eschwege
Director, Community and Economic
Development Division
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

Thank you for the opportunity of commenting on the draft study entitled "Impact of Increased Efficiencies on Air Fares and Travel." I believe that your draft modeling effort for the domestic airline industry is an extremely thorough and well done analysis of the inefficiencies presently existing in our scheduled air transportation system.

Your staff has done a careful job of reviewing the methodologies used in Dr. Theodore Keeler's earlier model along with various comments, criticisms and alternative suggestions. In refining Dr. Keeler's earlier work and using more recent data, your study makes a valuable contribution to the present debate over the efficacy of the economic regulation of air transportation.

The use of extensive sensitivity analysis greatly strengthens the conclusion of your study that passengers pay between $1.5 and $2.0 billion in excessive air fares each year. As is pointed out, the benefits from increased efficiency would be even greater if potential passengers who are discouraged by high fares from actually traveling had been considered. Also important is the fact that these efficiencies and resulting savings to consumers could be achieved in conjunction with increased profitability for our nation's airlines.

Perhaps the most important new ground broken by this study is your treatment of substantial improvements in efficiency and lower air fares possible in low- and medium-density, as well as in high-density markets. Many people in the aviation industry have conceded that substantial efficiency gains are possible in high-density markets, but in general they have not yet recognized that such efficiency gains are also possible in less dense markets as well.

I hope that you will release this excellent modeling effort as soon as possible so that its forecasts can contribute to the current deliberations on airline regulatory reform.

Sincerely,

William S. Heffelfinger

William S. Heffelfinger

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Policy
Washington, D.C 20230

JUL 21 1976

Mr. Henry Eschwege
Director, Community and Economic
Development Division
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

Thank you for sending Secretary Richardson a copy of the draft report by the General Accounting Office entitled "Impact of Increased Efficiencies on Air Fares and Travel." That report, which is an analysis of a study by Dr. Theodore E. Keeler on the topic "Airline Regulation and Market Performance," makes an important contribution to our knowledge of the benefits that consumers could obtain from more efficient operation of the airline industry.

The GAO report, as well as much of the other recent literature on the economics of air transportation, emphasizes that up to the point of full occupancy there is a tendency for the pro rata cost of air travel to decline as the number of persons traveling on a plane increases. By increasing seating densities and load factors, it is possible, therefore, to reduce the costs of air travel per person. In addition, by more carefully matching the size and types of aircraft used to serve a given market with the size of that market, it is possible to obtain further reductions in costs per person.

Because changes in seating densities and load factors have an impact on the quality of the service provided by an airline, it is possible that such changes would cause a shift in the demand for air transportation service. At a given level of fares, the quantity of air transportation service demanded may differ depending upon the quality of the service available. Such a difference is especially likely to exist in short-haul markets in which air transportation is in close competition with automobile, bus, and rail transportation.

If changes in the operation of the air transportation industry which make possible lower costs and fares per person also cause a shift in the demand for air transportation, it becomes more difficult to estimate the benefits to consumers from increasing efficiency in the airline industry. Under such a situation, it may not be sufficient to assume, as the GAO report appears to do, that the benefits to consumers can be calculated as if the demand curve had not shifted. In particular, if there is a reduction in the quality of service which causes the demand for air transportation to become lower and more price elastic at the previous equilibrium price, the techniques used by the GAO, and by Dr. Keeler, to estimate the benefits to existing consumers from lower fares may overestimate those benefits while the benefits to the additional consumers attracted by lower fares may be underestimated. There is no reason necessarily to expect these two amounts to cancel each other.

In view of the difficulties involved, we would not fault the GAO report for its treatment of the issue of estimating the benefits that would result from an introduction of greater efficiency in the air transportation industry. We would suggest, however, that the "Recommendations" section ought to take some implicit account of the issues raised above by indicating that it is desirable to have a market test in each separate market of what the public believes to be the optimum combination of fares and service. Such a market test would help to ensure that quality of service would be traded off for lower fares only up to the point at which there is a maximization of the benefits to consumers.

Rather than recommending either an increase in competition in the industry or changes in the rulemaking and enforcement procedures of the Civil Aeronautics Board, we believe the report should support an increase in competition with the accompanying greater flexibility with respect to fares and fewer restrictions on entry into and exit from the industry. This in turn would permit a market test in each of the separate air transport markets of the appropriate combination of fares and service.

Sincerely,

Robert S. Milligan

Robert S. Milligan
Deputy Assistant Secretary for
Policy Development and
Coordination

 APPENDIX XVII

COUNCIL OF ECONOMIC ADVISERS
WASHINGTON

ALAN GREENSPAN, CHAIRMAN
PAUL W. MACAVOY
BURTON G. MALKIEL

June 14, 1976

Dear Mr. Eschwege:

This is to comment on the draft report on the "Impact of Increased Efficiencies on Air Fares and Travel." Although I have a few questions the report is, overall, interesting and helpful. In particular, I have had limited confidence in the DPFI cost model and the inability of your projections to predict the intrastate fares supports the view that we should use it with caution.

As a further test for your model, you should do your calculations excluding the Hawaii markets and then see how close the predicted fares are to the actual fares in these markets. Intense competition from charter operators in earlier years encouraged the CAB to substantially relax restrictions in this market so that it may be the most unregulated markets in the country at present. You might try the same test using the New York-Puerto Rico market as a similar situation exists there.

I look forward to seeing the final draft of this report.

Sincerely,

Paul W. MacAvoy
Member

Mr. Henry Eschwege, Director
Resources and Economic
 Development Division
U.S. General Accounting Office
Washington, D. C. 20548

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DEPARTMENT OF ECONOMICS BERKELEY, CALIFORNIA 94720

June 30, 1976

Mr. Henry Eschwege, Director
Resources and Economic Development Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

Enclosed are my comments on the GAO analysis of my earlier article, "Airline Regulation and Market Performance." I am also sending a copy of these comments to Mr. Thomas Dooley. Overall, I believe that the GAO analysis is an excellent piece of work.

If you, Mr. Dooley, or anyone else on your staff have any questions regarding these matters, please do not hesitate to contact me.

Sincerely,

Theodore E. Keeler

Theodore E. Keeler
Assistant Professor of Economics

COMMENTS ON THE GENERAL ACCOUNTING OFFICE ANALYSIS OF "AIRLINE REGULATION AND MARKET PERFORMANCE"

Theodore E. Keeler
Assistant Professor of Economics
University of California, Berkeley

This GAO study, which involves an analysis and extension of my earlier paper on airline regulation, is to my mind a most impressive piece of work, and I agree with its basic conclusions. However, I do have a few comments.

1. The extension of my assumptions to low and medium-density routes may overstate the potential benefits of deregulation, because the 60 per cent load factor assumed, along with relatively high-capacity aircraft, may simply be infeasible or inconvenient on low-density routes. Thus, it is quite possible that fares would go down by considerably less than estimated on low-density routes. It was to avoid such problems and ambiguities that I restricted my study to higher-density routes, where the feasibility of a 60 per cent load factor is documented by California experience.

2. For all but direct capital costs, the GAO team has substituted a CAB cost model derived from the Domestic Passenger Fare Investigation of 1971 in place of my own. It is true that the CAB-GAO model has some advantages over my own, and that the latter was not available to me when I did the work for my paper, which was completed in 1971. However, similar models were available to me, and I rejected them, mainly because the CAB models have some serious shortcomings when applied to the specific routes I was concerned with. My broad objections to the CAB-GAO model may be divided between two groups, each pertaining to a different category of costs:

a. Direct Operating Costs. Both the CAB-GAO model and my own base their cost estimates for a given route on the assumption that the cost per block-hour for each plane type is constant -- it is applied to an estimated flight time for that route. However, flight times are estimated differently in the two approaches. I use actual average scheduled time on a given route, plus an allowance for lateness. The CAB-GAO model, on the other hand, estimates a relationship between distance and flight time, and assumes that this relationship is the same for all city pairs. The CAB-GAO model has the weakness that it totally neglects higher flying times occurring in congested areas. Thus, in 1968, the fastest planes between Los Angeles and San Francisco made the 350-mile run in a scheduled block time of 45 minutes. On the other hand, average flying time on the 189-mile run between New York and Boston was 55 minutes. Thus, the CAB-GAO model would grossly underestimate direct operating costs on the New York-Boston run, and probably overestimate costs on the Los Angeles-San Francisco run (and the GAO-CAB models have serious problems predicting unregulated fares in California; more about that below). I fail to see why the substitution of estimated aggregate times for a route will yield better results than use of actual times.

b. Indirect Operating Costs. The GAO report dismisses my model of indirect costs with the assertion that the variables used in it are multicollinear. Multicollinearity of variables does not in and of itself render an econometric model invalid; this is especially true when the model is used for predictive purposes. On the other hand, the CAB-GAO model contains some arbitrary allocations of cost categories to variables which my study does not (the latter aggregates indirect costs, and then allows them to vary with whatever of the independent variables the data might dictate). There are many possible specifications of indirect airline cost models, and I would be the last to claim that my own model is the best of all possible such models. But I believe that in the task of predicting non-CAB-regulated fares, it fares considerably better than the CAB-GAO model.

More specifically, the CAB-GAO model has a much higher cost per passenger (at a given load factor) which is fixed with a trip and independent of distance. That this is the case may be seen by comparing costs in the GAO study with my costs for a 110-mile trip, Los Angeles-San Diego in my model, and New York-Hartford in the GAO model (remember that differences in congestion, aircraft type, and load factor do not show up in the GAO model, so that the GAO estimate for New York-Hartford should be the same as its estimate for Los Angeles-San Diego). My model predicts a fare of $6.50 on the Los Angeles-San Diego route, compared with an actual fare (of all carriers in 1969) of $6.35. On the other hand, the GAO model predicts a fare of $12.18 on that route, despite a much lower assumed cost of capital than my own (see below). If the GAO-CAB model were correct, PSA and the other carriers on that route would not only lose money at a 60 per cent load factor (and a lot of money); they would also lose money at a <u>full</u> load factor.

The Los Angeles-San Diego route in 1969 is not a fluke. Consider the Los Angeles-San Francisco route, just under 350 miles in length. The 1968-69 intrastate fare was $13.50, and my model came within two per cent of predicting it. On the other hand, for an equivalent route (Minneapolis-Chicago, 345 miles), the CAB-GAO model predicts a 1969 fare of $24.66, 82.7 per cent above the actual Los Angeles-San Francisco fare. Again, all the carriers on the Los Angeles-San Francisco route would lose significant amounts of money if they had costs predicted by the GAO-CAB model, even with a full load factor. In fact, PSA earned a considerable profit in 1968, and it did so with an average load factor of about 60 per cent on the Los Angeles-San Francisco route. It might be objected that the CAB model still predicts costs well for the trunk carriers, and that PSA is just more efficient on short-haul routes. If that were so, and if the CAB model were correct, so that the trunk carriers really did have such high costs on these routes, then why would the trunk managements want to compete in these markets as vigorously as they have, when every extra flight would lose money, even at a full load factor? It would seem more likely that there is something wrong with the GAO-CAB cost model which tends to bias upwards estimates of potential unregulated fares on short-haul routes.

3. The question arises as to the appropriate "actual" fares to compare with "unregulated" fares. There is something here to be said for selecting a regulated fare which corresponds to the same product quality as is offered in the intrastate markets (with perhaps meal costs added on with longer distances). The intrastate fares used involve coach service with no time period or round-trip restrictions. It is only reasonable that the interstate regulated fares selected should correspond to the same product quality. That is one reason why I selected standard unrestricted coach daytime fares on CAB-regulated routes as the basis for comparison with unregulated fares. To the extent that the GAO analysis mixes in other types of fares, it is no longer standardizing for product quality. (Incidentally, it has been objected to my work and to the GAO analysis that they do not take account of the superior service quality which CAB regulation has induced, most specifically in the area of reduced schedule

delay, or greater ease of getting a seat at the time when a passenger wants to leave. But for coach passengers, there is little evidence that CAB regulation has reduced schedule delay relative to intrastate routes; research currently in progress at Berkeley would tend to indicate that to the extent that CAB regulation has improved service quality, the improvements have accrued to first class passengers alone).

4. The GAO study finds a pre-tax opportunity cost of capital in the corporate sector of only 10.4 per cent, compared with 12 per cent in my own study. The difference, I believe, stems from differences in assumptions as to the capital which should be included in the rate base, and the specific income which should be included in the return. The GAO analysis includes all investments of all corporations in the rate base, and all sources of income in the return. But this may make for double counting: consider the case where Corporation A owns some stock in Corporation B. The stock held by Corporation A in B represents a share in some of the physical assets of B. But the assets of B are already included in total corporate assets. If A's holdings in B are included in A's assets, there will be double counting when total capital is calculated.

In order to avoid double-counting, and to assure that the profit figures calculated actually represent income earned from direct operations of firms in the corporate sector, I attempted to exclude outside holdings of debt and equity from the rate base, and to exclude earnings from securities of outside corporations from my income figures. The only exception to this was in the area of current assets, where it was assumed that it is necessary to hold a certain quantity of liquid assets (such as government bonds) as a close money-substitute for daily operations of the company. Thus, the interest on short-term loans and government bonds was treated as income (i.e., a by-product of holding money-substitutes). Making these corrections to the Statistics of Income figures involves some arbitrary decisions; for example, to what extent do rent and royalty income represent operating income? Nevertheless, I believe that an attempt to make corrections for the problem will yield more accurate estimates of the opportunity cost of capital than ignoring them.

Because I have not kept the detailed worksheets for my dissertation calculations (the work was done over five years ago, and this part of my dissertation was not published), I do not recall exactly whether certain accounts were or were not included in the income and rate base, but on the basis of some spot recalculations, I have managed to come quite close to my original figures, and the 12 per cent opportunity cost of capital figure which I used in my airline cost calculations appears to hold up nicely with several alternative assumptions as to which accounts to include. I therefore stand by my 12 per cent assumption, and do not believe that it is a mistake.

5. For the high-density routes I considered, the extra costs incurred by stops along the way are irrelevant, as GAO figures bear out, because the routes are of sufficiently high density that practically everyone rides nonstop. However, it is appropriate that GAO should take account of the extra costs of stops on lower-density routes, as it has done.

6. It appears that the GAO study has double-counted aircraft capital costs, for it has calculated full capital costs at a going interest rate and utilization rate for aircraft as they stand, and then added on aircraft rental costs as paid by the carriers. This procedure would only be appropriate if the GAO had used actual airline accounting figures for aircraft ownership costs. My procedure involved calculation of full capital costs for a given aircraft trip, regardless of who owns the aircraft.

"Impact of Increased Efficiencies on Air Fares and Travel"

Comments

by

Dr. George W. Douglas

Introduction and Summary:

This study, a recreation of a previous analysis by Keeler, is on the whole a competent piece of work which confirms conclusions concerning industry efficiency drawn by Keeler and other recent investigators. Any study of this sort, of course, reflects the assumptions taken by the researchers, any or all of which are subject to challenge. Based on my own experience in this field it is my judgment however that the assumptions taken are generally reasonable (and typically supported by sensitivity analysis) and that the study's results are qualitatively correct. In the discussion which follows I will point out some thoughts I have on the reasonable range of assumed inputs and on the study's methodology. While there exists of course considerable uncertainty as to the quantitative measure of inefficiency, I am satisfied that it lies within the bounds of the study's sensitivity analyses.

Discussion:

A. Load Factors:

A critical source of inefficiency in the regulated industry is the excessive level of slack capacity, or the low load factors which have typically prevailed. The study is correct in assuming significantly higher load factors in an efficiently configured industry, perhaps averaging 60%. While the study assumes that all markets will tend to have ALF's on the order of 60%, my research indicates that the efficient level of slack capacity would vary by market distance and density. (See Douglas and Miller, Economic Regulation of Domestic Air Transport, Brookings 1974.) It may be noted, however, that the overall average efficient load factor for all markets by my calculations are also in the range of 60%. Hence, I should not think that this assumption constitutes an important bias in the estimate of total cost savings, but rather that the pattern of efficient fares would be somewhat different than those generated by this assumption. (Specifically, long haul and/or high density markets may have load factors greater than 60%, and therefore lower efficient fares than those calculated here, while other markets may have the converse.)

Moreover, it should be noted that while the efficient market would be characterized by lower fares, the convenience of the service to the traveller would be somewhat less, so that the net welfare burden is less than calculated.

B. Most Efficient Aircraft:

The study assigns the "most efficient" aircraft to each market. The aircraft so chosen (esp. DC8-61) are not representative of the existing fleet composition. I have also observed the superior cost efficiency of the DC8-61, but wonder whether there may be some statistical or accounting anomaly involved -- else why wouldn't the carriers use them more?

C. Return on Investment and Capital Recovery:

The "base case" assumption of the competitive ROI is definitely too low; I would think that the value of 18% used in the sensitivity analysis would be more appropriate as the "base case" assumption. This is based on the following:

1. The use of historic averages is clearly inappropriate in determining current competitive costs of capital. (e.g. Could one conclude that since average bond yields 1939-66 were 4.5% (a guess) that current yields should also be 4.5%?)

2. The industry does face greater than average financial risks, which requires higher than average ROI. For example, the average beta of airline common stocks is on the order of 1.55,reflecting their above average risk (see table).

   One can show that the before tax return on investment, or cost of capital, to a firm with a cost of equity r_e and interest cost i can be given as

$$r = r_e/(1+d)(1-t) + id/(1+d) \quad ,$$

   where d is the debt/equity ratio and t is the tax rate. Current interest yields on airline bonds are roughly 10%. The cost of equity, r_e, cannot be directly observed, but it clearly exceeds i. A lower bound estimate of currently required ROI could be calculated, for example, by setting r_e=i, and setting t at some typical level, say 1/1. This would yield an ROI $\geq$ 15%. A similar calculation could be performed for the years studied could generate a more realistic lower bound estimate.

3. The annual capital recovery depends as well on the economic life of the capital. While twelve years may be typical, it should be considered that the economic life, due to technological obsolescence, may be considerably less than the physical life. A shorter life, of course, would increase the annual capital recovery factor.

D. Use of the CAB's DPFI Cost Model:

The study employs the CAB's cost model in preference to Keeler's "since it has been validated." It is not clear what in the model is changed (only seating desnities?) but its use could seriously overstate the estimate of efficient carrier costs. One considerable source of

Table 1. Risk Characteristics of Airline Common Stocks

Carrier	Beta*	Price Stability**
American Airlines	1.40	30
Braniff International	1.60	30
Continental Air Lines	1.55	30
Delta Air Lines	1.40	50
Eastern Air Lines	1.40	30
National Airlines	1.65	25
Northwest Airlines	1.60	35
Pan American	1.50	15
Trans World Airlines	1.85	15
UAL, Inc.	1.60	30
Western Air Lines	1.55	30

*The beta is simply the regression coefficient of a time series regression of returns to an individual stock against the average of all stocks. The beta coefficient measures, then, the "non-diversifiable" risk; a value of one would indicate a stock of average risk while values higher than one indicate greater than average risk. Source - The Value Line Investment Survey, January 16, 1976.

**The price stability index measures the gross risk of the stock (including that which can be theoretically reduced in holding a diversified portfolio). This particular index, devised by Value Line Investment Survey, is scaled from 5 (highest instability or risk) to 100 (lowest risk).

inefficiency in the industry is what has become known as "X" inefficiency, or in mundane terms, sloppy management and waste. Hence, since the DPFI cost model is calibrated on existing cost experience of regulated carriers on the average, it tends to include whatever "X" inefficiency is imbedded in the system. (What is interesting, perhaps, is that the study shows significant cost savings even using this cost model.) Carriers in the intrastate markets seem to show significantly lower costs/higher productivities, thus confirming this effect. Other factors may also change observed costs in a competitive industry. For example:

--higher advertising costs would be incurred
--higher legal fees from litigation
--lower regulatory compliance costs
--differences in passenger service costs ranging from different marketing of onboard services to innovation in baggage handling, ticketing, etc.

While these factors are difficult to estimate, they would most likely cause efficient costs to be lower than those generated by the CAB cost model.

E. Without regulation the route structure would change somewhat. Some flights currently required to have an intermediate stop would proceed nonstop; some markets not currently served by direct flights may be served, others may be abandoned. Airlines could rationalize their route structures to integrate more effectively the stray bits and pieces of routes.

F. The definition of "most efficient" aircraft type and fleet composition is more complex than represented in this study. That is, the efficient aircraft type for a market is not defined as that which provides the lowest cost/ASM or cost/RPM. Rather, it is that type which given the density and distance, can provide the least cost service when convenience of the service is included as a cost.

G. Some input costs may be higher in the regulated industry. Labor cost in the airline industry reflect the power of each union to successfully shut down the firm. The sheltered markets of the industry has prompted management to accede to wage demands which can be passed along via CAB sanctioned fare increases. Presumably in a competitive market each firm would have greater resistance to wage inflation.

H. Has the cost model been validated for this application? That is, if the CAB base case inputs are used, does the model generate costs or fares consistent with those denoted as "actual" in the study? A useful means of reporting sources of inefficiency might then be to begin from the CAB "base case," and change the critical assumptions serially and report changes in costs (%) generated by each.

I. It should be noted explicitly in the study that the part of the industry studied is only trunk service. While the local service carriers doubtlessly have much greater relative inefficiency than the trunks, their share of the total airline market is relatively small.

 APPENDIX XVII

P.O. Box 455
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June 24, 1976

Mr. Thomas E. Dooley
U.S. General Accounting Office
Room 6122
441 G. Street, N.W.
Washington, D.C. 20548
U.S.A.

Dear Mr. Dooley:

As we discussed by phone on May 27, 1976, I have reviewed the restricted draft of "Impact of Increased Efficiencies on Air Fares and Travel" (May 6, 1976). Since you appear to have been too busy to call back to discuss certain matters further, I will outline my thoughts on those matters in this letter and, unless you advise to the contrary, will consider my work on this project to be completed.

Overall, let me express my general agreement with the findings of your study. By and large I think your findings provide good estimates of the minimum fare decreases that would result in the long run following the abolition of CAB regulation. Having said this, however, let me explain why I believe your estimates are minimums:

1. The assumed 60 percent load factor is unduly low.

2. The cost data are based on the performance of CAB-regulated airlines and, therefore, are inflated by the extent to which regulation per se serves to increase operating costs.

3. The use of average fare yields (rather than lowest widely-available published coach fares) results in your percentage reductions being based on "average fares" that are lower than those available to the majority of passengers.

These conclusions are based on the factors given below.

Load Factor. 60 percent is conservative. Evidence: the consistent achievement of load factors in excess of 70 percent from 1955 to 1964 by the California intrastate carriers (p. 202 of my book). Air California's 70.2 and 70.1 percent load factors in 1974 and 1975 (Air California, Annual Report, 1975). Southwest Airline's 58.4 and 62.5 percent load factors in 1974 and 1975, increasing to 66.5 percent for the first five months of 1976 (Southwest Airlines, Annual Report, 1975 and "Media Release," n.d.). It seems likely that Southwest's trend will continue until it achieves an average 70 percent load factor. 70 percent load factors are possible for airlines providing a specialized, homogeneous service. Without regulation, this is the kind of airline that would prosper in the U.S.

....2

Costs. See my Testimony before the Kennedy Subcommittee at pp. 477-82, Vol. 1 of the Hearings. Lack of specialization, relatively shorter aircraft lives, higher wages and payments to other inputs, are all examples of how costs are increased by the current CAB regulatory structure. Therefore, basing your cost estimates on CAB data results in overestimating the costs of unregulated airline performance. This means that the percentage decreases in fares following deregulation are underestimated.

Average Fare Yields. The use of fare yields results in percentage reductions being based on fares that don't actually exist. They are a composite of relatively low promotional fares and the higher coach fares (which are used by the majority of passengers). Those passengers now using promotional fares with the largest percentage discounts (around 35%) will experience relatively little decrease in fares due to deregulation since these extreme promotional fares come close to approximately marginal costs. Chapter 8 of my book shows that there are few promotional fares without regulation. On the other hand, the majority of passengers who are paying regular coach fares will enjoy larger percentage reductions than your figures indicate. See pp. 60-62 of my book for reasons why I used "lowest widely-available fares" rather than yields for my fare comparisons.

The effects of these factors are partially handled in your report by the alternative computations that you made (the 72 percent load factor, for example), but you did not run a computation showing the combined results of a series of these more extreme assumptions. Doing so would have provided estimates of much larger fare reductions. Some of these percentage reductions would have strained the credulity of your readers, but I think they would have been closer estimates of fare reductions than those you actually achieved, especially for high-density city pairs.

I made some marginal notes on the draft. These pages are enclosed should you wish to check them over.

I will be traveling on the West Coast from June 25 to July 16. Should you be interested in discussing any of the above you can telephone my secretary for information on where I can be contacted. Of course, I will be happy to discuss any aspect of this with you at your convenience.

Thank you for the opportunity of reviewing your interesting study. I trust it will be well received.

Very truly yours,

W. A. Jordan per DC

William A. Jordan

dc

Enclosures (2)

5412 32nd Street, N.W.
Washington, D. C. 20015
May 27, 1976

Mr. Henry Eschwege
Director
Resources and Economic Development Div.
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

Thank you for requesting my comments on the Draft GAO Study, "Airline Regulation and Market Performance." As you indicate in your letter, my comments on this report reflect my own views and not those of my employer, the National Commission on Supplies and Shortages.

Ted Keeler's 1972 study represented an interesting attempt to quantify the effects of airline deregulation. Its basic approach was to estimate for a limited number of markets the fares required to operate a profitable, efficiently-run, high load-factor service and compare these fares on a market-by-market basis with the fares then offered by the airlines. Since these actual fares were (and still are) premised upon lower load factors than Keeler's "constructed fares," and since they are set to allow profitable operation by the average (as opposed to the most efficient) carrier, Keeler naturally found that deregulation would lead to large "savings" to consumers.

As I understand it, the purpose of the current GAO exercise is to update and expand Keeler's results and to correct what were felt by some to be certain errors in the original. One can evaluate this study in various ways. On one hand, one can ask whether it indeed accomplishes the task I have just stated. It is my judgment that, by and large, it does. The modifications that GAO has made seem reasonable, and I have little doubt that Dr. Keeler himself would have made such modifications if he had had the time and resources and if the DPFI cost models had been available to him at the time he originally performed the study. I am encouraged to see that all the modifications, when taken together, do not produce results that are substantially different from the results he originally reported.

On a different level, I have certain problems with both the Keeler study and with the GAO extension of it. I would stress that these problems are not so great that I would urge the suppression of the GAO piece. Instead, I would urge that the figures resulting from the analysis be treated as possible "order of magnitude" estimates, not as exact predictions of what might occur in a differently-regulated environment.

My first problem derives from the fact that the Keeler, GAO, and CAB cost models all treat the airline system as an aggregation of individual city-pair markets. But it is more than this. It is a network. Aircraft routing decisions are made on a network basis--not on a disconnected, segment-by-segment basis. The aim of a scheduler is not--and should not be--to minimize segment operating costs. Instead, he should aim to maximize network profits. Thus, we see certain segments being operated at very low load factors because such operations are profitable when viewed in the context of the entire network. While in a deregulated system, load factors would, on the whole, almost certainly rise, even in such a system, certain low load-factor segments would continue to be operated. The existence of such segments would not be evidence of "inefficiency," though GAO seems to infer this.

The violence to reality done by treating the airline system merely as a collection of city-pairs is minimized if a few carefully-selected segments are analyzed. By looking at airlines' aircraft routing diagrams, for example, one could uncover certain routes that are operated on almost a pure "turnaround" basis. For such segments, the analysis Keeler and the GAO perform may not be too wide of the mark. But for others, the analysis may provide a misleading indication of how that specific market would perform under "deregulation." Expanding the sample as GAO does in its study likely compounds the problem.

Second, I have problems with the model of optimal load factor determination that is implicit in both the Keeler and the GAO pieces. Those of us who believe that fares would come down and load factors go up do so because we believe that, on balance, the current and potential flying public would accept higher load factors if they could, in turn, be compensated for this by lower fares. Keeler--and the GAO--apparently assume that this balance would be struck at a load factor level of about 60 percent. They justify this by appealing to the California intrastate experience where load factors of this level have been operated in an essentially deregulated system (though the citations in the GAO report are a bit inconsistent on this point).

However, as Douglas and Miller have shown, the optimal load factor is determined by balancing the value of empty seats (in terms of increased scheduling convenience) against the cost of operating those empty seats. Factors which influence the value people place on their time and factors which raise the cost of operating empty seats will combine to shift the optimal load factor. For example, the price of aviation fuel recently doubled. All else held equal, this should serve to increase the optimal load factor since it raises the cost of flying empty seats. And, just as would be expected, load factors have risen. I know that they have risen in the interstate system. I imagine that they also have risen in the intrastate system--though not by as much.

Indeed, on page 14 of the draft, the excess of actual over estimated fares is shown to be steadily shrinking. One might infer from this that the CAB is already moving in the direction that GAO suggests. And to a degree, this is true. Certainly two events that account for part of the decline in this "excess" are the adoption by the Board of load factor standards and the increase in the fare taper that was instituted as a result of Phase 9 of the DPFI. However, the key point to note is that the target has moved also. If 60 percent was indeed an appropriate load factor target for a deregulated system in 1969, it most certainly would be higher today. Thus, the "savings to passengers" may be substantially underestimated.

This question of what is indeed the "optimal" load factor in a deregulated system raises an additional concern in my mind about the GAO study. Throughout the study there is an implicit equating of higher load factors with "efficiency." However, there is no reason why an "efficient" airline system might not be one that operated at a 40 percent load factor--provided costs and the value travelers placed on their time combined to make that the "optimal" load factor. In such a case, adoption of regulatory policies that would produce 60 percent average load factors would be highly inefficient. People would be getting a product that as much failed to reflect their tastes as would consumers who would prefer a systemwide load factor of 60 percent and who were given an actual load factor of 40 percent. Indeed, in a deregulated system (and even ignoring the "network effects" I have discussed at length above) I would not be surprised to see certain routes--routes catering primarily to business travelers--to have load factors in the 40's. Other routes--routes catering primarily to vacation travelers--might exhibit load factors in the 70's. Some routes with large numbers of both types of travelers might have two types of service--one offering load factors in the 40's and fares to match; the other offering load factors in the 70's and fares consistent with this level of service. All would be equally "efficient" in that they would be equally reflective of the tastes of the particular consumers they catered to. The key problem with regulation--aside from its sluggishness--is that it substitutes decisions of bureaucrats for decisions of consumers. Now there is no reason why, if the bureaucrats are conscientious and hard working, they cannot arrive at the same decisions as consumers would have and create a fare structure that produces a structure of services that is identical to that which would evolve naturally under competition. But why engage in this elaborate exercise to simulate the workings of the market unless there are reasons to believe that reliance upon competition will fail to produce the desired result? The thing that the research of the last ten years shows--and the thing that the CAB now admits--is that the rationale that have been advanced to support regulation in the airline industry don't stand up to the facts. "Destructive competition" is not a feature of an unregulated air transport system. There is not now widespread cross-subsidy. Therefore, there would be little or no loss of air service by small communities. Carriers would not enter and abandon routes on a totally random basis. To be sure, transition to a system of open competition should be accomplished slowly, but there should be no fear about the ultimate result.

This last point gets at another quibble I have with both the Keeler and GAO pieces. By attempting to put a dollar value on the savings to consumers, both have substituted their judgment for that of consumers. If Keeler and GAO wanted to be more honest, they should call their results not "savings to passengers with increased efficiencies," but "savings to passengers assuming we are guessing correctly about what passengers' preferences truly are." For that is what they are really estimating. To give GAO credit, the calculation of a sensitivity analysis employing different possible load factors (page 80) is one way of getting around the problem, though I would question the validity of the estimated "savings" derived in the base case using the actual trunkline load factors. In view of the failure to consider the "network effect" I have referred to above, I would judge that much of this is illusory, arising as it does largely from the assumption that the most efficient aircraft is used on every route segment and that higher seating densities are used.

I would close by returning to what I said at the start of this letter. Ted Keeler's original piece was an interesting and useful speculation about how a deregulated system might differ from the system that existed in 1969. To arrive at his results, Keeler was forced to make certain simplifying assumptions that diverse from reality in certain aspects. The GAO draft study relaxes several of these assumptions in a reasonable way and performs useful sensitivity analyses. Yet the GAO study retains many of the crucial assumptions that Keeler made. Further, the GAO's expansion of Keeler's sample may compound the problem caused by Keeler's failure to treat the airline system as a network rather than a collection of individual city pairs. I don't know how, given the state of the art of modeling, a better estimate could be generated. Nevertheless, in view of this problem, and in view of the problem caused by the need to guess what airline consumers on average would consider the optimal load factor to be, I would treat the estimates with an appropriate level of caution, realizing that there are some factors which, on balance, should serve to inflate them (the network problem) and others which should serve to depress them (the problem caused by the fact that optimal load factors probably have increased with increasing costs), and that there is no reason to claim that these two effects should cancel each other out.

I am returning the draft report to you with marginal notes. I would be glad to elaborate further on anything I have said, should you desire me to do so.

Sincerely,

George C. Eads

George C. Eads

Enclosure

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