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THE ECONOMIC AND SOCIAL SIGNIFICANCE OF THE FEEDER AIRLINE SYSTEM: AN ANALYSIS OF CONTRIBUTIONS, COSTS, AND SUBSIDY-REDUCTION PROSPECTS

Dissertation
Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

by

RICHARD EUGENE NEEL, B. S., M. S.

The Ohio State University
1960

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Adviser
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CHAPTER I

PURPOSE AND IMPORTANCE OF THE STUDY

Congress provided a broad standard for the development of the domestic air transportation system through the passage of the Civil Aeronautics Act of 1938, which contemplated a system that would meet the "present and future needs of the foreign and domestic commerce of the United States, of the Postal Service, and of the national defense."\(^1\) By virtue of Reorganization Plans 3 and 4, made effective on June 30, 1940,\(^2\) the Civil Aeronautics Board became the principal agency of the government which exercises regulatory and quasi-judicial powers over American civil aviation. Of particular relevance to this study is the authority delegated to the Board to exercise the powers of economic regulation. On the other hand, the Administrator, Civil Aeronautics Administration, became the executive agency of the federal government in civil aviation, performing the enforcement, operational, and promotional functions.

\(^1\)Civil Aeronautics Act of 1938. 59 Stat. 977 (1938), Sec. 2 (a).

Air carriers were authorized to perform the services of transportation of mail, freight, express, and passengers. As a developmental and promotional aid to air transportation, the payments made by the federal government for the carriage of mail were to be of sufficient magnitude to supplement the other revenues of the carriers so as to enable them to provide the type of service which would meet the needs of commerce of the United States, the Postal Service, and the national defense. It may be seen that air mail payments, including subsidy, could be used to influence the rate and direction of development in the industry. Thus, the framers of the Act of 1938 assigned a potentially important promotional role to air mail payments. Domestic, scheduled, common-carrier service was performed initially by the sixteen carriers in existence at the time of the passage of the Civil Aeronautics Act. These carriers received permanent certification under the "grandfather" clause of the Act.

A 1944 interpretation of the Congressional mandate to promote the development of air transportation led to the genesis of the feeder, or local-service, type of carrier.

---

3Civil Aeronautics Act of 1938, op. cit., Sec. 406 (b).
4Ibid., Sec. 401 (e) (1).
5Investigation of Local-feeder Pick-up Service, Civil Aeronautics Board, Docket No. 857, 1944. Hereafter, this type of carrier will be designated as a "feeder" carrier.
These carriers were authorized to provide service prin-
cipally to small cities within a limited area on a regional 
basis. On the other hand, the carriers permanently certifi-
cated in 1938 were designated as trunk-line carriers and 
continued to provide service on the main traffic arteries 
between relatively large cities. The plan of 1944 for the 
performance of feeder service was begun on an experimental 
basis with the issuance of temporary certificates. Perman-
ent certificates have since been issued to the feeder carriers.

At this point, a consideration of some pertinent 
statistics will indicate the status of the carriers within 
the domestic and foreign, scheduled, common-carrier systems 
with regard to their ability to finance with private re-
sources their own continuing growth. Initially, it should 
be pointed out that the Civil Aeronautics Board, since 1951, 
has made an administrative separation of subsidy from total 
mail payments to all carriers. Under present regulations, 
the Postmaster General makes a payment to the carriers for 
the carriage of mail. This mail payment is a "service" 
rate which is designed to cover the cost of the carriage 
of mail and to provide a return on the investment involved 
in such service. Then, the Civil Aeronautics Board makes 
the "need" rate payment of subsidy from its budget. For

---

1958 the subsidy figure was $32,523,000, while for 1959 the estimate had increased to $40,728,000, according to figures released by the Board. The Board estimates that about 70 per cent of the 1959 figure will be paid to the feeder carriers, with a possibility that the amount will be increased by as much as $6,000,000 because of new-route and reequipment programs. The major portion of the remaining subsidy payments is expected to be distributed to helicopter operations and to carriers providing Alaskan services. In contrast, the domestic trunk-line carriers and the international carriers, with the exception of Braniff's Latin-American operations, will not receive subsidy payments, according to the Board estimates for 1959.

It is significant to note from an analysis of the following figures that under conditions which generally have been favorable to domestic trunk-line carriers, the feeders are still relying on government support, though some of the increased support is attributable to an expansion of feeder operations. In the first year of subsidy


9Ibid.
separation (1951), the estimated figure of subsidy for the feeders was $17,310,000, whereas the estimate for 1959 is $29,722,000. Moreover, in 1958 the total non-subsidy operating revenues of the feeders were $62,131,000, whereas the subsidy revenues amounted to $32,523,000. Thus, of total revenues from all sources, approximately 35 per cent was provided by the governmental subsidy payments.

These statistics reveal significant information about the monetary operating results of the feeder operations, but they alone do not furnish sufficient criteria for an evaluation of the contributions of the feeder system to the welfare of the nation. It is significant to note, however, that usage and cost data reflected in monetary figures and in physical output units are virtually the only measures used in the formulation of policies to guide the operation of and investment in the feeder system.

At the inception of feeder service, the Civil Aeronautics Board stipulated that these operations were to be conducted on an experimental basis and accordingly issued temporary certificates of public convenience and necessity to all the carriers, implying, it seems, that at

\[^{10}\text{Civil Aeronautics Board, Service Mail Pay and Subsidy for United States Certificated Air Carriers, loc. cit.}\]

\[^{11}\text{Air Transport Facts and Figures, loc. cit.}\]
some time the "success" of the experiment would have to be determined. However, no criteria were developed for the determination of whether or not the carriers had transcended the experimental stage. Then, in 1955, the Board, acting on the basis of Congressional enactment, conferred the status of permanency on all the then-operating carriers. This action of Congress was characterized, as had been earlier cases of the Board, by the apparent lack of any plan for the development of the feeder system. The absence of such a plan can be attributed in large part to the shortage of adequate data pertaining to the total current and potential benefits from the operation of the feeder system and to the lack of a suitable framework within which total benefits can be related to total costs for the purpose of drawing conclusions as to the net contribution of the feeder system to national welfare.

The purpose of this study will be to determine the significance of the feeder system to the nation and whether its existence and perpetuation can be justified on both economic and non-economic, especially national-defense, grounds. The general approach is to consist of a costs-benefits study within the framework of welfare economics. As an initial step, the factors to be considered under the headings of "total benefits" and "total costs" will be discussed. The consideration of the former will necessitate
the introduction of usage data, but it will also involve
the detailed analysis of non-user benefits, or external
economies of consumption, and their significance in the
feeder operations. Another step in the analysis will be
the development of an analytical framework to be used in
the comparison of total costs and total benefits and the
application of this framework in the determination of the
net contributions to the welfare of the economy from the
feeder system. The same methodological procedure will be
used as a guide to the formulation of future investment
policy in the feeder industry.

The results of this study will include the develop­
ment of data relative to the total benefits received from
the operation of the feeder system. Usage statistics have
always been available, but there has been a shortage of
data relative to non-user benefits, especially national­
defense benefits. It is believed that this study will be
the first to make a comprehensive application of the con­
cept of external economies of consumption to the feeder
industry. A possible result of this phase of the study may
be a negation of the existence, or a reduction of the mag­
nitude, of the alleged indirect benefits furnished by the
operation of the feeder system.

In addition, this study is designed both to develop
an analytical framework for the comparison of total benefits
and total costs and to utilize that framework for the purpose of conducting a costs-benefits analysis. Such an analysis will provide data for the formulation of conclusions relative to the net contributions of the feeder system to welfare. These data, together with those developed from an analysis of the future prospects of the feeder system, will provide guides for the formulation of future investment policy in the feeder industry.

Statement of Hypothesis

In the solution of this problem, the writer will use the hypothesis that the contribution of the feeder system to welfare cannot be determined solely on the basis of the standards of the market, but that both market values and non-market values, reflected largely in the form of external economies of consumption, must be considered in such a determination. Working from this hypothesis, the writer will analyze comprehensively the total benefits from the operation of the feeder system, elaborate an analytical framework which will permit a comparison of total benefits and total costs for the feeder system, and

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12 It is believed that the tools of analysis developed in this study will provide a sound basis for the conduct of costs-benefits studies for any mode of transportation, especially when there is a presence of external economies of consumption.
then utilize this framework to draw conclusions relative to the significance to the economy of the feeder system.

The use of this hypothesis and these procedures should permit both the drawing of conclusions relative to the contribution of the feeder system to welfare and the making of future investment decisions which will meet the test of efficiency in resource allocation.

Method of Analysis

The study herein contemplated will utilize both the inductive and the deductive approaches with the methodological goal being one of combining the results of these two types of analysis in such a way as to develop new knowledge in the form of valid generalizations.

The following brief sketch will indicate more specifically the method of analysis and the types of data to be utilized in this study.

Chapter II will define the concepts to be used in the study, develop the analytical framework to be utilized in the comparison of total benefits and total costs, and indicate the application which will be made of this framework in the determination of the significance of the feeder system to the economy, as well as in the formulation of future investment policy in the system. The foundation for the preparation of this chapter will be the writings of the "old" and the "new" schools of welfare economics.
Much as Chapter II will be designed to construct a conceptual and analytical framework for the conduct of the study, Chapter III will be designed to provide a structural framework for the study on the basis of an industry grouping. The use of the industry concept will permit the making of both abstract and empirical analyses and the drawing of conclusions therefrom for an operationally distinguishable segment of the air transportation industry. Within the industry framework, the theoretical equilibrium adjustment of output to price will be compared with the actual adjustment, the consideration of the latter being based largely on statistical data.

Chapter IV will be concerned with the introduction and analysis of data, primarily of a statistical nature, relative to the actual usage of the feeder system. Such data will offer the most important indication of the user benefits furnished by the feeder system.

Chapters V and VI will take the form of an analysis to determine the significance of the feeder industry to national defense. Chapter V will consider the "capabilities" for national defense purposes of the feeder system, whereas Chapter VI will consider the significance of the feeder system insofar as the "requirements" of national defense are concerned. In combination, they will furnish data relative to the significance of the feeder system as
far as national defense is concerned, national defense being most frequently offered as the most important recipient of non-user benefits.

Chapter VII will be concerned with the determination of the total costs of the operation of the feeder system and the allocation of these costs among the users of the system - the Post Office Department and "commerce." There will be a theoretical analysis made for the purpose of allocating a share of the cost burden of supporting the feeder system to national defense, such share being, at least in part, a basis for the apportionment of taxes for the subsidization of the feeder industry, if it is found that national defense derives some benefits from the existence of the feeder industry.

Chapter VIII will bring together the major findings of the previous chapters. More explicitly, there will be a consideration of the total benefits received from the operation of the feeder system, based on both statistical data and the inferences that can be drawn from the theoretical and statistical analyses made relative to non-user benefits. There also will be a summary analysis of total costs and their allocation, made largely on the basis of statistical data. Then, within the framework of welfare economics and on the basis of guiding principles furnished by welfare theory, a comparison of total benefits and total
costs will be made for the purpose of drawing conclusions relative to the net contributions of the feeder system to welfare.

Chapters IX and X will be devoted to a consideration of the prospects of the feeder carriers for reducing their subsidy requirements in such a manner as not to reduce the welfare of the economy. Chapter IX will consider the possibility of achieving this goal through revenue increases, whereas Chapter X will be concerned with the possible attainment of the same goal through cost decreases. These chapters will describe current and foreseeable developments, such as technological and managerial innovations, regulatory changes, and legislative enactments, and analyze the probable effects therefrom on the feeder industry.

In the light of the findings of these two chapters and those of Chapter VIII and within the framework, and through the utilization of the relevant principles, of welfare economics, conclusions will be drawn with respect to the formulation of the types of investment policies which will advance the welfare of the nation.

Chapter XI will contain conclusions and recommendations.

Scope of the Study

The research of this study will be limited to the feeder sector of the domestic, scheduled, common-carrier
system. Thus, the trunk lines will be excluded, though it is believed that the type of study undertaken herein would develop significant information if it were conducted for the trunk-line sector. Excluded also will be the operations of international, territorial, irregular, all-cargo, and helicopter carriers. To include these types of operations would unduly extend the study and would contribute little of material value to the investigation of the contemplated topic.

The legislative framework within which the feeders perform their operations will be treated as a given factor. That is to say, the Civil Aeronautics Act of 1938 [The Federal Aviation Act, as of 1958] will continue to furnish the mandates for the conduct of the operations under consideration. Likewise, the administrative, regulatory, and quasi-judicial bodies charged with carrying out the Act of 1938 [1958] will be taken as given factors. On the other hand, the policies by which the Act is administered will not remain in the same type of inviolable position. Thus, a reservation is made for the opportunity to formulate recommendations which would permit the Civil Aeronautics Board to administer the mandates of the Act of 1938 [1958] in different ways from those presently being employed.

Though the feeder airlines receive subsidy benefits from the governmental provision of airports and airways,
this study will consider only the operational subsidy payments made in conjunction with the mail-transportation activities of the feeders. As mentioned earlier in the outline, since 1951 these subsidy payments have been separated from the mail payments which are made to cover the costs of transporting the mail. Based upon a service rate which is considered to be the rate necessary to cover the cost of transporting the mail, including a return on investment, the Post Office Department compensates the carriers for the provision of this service. Then, the Civil Aeronautics Board makes the subsidy payment, which is the difference between the total revenues from all operations of the carriers and the total costs of all operations, including a return on capital, considered by the Civil Aeronautics Board as necessary to provide all these services. It is this "separated" subsidy figure which will be used in this paper. To consider the airport and airways subsidies would unduly extend the scope of this paper and would not contribute in any great measure to the development of the study herein contemplated. In this respect, this writer is interested in the "mail" subsidy because it is the amount which is used to finance the operations of the feeders. It is principally through this subsidy that the Civil Aeronautics Board can influence the rate and direction of development in the feeder industry.
It seems, however, that a benefits-received relative to costs-incurred type of study, similar to that contemplated herein for feeder operational subsidy, would contribute significant data if it were undertaken in relation to airport and airway subsidies.

This paper will not undertake a consideration of the accuracy of the procedures used in the determination of the mail service rate and the final subsidy figure. In this respect, it will be assumed that the service rate is the rate which just covers the total costs of the transportation of mail and that the subsidy payment is of the amount which is just sufficient, along with the other revenues of the carriers, to cover the total costs of the carriers, including capital-attraction costs, incurred in performance of all feeder services. These assumptions probably credit the Civil Aeronautics Board with the possession of greater costs data and rate-making acumen than it possesses in reality, but to conduct the cost and rate-making analyses necessary to obtain another set of data would involve a project of a magnitude deserving of a separate undertaking.

Since this costs-benefits study is designed to indicate whether resources have been allocated efficiently in the feeder industry and to provide guides to the formulation of investment policy in the future, this writer would like
to maintain a distinction between problems of allocation and problems of distribution. The primary concern, then, will be with the efficiency of resource allocation in an aggregative sense and not with the distribution of income, a problem which can be handled through appropriate revenue-and-expenditure programs, assuming that income distribution, or redistribution thereof, is of primary concern.

It is difficult to discuss fully the indirect benefits from the feeder system and the apportionment among non-users of the costs involved in the provision of the feeder service without becoming involved in the problem of determining whether the benefit or the ability-to-pay principle should be used as a basis for the apportionment of such costs to non-users. However, a comprehensive consideration of the nature of these two approaches, their advantages and disadvantages, and their redistributive implications would not contribute materially to the attainment of the objectives of this study. This study, however, will discuss briefly the nature of the two approaches, indicate a logical preference for the use of the benefit approach in the handling of allocative problems, and explain the reasons for the selection of this approach.

Inasmuch as a total costs-total benefits study should consider both external economies and external dis-economies of both production and consumption, this study
will point out how all of these concepts may be handled in welfare analysis, but it will be concerned primarily with a conceptualization and an analytical treatment of external economies of consumption.

Sources of Data

In the general area of feeder airline operations and public policy applicable thereto, there is a dearth of information, particularly of an analytical nature. Much of the data which are available is essentially of a descriptive character. This gulf in the availability of data creates an opportunity for detailed study, particularly of the nature that is contemplated herein. This same shortage of data creates a necessity for the conduct of considerable original research the results of which, it is hoped, will make a significant contribution to the accumulation of knowledge in the feeder-airline field. The most critical shortage of data is a result of the almost complete failure of writers in this field to develop a comprehensive measure of the contributions made by the feeder carriers to the economy and to relate these benefits to the costs incurred in obtaining them.

To this writer's knowledge, there are no books or monographs which are devoted exclusively to the operations of feeder airlines and to public policy governing the
operations of these lines. Certain books do give survey treatment to these matters, but they do not contain data which is significant for the conduct of this study.

Considerable reliance will be placed on the use of articles taken from periodical literature, particularly from the *American Economic Review*, the *Journal of Air Law and Commerce*, the *Quarterly Journal of Economics*, and the *Journal of Political Economy*.

For the development of Chapter II, the works of the writers of both the "old" and the "new" schools of welfare economics will be studied. Also of significance to this study will be *Marginal-Cost Price-Output Control* by Burnham Putnam Beckwith and *The Theory of Public Finance* by Richard A. Musgrave. The former will be helpful for the purpose of distinguishing between total and marginal analysis and for indicating the types of situations to which they are best suited. In addition, Beckwith discusses comprehensively the marginal-cost pricing concept and alludes to the alternatives of full-cost and discriminatory pricing. The latter author provides a thorough description and analysis of the merits of the benefit and the ability-to-pay principles of apportioning taxes.

A considerable amount of the empirical data relative to usage of the feeder system and to the costs of the operation of the feeder system will be gathered from government
statistics, especially those published by the Civil Aeronautics Board. These data are tabulated by the Board from the reports filed with them by the individual feeder carriers.

In a study which draws conclusions from a consideration of data which are virtually incapable of being assessed by the standards of the market, it will become necessary to rely on expert opinion, such as that of military and governmental experts. One example of such an imponderable is the required size of the feeder system for national defense needs; here, the necessity of relying on military and Congressional leaders for expressions of opinions is obvious. Accordingly, in this study, reliance will be placed on sources of data such as Congressional and Civil Aeronautics Board hearings, addresses of military experts, and other similar sources.

The unpublished dissertation of Paul D. Zook entitled "Local and Feeder Airlines and Public Policy," which was completed at the University of Illinois in 1954, has been thoroughly examined for the purposes of determining whether my proposed study would constitute a duplication of effort and of adjudging its value as a potential source of data. His study was completed before the feeders had been permanently certificated. This factor and the changing conditions in the industry have caused much of his data
to be of only historical significance. His paper is highly descriptive of the legislative and regulatory framework within which feeder operations are conducted. As this writer does not intend to examine at any length the historical policy-making actions of the Civil Aeronautics Board but instead intends to develop data which will be useful in the future in the making of regulatory, and possibly legislative, decisions for the conduct of feeder operations, Dr. Zook's study will afford little assistance.

Another unpublished dissertation, completed in 1958 at Ohio State University by Milton Z. Kafoglis and entitled "Welfare Economics and Governmental Programs with an Application to Highway Finance," has provided some valuable insights. Of greatest significance to this study are his treatments of the external-economies argument as a justification for subsidy and the theoretical framework for cost assignments in the cognate field of highway finance.

Outline of Chapters

Although it is probable that additional research will stimulate new ideas and uncover other sources of data, the following outline will guide the preparation of this study.
I. INTRODUCTION

A. Nature and importance of the study
B. Statement of the hypothesis
C. Method of analysis
D. Scope of the study
E. Sources of data
F. Outline of chapters

II. CONCEPTUAL AND ANALYTICAL FRAMEWORK

A. Conceptualization in relation to matters of cost
   1. Consideration of alternative cost-price relationships
      a. Description of these alternatives
         1) Discriminatory pricing
         2) Marginal-cost pricing
         3) Total-cost pricing
      b. Analysis of conditions best suited for utilization of each of these alternatives
         1) Discriminatory pricing
         2) Marginal-cost pricing
         3) Total-cost pricing
   2. Importance of subsidy to feeder operations
      a. Definition of subsidy
      b. Consideration of significance of subsidy to operation of feeder system
   3. Allocation of common costs among users of feeder service
      a. Nature of the allocation problem
      b. Alternative allocation theories
      c. Actual method of allocation used by Post Office Department
      d. Allocation method to be used in this study

B. Conceptualization in relation to matters of benefits
   1. User benefits
      a. Nature of these benefits
      b. Measurability of these benefits
         1) Monetary
         2) Physical output units
      c. Satisfaction of user demand and creation of non-user benefits
         1) Non-user benefits as a result of utilization of system to satisfy collective wants
         2) Non-user benefits as a result of external economies of consumption
2. Non-user benefits
   a. Nature and examples of non-user benefits
      1) External-economies-of-consumption case
      2) Satisfaction-of-collective-wants case
   b. Measurability and measurement of non-user benefits
      1) Market measures
      2) Non-market measures
         a) Use of testimony and opinions of experts
         b) Utilization of principles of welfare economics
   c. Non-user benefits and the case for intervention with the market processes
      1) Rationale for government intervention in cases of both external economies of consumption and collective satisfaction of wants
      2) Rationale for non-user support of feeder system in cases of both external economies of consumption and collective satisfaction of wants

C. Construction of analytical framework for conduct of costs-benefits analysis
   1. Contributions of "old" school of welfare economics
      a. Assumption of interpersonal comparisons of utility
      b. Statement of conditions necessary for attainment of allocative optimum
      c. Development of criteria for use in evaluating reorganizations designed to move the economy towards optimum
      d. Elaboration of concept of consumers' surplus
      e. Development of methods of financing deficits
   2. Contributions of "new" school of welfare economics
      a. Assumption of inability of making interpersonal comparisons of utility
      b. Development of compensation principle
      c. Statement of conditions necessary for attainment of allocative optimum
      d. Development of criteria for use in evaluating reorganizations designed to move the economy towards optimum
e. Elaboration of concept of external economies of consumption
f. Development of methods of financing deficits

3. Characteristics of a framework for conduct of costs-benefits analysis
   a. Separation of problems of allocation from those of distribution
   b. Assumption of goal of optimum welfare for resource allocation
   c. Possible positions of economy in relation to optimum
      1) Equilibrium at optimum (no allocative reorganization would increase welfare)
      2) Equilibrium short of optimum (certain allocative reorganizations would increase welfare)
   d. Framework for consideration of factors necessary to determine position of economy relative to optimum
      1) Cases in which there are no external economies and no program for satisfaction of collective wants and perfectly divisible factors
         a) Ability of market to satisfy allocative optimum conditions
         b) Revenue - expenditure programs are necessary to handle problems of distribution
      2) Case in which there are no external economies and no program for satisfaction of collective wants and imperfectly divisible factors
         a) Ability of market to satisfy allocative optimum conditions
         b) Nature of the decreasing-cost case
         c) Welfare test to determine whether an allocative reorganization would increase welfare (If it would, the system is not at optimum)
            1 - Use of interpersonal comparisons of utility
            2 - Use of compensation principle
         d) Alternative welfare test to determine whether an allocative reorganization would increase welfare (If it would, the economy is not at optimum)
1 - Whether total benefits, including consumers' surplus, would exceed total costs, including subsidy

3) Case in which there are external economies - concentration on external economies of consumption - and user revenues equal user costs (no subsidy requirement)
   a) Ability of market to satisfy conditions of allocative optimum
   b) Welfare test to determine whether an allocative reorganization would increase welfare
      1 - Use of interpersonal comparisons of utility
      2 - Use of compensation principle
   c) Alternative welfare test to determine whether an allocative reorganization would increase welfare
      1 - Whether total benefits, including consumers' surplus and external economies of consumption, exceed total costs, including subsidy
   d) Assumption that the system is at optimum
      1 - Non-user benefits are "free" additions to total welfare
      2 - Non-user sharing of user costs is a problem of distribution (equity)

4) Case in which there are external economies - concentration on external economies of consumption - and user revenues are less than user costs (subsidy requirement)
   a) Ability of market to satisfy conditions of allocative optimum
   b) Welfare test to determine whether an allocative reorganization would increase welfare
      1 - Use of interpersonal comparisons of utility
      2 - Use of compensation principle
   c) Alternative welfare test to determine whether an allocative reorganization would increase welfare
1 - Whether total benefits, including consumers' surplus and external economies of consumption, exceed total costs, including subsidy.

5) Case in which there are governmental programs designed to satisfy collective wants
   a) Determination of needs for such programs
      1 - Market measures
      2 - Political measures
         a - Voting expression of preferences
         b - Conclusions of experts
   b) Assumption that optimum is definable on the basis of available measures
   c) Welfare test to determine whether an allocative reorganization would increase welfare
      1 - Use of interpersonal comparisons of utility
      2 - Use of compensation principle
   d) Alternative welfare test to determine whether an allocative reorganization would increase welfare
      1 - Whether total benefits, including consumers' surplus and collective benefits, would exceed total costs, including subsidy

D. Consideration of alternative methods of apportioning a portion of total costs to non-user beneficiaries
   1. Nature of two most important methods
      a. Ability-to-pay method
      b. Benefit method
   2. Logical choice of benefit approach in allocative problems
   3. Rationale for selection of the benefit approach
      a. It is consistent with the separation of problems of allocation and those of distribution
      b. It relies on the market and consumer preference
1) Market expression of preference  
2) Ballot expression of preference  
   c. It is logically consistent with the use of the compensation principle  
d. It is consistent with situations in which the amount of enjoyment of service is identical for each person

E. Summary

III. MARKET STRUCTURE OF FEEDER SYSTEM

A. Orthodox classification of markets  
   1. Number of sellers  
   2. Type of product  
   3. Conditions of entry  
   4. Theoretical equilibrium adjustment

B. Market classification of feeder industry  
   1. Number of sellers  
   2. Type of product  
   3. Conditions of entry  
   4. Actual disequilibrium adjustment  
      a. Industry operational costs greater than industry operational revenues  
      b. Governmental provision of operational subsidy

C. Determination and importance of subsidy  
   1. Use of "service" mail rate  
   2. Use of "need" subsidy rate  
   3. Trends in "need" subsidy payments

D. Performance of managerial functions by Civil Aeronautics Board  
   1. Rate and fare determination  
   2. Entry and exit controls  
   3. Product-differentiation regulation  
   4. Investment decision-making

E. Summary

IV. NON-MILITARY USAGE OF FEEDER SYSTEM

A. Congressional mandate for development of domestic air transportation

B. Contributions to postal service  
   1. Priority to mail cargo
a. Air mail  
b. First-class mail  
c. Parcel post  

2. Expedition of mail delivery  

3. Facilities available for mail transportation  
a. Available plane-miles  
b. Available ton-miles  
c. Number of cities served  

4. Utilization of available facilities  
a. Utilization of available ton-miles  
b. Total revenues from transportation of mail  
c. Mail revenues as percentage of total revenues  
   1) Without subsidy  
   2) With subsidy  

C. Contributions to domestic commerce  

1. Passenger operations  
a. Available passenger-miles  
b. Number of cities served  
c. Average mileage of passenger flights  
d. Frequency of passenger flights  
e. Utilization of available passenger-miles  
f. Total revenues from transportation of passengers  
g. Passenger revenues as percentage of total revenues  

2. Freight and express operations  
a. Nature of freight and express operations  
b. Available ton-miles  
c. Utilization of available ton-miles  
d. Total revenues from transportation of freight and express  
e. Freight and express revenues as percentage of total revenues  

3. Other operations  
a. Nature of other operations  
b. Total revenues from other operations  

4. Traffic "fed" from feeders to trunks  
a. Significance of through service to commerce  
b. Revenue contributions to trunks from such traffic  
c. Effect on trunk-line revenues of abandonment of "feeder" service  

5. Tax contributions of feeder system  
a. Types of tax contributions  
b. Monetary significance of tax contributions  

D. Summary
V. MILITARY CAPABILITIES OF THE FEEDER SYSTEM

A. Introduction
1. Explanation of the "capabilities" concept
2. Explanation of the "requirements" concept
3. Relationship of the two concepts.

B. Present military utilization of feeder transportation services
1. Utilization by passenger-miles
2. Utilization by ton-miles
3. Utilization by revenue dollars

C. Total capabilities of present feeder system
1. Route configuration
2. Operational facilities
   a. Aircraft
   b. Personnel
   c. Ground and maintenance equipment
3. Space availability
   a. Passenger-miles
   b. Ton-miles

D. Stand-by capabilities of present system
1. Operational facilities
   a. Aircraft
   b. Personnel
   c. Ground and maintenance equipment
2. Space availability
   a. Currently unused passenger-miles
   b. Currently unused ton-miles

E. Summary

VI. MILITARY REQUIREMENTS OF THE FEEDER SYSTEM

A. Military utilization of trunk facilities during periods of emergency
1. Type of emergency
   a. World War II
   b. Korean War
   c. Berlin Airlift
2. Nature of the demands during each period
3. Effect on commercial service of each of these emergencies
B. Military utilization of feeder facilities during periods of emergency
   1. Type of emergency
      a. Korean War
      b. Berlin Airlift
   2. Nature of the demands during each period
   3. Effect on commercial service of each of these emergencies

C. Evolution of air transportation programs for military and national-defense needs
   1. Nature of these programs
      a. Air Materiel Command Program
         1) Military Air Transportation Service
         2) LOGAIR
      b. Civil Reserve Air Fleet
         1) Requirements of feeders
         2) Requirements of trunks
         3) Effects on commercial service of actual utilization of the CRAF
   2. Probable adequacy of these programs
      a. Preparedness conditions
      b. Partial-mobilization conditions
      c. Full-scale mobilization conditions

D. Requirements of feeder system for conduct of military transportation
   1. Preparedness conditions
   2. Partial-mobilization conditions
   3. Full-scale mobilization conditions

E. Congressional and military statements relative to potential military usage of common-carrier air transportation systems
   1. Usage of feeders
   2. Usage of trunks

F. Significant advantages of feeder system for national-defense purposes
   1. Availability of stand-by capacity
   2. Speed advantage of air carriers

G. Significant inadequacies of feeder system for national-defense purposes
   1. Non-strategic route configuration
   2. Necessity for air-surface movements
   3. Shortcomings of flying equipment
      a. Relatively low carrying capacity
      b. Unsatisfactory interior design of aircraft
4. Deficiencies of feeder airports
   a. Small (particularly for jets)
   b. Absence or shortage of modern aids to
      navigation

H. Summary

VII. ALLOCATION OF TOTAL COSTS OF OPERATION OF FEEDER SYSTEM

A. Nature and magnitude of expenses of feeder carriers
   1. Operating expenses
   2. Ground and indirect expenses
   3. Total operating expenses
   4. Trends in total operating expenses
   5. Restatement of significance of subsidy payments

B. Allocation of costs of operation to postal service
   1. Feeder operational results of air mail service
      a. Feeder service rate covers total feeder
         cost of air mail transportation
      b. Feeder mail transportation service re-
         ceives no subsidy
   2. Overall Post Office Department operational
      results for air mail transportation
      a. Total postal air mail revenues
      b. Total postal air mail costs
         1) Feeder service rate
         2) All other air mail costs of Post
            Office Department
      c. Determination of difference between total
         revenues and total costs of service
      d. Theoretical implications of this difference
         1) When total revenues are greater
         2) When total costs are greater

C. Allocation of costs of operation to "commerce"
   1. Total costs of "commercial" operations (All
      operations except those performed for postal
      service and the military)
      a. Total operational costs for all feeder
         services
      b. Total costs of air mail service (service
         rate)
      c. Difference represents costs to commerce
   2. Total revenues from "commercial" operations
      a. Total operational revenues from all
         feeder services
b. Total revenues from air mail service (service rate)
c. Difference represents revenues from commerce

3. Subsidization of "commercial" operations
   a. Total costs charged to commercial operations
   b. Total revenues derived from commercial operations
   c. Difference represents operational subsidy to commerce (Thus far, subsidy on national-defense grounds has been implicitly ignored)

4. Theoretical and policy implications of such an allocation to commerce

D. Allocation of costs of operations to national defense
   1. Present military usage of feeder service (nil)
   2. Allocation of costs of feeder stand-by capacity (Assumption of military use of unutilized feeder capacity only)
      a. Feeder charges for performance of such service for military
         1) Average passenger fare of feeders times unutilized feeder seats (average)
         2) Minimum cargo rates of feeders times unutilized ton-miles (average)
         3) Total feeder charges for performance of stand-by capacity service
      b. Alternative charges for performance of same magnitude of service by non-feeders (LOGAIR)
         1) Operating costs
         2) Ground and indirect costs
         3) Total alternative costs
      c. Summary of allocation of costs on national-defense grounds
         1) Alternative of feeder performance of unutilized-capacity service
         2) Alternative non-feeder performance of unutilized-capacity service
      d. Policy implications of allocation of costs on national-defense grounds

3. Theoretical implications of usage of feeder services for national defense to an extent greater than available stand-by capacity
VIII. APPLICATION OF ANALYTICAL FRAMEWORK IN THE DETERMINATION OF THE SIGNIFICANCE OF THE FEEDER SYSTEM TO THE ECONOMY

A. Resume of total benefits from feeder system
   1. User benefits
   2. Non-user benefits
      a. National-defense benefits
      b. Other benefits

B. Resume of total costs of feeder system
   1. Contributions by users
   2. Contributions by non-users (subsidy)

C. Statement of allocative optimum (If the system is not at optimum, its net contribution to welfare is not at a maximum)

D. Determination of position of feeder system in relation to allocative optimum
   1. Assumption of use of alternative tests of interpersonal comparisons of utility or of the compensation principle in a hypothetical economic reorganization
      a. Condition under which nobody could be made any better off
      b. Condition under which at least one person could be made better off and his (their) gain(s) would exceed the loss(es) of the loser(s)
   2. Assumption of comparison of the relationship between total benefits, including consumers' surplus and indirect benefits, on the one hand, and total costs, including subsidy, on the other, from a hypothetical economic reorganization
      a. Total benefits, including consumers' surplus and/or indirect benefits, would not exceed total costs, including subsidy
      b. Total benefits, including consumers' surplus and/or indirect benefits, would exceed total costs, including subsidy
3. Inferences to be drawn from D.1 and D.2
   a. If D.1.a. and D.2.a. apply, the feeder system is at an allocative optimum
   b. If D.1.b. and D.2.b. apply, the system is not at an allocative optimum

E. Consideration of guides to be used in the formulation of investment policy for the future for the feeder system (Consideration by use of the same principles as those used in section D. of this chapter)

F. Approaches to attainment of optimum (To be covered in Chapter XI on Conclusions and Recommendations)

IX. ANALYSIS OF PROSPECTS OF FEEDERS FOR IMPROVEMENT OF REVENUES UNDER PRESENT CIVIL AERONAUTICS BOARD POLICY

A. Total and physical-output unit trends in operational revenues
   1. Passenger
   2. Mail
   3. Freight and express

B. Air traffic potential
   1. Passenger potential
      a. As percentage of all inter-city traffic
      b. By distance categories
   2. Freight potential
      a. As percentage of all inter-city traffic
      b. By distance categories

C. Nature of primary factors influencing feeder revenues
   1. Route configuration
      a. City pairs
      b. City population
   2. Rate structure
   3. Service competition
   4. Sales promotion
   5. Quantity and quality of service of alternative modes

D. Current regulatory policy in relation to each of these primary factors
   1. Route configuration
      a. Abandonment of feeder routes
      b. Extension of feeder routes
c. Mergers of routes
   1) Feeder with feeder
   2) Feeder with trunk

2. Rate structure
   a. General stickiness of rates and fares
   b. Authorization of promotional and
directional rates and fares
   c. Results of recent Civil Aeronautics
   Board area cases and general -fare
   investigations

3. Service competition
   a. Non-authorization of certain services
   b. Non-approval of expenses incurred in per-
   formance of certain services

4. Sales promotion (exclusive of rate and
   service variations)
   a. Non-authorization of certain sales-pro-
      motion methods
   b. Non-approval of expenses incurred in
   certain types of sales-promotion
      activities

5. Quantity and quality of alternative modes of
   transportation
   a. Rivalry between feeders and trunks
   b. Rivalry between feeders and surface
      carriers

E. Possible results and the implications of regula-
   tory policy in relation to each of these
   primary factors

F. Summary

X. ANALYSIS OF PROSPECTS OF FEEDERS FOR REDUCTION OF
   COSTS UNDER PRESENT CIVIL AERONAUTICS BOARD POLICY

A. Total and physical-output units trends in costs
   1. Total costs, including subsidy
   2. Subsidy "costs"

B. Nature of primary factors limiting reduction of
   costs
   1. Lack of suitable aircraft and facilities
   2. Short-haul operations
   3. Variability of traffic
      a. Directional
      b. Seasonal
   4. Availability of "subsidy" insurance
5. Relationship between size of feeder carriers and total unit operating costs

6. Capital-raising difficulties

C. Current regulatory policy in relation to each of these primary factors

1. Lack of suitable aircraft and facilities
   a. Introduction of new aircraft
      1) Nature of aircraft
      2) Results of operation of new aircraft
   b. Development of new facilities
      1) Airports
      2) Flying aids

2. Short-haul operations
   a. Non-stop operations
   b. Skip-stop operations
   c. Flag-stop operations
   d. Authorization for greater frequency of flights

3. Variability of traffic
   a. Authorization of seasonal service
   b. Approval of directional and promotional rates and fares

4. Availability of subsidy "insurance"
   a. Establishment of incentive mail-pay rates
   b. Authorization of competing trunk-line routes

5. Relationship between size of feeder carriers and total unit operating costs
   a. Structural revisions of feeder system (extensions and abandonments)
   b. Changes in rivalry between feeders and feeders and trunks

6. Capital-raising difficulties
   a. Granting of permanent certificates of public convenience and necessity to feeders
   b. Legislation relative to government guarantee of loans to feeders
   c. Legislation relative to re-investment of capital gains by feeders

D. Possible results and the implications of regulatory policy in relation to each of these primary factors

E. Summary
XI. CONCLUSIONS AND RECOMMENDATIONS

A. Formulation of conclusions

B. Statement of recommendations
CHAPTER II

CONCEPTUAL AND ANALYTICAL FRAMEWORK

Introduction

This chapter will be designed to outline the assumptions under which this study will be conducted, to conceptualize the terms "benefits" and "costs," and to develop a framework which will furnish guides to be used in Chapter VIII in the determination of whether the feeder system is at optimum. When it is at optimum, it may be said that it is making the maximum possible contribution to welfare. When it is not at optimum, it is possible that given economic reorganizations could be made which would increase welfare.

Total Versus Marginal Analysis

At the outset, this writer should like to distinguish between total and marginal analysis and to point out that the conduct of this study will be based largely on a "total-analysis" approach. A helpful distinction is made between these two types of analyses by Beckwith, who maintains that total analysis involves the addition of

...total gains and outlays of producing a quantity of goods and compares the resulting total in order to judge the economic wisdom of producing the goods in question. The totals compared include
intramarginal as well as marginal gains and outlays. The intramarginal gains should include consumers' surplus, and the intramarginal outlays should include economic rent.

Total analysis is useful in "weighing any economic decision which would increase the output of a good by many units," a decision the essence of which is that it involves "lumpy changes in output continuing over a considerable period of time."¹ Such types of decisions characterize the investment policies of the feeder system in most, if not in all, cases.

On the other hand,

...marginal analysis compares marginal money gains and costs for a single marginal unit of output, assuming no increase in fixed capital. Marginal analysis never requires the measurement and use of consumers' surplus, land rent, quasi-rent, or any other intramarginal surplus because they are never included in marginal gains or costs.

This type of analysis is applicable to the

...problem of whether to raise or lower the output of a given good by one unit and to the closely related if not identical problem of whether to raise or lower prices in order to change this output by one unit. In other words, marginal analysis should be used to solve price-output control problems, assuming no change in fixed plant capacity.²

Involving as it does a comparison of "total gains and outlays" within a structural framework which can be changed only by the making of lumpy investments, this paper will

²Ibid., pp. 13, 14.
make most frequent use of the total-analysis approach. The marginal analysis will be useful, however, in evaluating the wisdom of making those types of changes of price and output which do not involve changes in the amount of fixed investment.

A useful observation relative to the importance of the "Total conditions" and the "Marginal conditions" is made by Myint. He maintains that the gains to be obtained from a tightening up of the "Marginal conditions" are often likely to be much smaller than those to be obtained from reorganizing the "Total conditions." This does not mean that the margins should be abandoned altogether, for even "Surplus magnitudes" base their margins somewhere. Instead, it means that the margins should be treated as "secondary guiding lines to be approached rather than to be reached." He further points out that the "Surpluses" are larger and more important than the usual marginal products and are, therefore,

...large enough magnitudes for the administrative machinery to come to grips with and large enough magnitudes to outweigh even the very large margin of errors we must allow for the calculation of gains and losses in practice.\(^3\)

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Conceptualization in Relation to Matters of Cost

Alternative Cost-price Relationships

If the purpose of this study is kept in mind, it will be unnecessary to belabor the point that it does not encompass directly the formulation of "appropriate" pricing policy for the feeder industry. To make this study more comprehensive and significant, however, it seems worthwhile to distinguish between average-cost and marginal-cost pricing and to indicate the types of situations to which they most ideally are suited. In addition, the contributions to welfare to be had from a policy of marginal-cost pricing will be contrasted with those to be had from discriminatory pricing.

**Average-cost pricing.**—Average-cost pricing will be used to signify a type of arrangement under which, for a given quantity of output, total money receipts will equal total money costs on the basis of the establishment of a uniform price for all users of the service. Under an arrangement such as this, maximum utilization and welfare may not be derived from the operation of the system because of the insufficiency of effective demand at the prevailing prices. Under certain conditions, marginal-cost pricing might make a greater contribution to the welfare of the community.
Marginal-cost pricing.— Advocates of marginal-cost pricing aver that welfare could be increased by equating prices with marginal costs in those cases where such an equation is not currently existing. Such an advocacy is based on the assumption that it meets the marginal conditions for maximizing welfare and for this reason represents an optimum. As Beckwith points out, the practical significance of marginal-cost pricing depends on "how often marginal costs are below so-called average costs." Such a statement is based on the reasoning that marginal-cost control would not have any "practical effect" if marginal costs were above average costs at all times. On the other hand, the larger the number of cases in which marginal costs are below average costs, the greater will be the effect of the application of marginal-cost pricing. Beckwith argues that "marginal costs are below average costs in 80 to 90 per cent of actual cases." Little, in contrast, maintains that the "distinction between average and marginal cost is, more than very seldom, of the slightest importance to the welfare of society."—


5Beckwith, op. cit., pp. 9, 10.

A brief consideration of the theory of marginal-cost pricing will follow. In industries in which marginal costs are below average costs, the fixed plant is characterized by unused capacity, and pricing at marginal cost would have the effect of creating a condition in which the total receipts would be less than the total costs and an accounting deficit would be incurred. Under these conditions, the continuation of operation of the system could not be based upon the operation of the market alone. Thus, marginal-cost pricing in a decreasing-cost industry would involve the incurring of deficits and, within the framework of the market, would require the development of a program of taxes and subsidies to finance those deficits. Parts of later chapters of this study will consider these problems within the framework of welfare theory.

For conditions under which there is an absolute limit beyond which output could not be increased, marginal-cost control would not be satisfactory, and another principle would be needed to solve the problem of optimum price when output is at the optimum level. The correct rule for cases such as these is that "price should be raised or lowered until sales just equal supply." In other words,

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8 Beckwith, op. cit., p. 174.
when output is at a maximum, "the general rule is the choice of a demand price that allows consumption of the available service," or a condition of "demand control of the price level." When the productive equipment is scarce, a firm may get a "plant rental." When the price is set by demand alone, this rental would be the difference between the total revenue and the total variable cost. When the price is set by an equation of marginal cost and consumer demand, it would be the difference between marginal cost and average variable cost times the output.\textsuperscript{9}

This is the nature of marginal-cost pricing. In contrast to average-cost pricing, one of the major shortcomings of which is the fact that every commodity has many average-cost curves, a condition which precludes the determination of a unique ideal price, it is held that the marginal-cost curve is determinable and that only through the use of such a curve is it possible to set "ideal prices."\textsuperscript{10}

\textbf{Discriminatory pricing.}—Because of the difficulties of resolving the problems which would be created by the inauguration of marginal-cost pricing and owing to

\textsuperscript{9}Troxel, op. cit., pp. 451-456.

\textsuperscript{10}Beckwith, op. cit., pp. 196, 197.
the practical obstacles which would be involved in gaining the acceptance by managers and regulators of such a pricing scheme, there have been proposals made to the effect that a non-uniform system of pricing be pursued which would in itself cover total costs. This system involves the use of discriminatory pricing. In the *locus classicus*, Pigou describes the three degrees of discriminatory pricing. The first-degree case is one in which a different price is charged for each of the different units of a commodity. Since such price for each unit is equal to its demand price, no consumers' surplus accumulates to the buyers.11

The second-degree case involves the making of a rigorous separation of prices in such a way that all units with a demand price greater than $x$ sell at a price $x$, that all units with a demand price less than $x$ and greater than $y$ sell at a price $y$, and so on. The third-degree case is one in which the seller is able to make a practical separation of consumer groups, charging a separate price to the members of each group. In the view of Pigou, only the third degree is found "in real life." 12


12Ibid.
The advocacy of discriminatory pricing is based on the prospect that it will increase output by reducing prices for some consumers below average cost. In those situations in which the demands of various consumer classes differ in elasticity and discrimination is technically feasible, discriminatory pricing might raise physical output closer to the ideal without placing any burden on those customers who would have to pay the highest rate. In the event that a large enough number of persons responded to discriminatory pricing to permit a greater spreading of the overhead costs, such pricing might even make possible lower prices for the old as well as for the new customers.\textsuperscript{13}

Aside from the many practical objections leveled against discriminatory pricing, it permits only an approach toward the optimum level of output and not an attainment of it. Such a conclusion is based upon the likelihood that it will reduce the lowest prices only a part of the way to the marginal-cost level, thus permitting only a small minority of all consumers to buy at such minimum prices. For this reason, it is considered to be inferior to marginal-cost pricing.\textsuperscript{14} Reder reaches essentially the

\textsuperscript{13}Beckwith, \textit{op. cit.}, p. 225.

\textsuperscript{14}Ibid.
same conclusion, basing his objection to discriminatory pricing on the fact that it does not satisfy all the marginal conditions.\textsuperscript{15}

In keeping with the intention of using marginal analysis only within a framework of fixed investment when a change of a single unit of output is contemplated, this study will be based largely on a consideration of a system in which average-cost pricing is used, even though non-user support is a necessary addition to the contributions made by the users for the support of the system. The tools of welfare theory will permit the consideration of cases such as these.

\textbf{Conceptualization of Subsidy}

In this paper, "subsidy" will be used to denote the amount of the difference between total user revenues and total costs from the operation of the feeder system, which amount takes the form of government payments to the system from tax-derived revenues. Insofar as this figure represents an amount paid for the purpose of maintaining a system larger than that required by the market, as for national-defense purposes, it may be considered a true subsidy. In

the event that this is the irreducible amount necessary for the performance of a given quantity of service for the satisfaction of user demand only, it is really a user cost which is not being borne by users. One of the objectives of this study will be that of determining the nature of the benefits being provided by these "subsidy" payments.

Regardless of the terminological issues, it can hardly be disputed that these payments are of considerable significance to the perpetuation of the presently existing feeder system. In 1957, for example, the subsidy payments to the feeders amounted to $28,037,000. In that same year, approximately 35 per cent of the feeder revenues from all sources were provided through the subsidy medium.16

Allocation of Common Costs

One of the problems faced in the formulation of a pricing program for the feeder system is that of selecting the theory to be followed in the allocation of common costs among the users of the service. This allocation is necessary because the provision of feeder service is characterized by a situation in which more groups of users than one utilize the same facilities at the same time and incur costs some of which are of such a nature that they cannot be

separated and attributed to any particular group of users. These non-separable costs are not joint costs, the latter term being used to refer to "costs incurred in the production of two or more commodities so related that an increase in the output of one is necessarily accompanied by an increase in the output of the other." Airline costs are not joint in this sense, as the transportation of more passengers, as an example, does not necessarily involve the transportation of any other class of traffic.

In the interest of avoiding a purely arbitrary assignment of such common costs to users, it is desirable to develop a satisfactory theoretical basis for the imputation of these costs. In this paper, it will be maintained that costs should be allocated only to users; in the case of the feeder system, these classes of users are the Post Office Department and "commerce." A case may be made for a program through which non-user beneficiaries, such as the military, help share the costs of supporting the system, but this is not the same thing as allocation of common costs among users. Instead, it represents an attempt to develop a program under which a share of common costs is to be borne by non-user beneficiaries.

In the section outlining the scope of this paper, it was mentioned that there would not be undertaken a determination of the correctness of the procedure, and thus of the derived results, used in the determination of the service mail-pay rate, which is the rate that "compensates the air carriers for carrying the mail, reimbursing them for the related costs, including a fair return on the investment which is used in the mail service." Since the military does not directly use feeder service, the only other user is "commerce," to which the remainder of total, and thus of common, costs will be distributed. To handle the matter in any other way than through the making of this assumption would necessitate the undertaking of an empirical study the scope of which would be deserving of a separate undertaking. If it were necessary to select a theory on which to base such an allocation, this writer would choose one based on a marginal-cost allocation, rationalizing this preference on the grounds that "only the marginal-cost curve is determinable." The application of this theory to the feeder system might result in the utilization of a measure such as space-occupance, the marginal cost being the cost of additional space.

18Frederick, op. cit., p. 245.

19Beckwith, op. cit., p. 197.
A searching of the literature and a conduct of personal correspondence have failed to produce data which would indicate the allocation theory, or method, actually used by the Post Office Department in the determination of the mail service rate. Again, however, it should be pointed out that this study does not purport to determine the theoretical appropriateness of the allocation procedure being pursued, but that it will assume that the formula does yield "correct" results.

Conceptualization in Relation to Matters of Benefits

User Benefits

In any want-satisfaction arrangement which is based at least partly on the allocation of private resources, there will be user benefits arising from the operation of the system, and possibly some non-user benefits. With particular reference to the feeder system, the users of the service derive benefits for which they pay prices in the form of rates and fares. The benefits which they derive are readily measurable by the market in terms of monetary measures or in terms of physical-output units, such as ton-miles and passenger-miles.

Non-user Benefits

At the same time that a system is satisfying the wants of users, it may also be making contributions to the
satisfaction of the wants of non-users, or it may be furnishing indirect benefits. To indicate the applicability of this statement to the feeder industry, it will be helpful to distinguish between group and collective wants, as has been done by Suranyi-Unger. In the former type of want case, want satisfaction is "only the result of individual efforts and of the allocation of individual or private means." It refers to a type of situation in which the gratification of the want of one individual might also "automatically render satisfaction to the similar want of other individuals." In fact, "it might even be more or less impossible to sever and dissociate such want satisfaction for a plurality of individuals." This writer will maintain that the provision of air service is made under such conditions that it may properly be labeled a group-want satisfaction arrangement, but merely for the purpose of distinguishing it from a situation in which the process of the satisfaction of the wants of one individual has no effect at all on the satisfaction of a "like" want of any other individual. Suranyi-Unger's concept seems to be most applicable to a situation in which the satisfaction of one user's wants renders satisfaction to a "like" want of another individual[s], both being required to pay for

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their satisfaction, as through a fare. Thus, both indi-
viduals are users of the service. This paper will maintain,
but not attempt to prove, that the concept of external
economies of consumption, which will refer to "services...
rendered free (without compensation) by one consumer to
another,"21 is an extension of the case of group wants,
under circumstances in which the process of satisfaction
of users' wants renders satisfaction to non-users; that is
to say, that non-users are the recipients of indirect
benefits, such as national-defense protection.

In contrast, the satisfaction of the collective
wants is a result of "collective action and collective
means." In this case, "whenever there are discrepancies
between private utilities and disutilities that make want
satisfaction unlikely through private actions, some kind
of concerted action is needed for want satisfaction...,"22
such collective forces being "mobilized and organized
along the lines of a planned consideration of utilities
and disutilities."22 In this paper an arrangement for the
satisfaction of collective wants and the provision of

21Tibor Scitovsky, "Two Concepts of External
p. 143.

22Suranyi-Unger, loc. cit.
non-user, or indirect, benefits will be treated as if it were a planned program to distinguish it from the group-want case with external economies of consumption. In the latter case, indirect benefits occur automatically or incidentally from the satisfaction of the wants of direct users. In the former case, these benefits arise because the system has been designed for the purpose of developing indirect benefits. In this study, the collective-want-satisfaction case will be considered as one in which there is the provision of both direct and indirect wants by the same system, as in a case in which the feeder industry provides service for users but is also designed to provide indirect benefits, such as national-defense protection, the furnishing of which protection is not incidental to the provision of user service since it is a result of definite planning. This case of collective-want satisfaction is to be distinguished from the "pure" type in which the only service furnished is that of a non-user, or indirect-beneficiary, nature, such as in the provision of a radar-warning system for the nation. One of the objectives of this paper will be to determine whether the feeder system fits into the group-want-with-external-economies case or the satisfaction-of-collective-wants case, or both, and to consider what the implications of such categorizing have for the attainment of optimum utilization of the feeder system and for the formulation of public policy,
especially that directed to governmental financing, for the feeder system.

Whereas Suranyi-Unger defines a group-want case as one in which the operations are conducted with the use of "individual or private means," this study will relax the requirement that only private resources be used and will assume that public resources also may be used, thus making it possible for it to encompass the operations of the feeder system which receives publicly supplied "subsidy." Thus, a group-want situation will continue to be one in which the provision of service to one user[s] involves the provision of service automatically to another user[s] and to non-users, if the external-economies-of-consumption case is applicable. It is to be distinguished, then, from a program for the satisfaction of collective wants, such a program having been deliberately designed to provide non-user benefits.

One of the most important examples of the case of collective-want satisfaction is the vast program developed for the defense protection of the nation. Needless to say, the use of the feeder system for national-defense purposes has been advanced frequently as a reason for government partial support of the system. The formulation of a "pure" program for the satisfaction of collective wants is based on the political process, including the budgeting function.
Not only is it necessary for "government" to determine how the program is to be financed and administered, but it is also charged with the responsibility of determining "optimum," in the sense of outlining the need for that particular service. As will be seen later in this study, the formulation of such a program in a democratic system is made complex because of the problem of interpreting the preferences of voters and of determining the amount of authority delegated to elected representatives by the electorate. Yet another complication is added when the program for the satisfaction of collective wants is administered through the medium of a system which also satisfies user wants, as is the case in the feeder system, assuming that this industry is also designed to satisfy collective wants. The problem then becomes one of interpreting both market and ballot expressions of preference in the development of the system. Reference will be made again to this problem later in this chapter.

**Government Interference with Market Processes**

*Laissez-faire economics, as espoused by Adam Smith and other writers of the classical tradition, divided the economic system into two sectors, namely, the one consisting of the category in which private enterprise should be permitted to function without restraint, and the other*
comprising the "extreme cases" in which the state should be permitted to interfere, such as in the cases of defense protection, administration of justice, and the provision of "public institutions" and "public works," or in those involving the care of persons who were incapable of "judging or acting" for themselves, such as insane persons. The first category was by far the most important one, and its significance was indicated by the strong emphasis which the classical school placed on the market as the ideal regulator of economic affairs.

This belief in the efficiency of competition was perpetuated by the general equilibrium theorists, especially Pareto. Assuming "(1) perfect competition on both sides of every market, and (2) perfect divisibility of all resources and products," this school formulated the conclusion that the market led to a situation of economic optimum provided that every economic influence of one person's behavior on another person's well-being was transmitted through its

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24Ibid., p. 669.

25Ibid., p. 681.

impact on market prices. But, this school came to the important conclusion that whenever there was interdependence among the members of the economy, the market alone did not lead to an economic optimum, and such interdependence became the "cause for conflict between private profit and social benefit."²⁷

Pigou was considering essentially the same matter when he stated that the central problem of economic policy in an effectively competitive economy is to eliminate divergences between marginal private and marginal social products. He defined marginal private net product as

...that part of the total net product of physical things or objective services due to the marginal increment of resources in any given use or place which accrues to the person responsible for investing resources there.

On the other hand, marginal social net product was defined as

...the total net product of physical things or objective services due to the marginal increment of resources in any given use or place, no matter to whom any part of this product may accrue.²⁸

Baumol stated his objection to the competitive norm, and thus made his case for government interference, in a

²⁷Scitovsky, op. cit., pp. 143, 144.

different manner. Because of the "interrelation of consumer demands" and the "existence of group or social wants which can only be satisfied at the same time," the presence of unrestricted consumer freedom, or conversely, the "absence of coercion," may result in a vitiation of consumer sovereignty, since the individual consumer is in no position by himself to obtain the object he desires. "Here it might be more correct to insist that the consumer is sovereign when he is subject to this sort of coercion rather than when his freedom is completely unrestricted."

Not only does Baumol furnish a rationale for government intervention, but he also provides a standard which may be used in the formulation of governmental taxation-subsidy programs. In this respect,

...if the attainment of the item desired is worth more to him than the contribution which would be required of him in a coercive arrangement, it may well pay every member of the community to subject himself to a coercive arrangement whereby his own and everyone else's contribution is enforced.29

As will be seen later in this chapter, an application of reasoning such as that involved in the foregoing statement might be used to justify government programs of taxation and subsidy in cases involving both the satisfaction of group wants under conditions which develop external

economies of consumption and the satisfaction of collective wants under programs designed specifically for that purpose.

The preceding material has been designed to indicate the theoretical reasons generally advanced for interference with the market processes. One of the most important of these, as has been indicated, is that those results which obtain from unrestricted individual freedom and unhampered operation of the market are not the results which would be necessary to attain an optimum for the economy taken collectively. In fine, there are differences between private and social products. While numerous reasons may be advanced for these divergences, this paper will concentrate on two broad categories, namely, the case of group wants under conditions in which there are external economies of consumption and the case of programs constructed for the purpose of satisfying collective wants. For each of these cases, with special reference to the feeder system, there will be a consideration of the conditions necessary for the attainment of optimum and of the implications of those cases insofar as the design of a program of taxation and subsidy is concerned.

Construction of an Analytical Framework for the Conduct of a Costs-Benefits Analysis

In the conduct of this study, as has been indicated earlier, recourse will be had to the theories of welfare economics for the purpose of treating allocative questions
which can not be handled by the market alone. Clearly, it would be impossible in this type of study to conduct an excursion into the many subtleties of welfare theory. Instead, it will be possible to consider only the contribution made by this branch of economics to the conduct of a study of this type and to indicate how these contributions are to be utilized in this study. Such will be the purpose of this and the succeeding sections of this chapter. For the purposes of this and the following sections, it will be helpful to maintain a not too rigorous distinction between the so-called "old" and "new" schools of welfare economics.

**Contributions of the Old School of Welfare Economics**

*Interpersonal comparisons of utility.*—One of the most thorny problems of welfare economics has been that of how to judge the welfare effects of economic reorganizations. This problem is not so complex when, on the positive side, they make everybody better off, or they make somebody better off and leave everybody else unaffected; and, on the negative side, they make everybody worse off, or they make somebody worse off and leave everybody else unaffected. It is complex, however, when the reorganization in question increases the satisfaction of some people and, at the same time, decreases the satisfaction of others.
The core of the problem has been that of comparing the satisfaction of one person with that of another. The old school, particularly Pigou, assumed that interpersonal comparisons of utility could be made. Such an assumption is based, implicitly at least, on the premises that utility is a quantifiable concept and that it can be represented by cardinal numbers, a measurement which involves the specification of "utility units." In contrast, the ordinal measurement of utility, which is espoused by the new school, only requires that an individual either prefers one combination of commodities to another or that he is indifferent between the two combinations. In judging the effects of an economic reorganization on an individual, assuming that his position does change as a result of such a reorganization, it is only possible to state that he is "better off" or "worse off," but it is not possible to measure the exact magnitude of such a change.

**Summation principle.** Since it was assumed that interpersonal comparisons of utility could be made on the basis of a cardinal measurement of utility, it was possible to measure the welfare of the economy as a whole by the process of summing the welfare figures of all individuals.

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in the economy. Likewise, it was possible to determine the net effect of an economic reorganization by making an algebraic summation of total welfare before and after the making of such a reorganization. In such a calculation, the presence of a larger total of utility after a reorganization than that which was present before such a reorganization would indicate that the reorganization had increased aggregate welfare. Such a summation test might be considered as an alternative to the test based purely on the making of interpersonal utility comparisons. It may be seen, then, that on the basis of the use of interpersonal comparisons of utility and the summation principle, it was possible to determine the net effects of an economic reorganization and from that determination to arrive at conclusions as to whether the economy was at an optimum. In this respect, whenever an economic reorganization would not increase total welfare, it could be said that the economy was at an optimum.

Consumers' surplus. Another important concept introduced by the old school of welfare economics was that of consumers' surplus. The origin of this concept may be traced to the writings of Marshall. He defined it in one place as "the excess of the price which he [the consumer] would be willing to pay rather than go without the thing
over that which he actually does pay..." In another place he defined it as the benefit a consumer would lose

...if his surroundings were so altered as to pre­
vent him from obtaining any supplies of that com­
modity and to compel him to divert the means which
he spends on that to other commodities [one of
which might be increased leisure] of which at
present he does not care to have further supplies
at their respective prices.33

In his consideration of the surpluses, Marshall was con­
cerned with "chunks of economic welfare." On the other
hand, Pigou concluded that any type of measure which used
the surpluses was not admissible, even in his analysis of
"lumpy investments," where, "by the very nature of the
subject the surplus analysis would have been much more
effective."34

The interpretation to be given to consumers' sur­
plus in this study is that it represents an amount of
surplus to each consumer for whom it has accumulated, ex­
cluding, of course, the marginal consumer, which amount he
would be willing to give up, if necessary, to obtain the
product in question. As Myint points out, Marshall's
consumers' surplus could be in the nature of either "abso­
lute" or "relative" magnitudes. Thus, if "the benefit

32Alfred Marshall, Principles of Economics, Eighth
33Ibid., p. 830.
34Myint, op. cit., p. 177.
accrues from a given institutional framework, as it stands, the surpluses would be in the nature of absolute magnitude." On the other hand, if it were being used to determine the "loss or gain experienced by the individual due to a movement from one price-quantity situation to another, it would constitute a relative magnitude." The latter type of magnitude will be most useful in this study as a partial indicator of whether the feeder system, as it now stands, is contributing the maximum amount to the welfare of the country. If consumers' surplus can be created by an economic reorganization in sufficient amounts to compensate those who lose from the reorganization, the feeder system is not at an optimum. An application of this concept may also be made in the determination of whether a contemplated new investment would enhance welfare. In this type of situation and considering only consumers' surplus, it may be concluded that when the user beneficiaries, including those who accumulate consumers' surplus, of this contemplated service would be able to compensate the losers, the new investment could be justified. As will be pointed out in the next section of this chapter, the usefulness of these types of data is

greatly enhanced by the utilization of the compensation principle. 36

Producers' surplus will not be discussed explicitly in this paper, but it is possible to treat it theoretically and methodologically with the same tools of analysis that will be utilized in the consideration of consumers' surplus.

Contributions of the New School of Welfare Economics

Inadmissability of interpersonal utility comparisons. - One of the most succinct statements of many of the distinguishing characteristics of the new welfare economics may be found in Little. It seems worthwhile to quote directly this material and then to comment on it.

The New Welfare Economics is new in that it claims to have established the 'optimum' conditions of production and exchange without adding the 'utilities' of different persons. In this respect it has broken with the utilitarian tradition in economics. 37

In effect, then, it rejected the possibility of making interpersonal comparisons of utility and cardinal measurement of

36 For a more comprehensive treatment of the consumers' surplus concept, see two articles by J. R. Hicks, one of which is "Rehabilitation of Consumers' Surplus" in the Review of Economic Studies, Vol. 8, 1941, pp. 108-115, and the other which is "The Four Consumer's Surpluses" in the Review of Economic Studies, Vol. 11-12, 1943-1945, pp. 31-41.

37 Little, op. cit., p. 86.
utility and, instead, relied upon the use of ordinal measures of utility which would indicate whether an economic reorganization would result in a new position which was "better or worse" than the former position, but which would not indicate the amount of "goodness" or "badness" of the change.

Statement of optimum.- This section will consider briefly some of the definitions of the position of optimum.

The founder of the New Welfare Economics was Pareto, who not only used the concept of ordinal preference, but also defined, for a society, an 'optimum' position which was independent of any necessity for adding satisfactions, or comparing the satisfactions of different individuals. An 'optimum' position was one in which it was impossible to put any individual 'on a higher indifference curve' ... without causing someone to drop to a lower one. It must be emphasized at once that there are an infinite number of such 'optima,' and that only 'the optima' (the best of these 'optima') is necessarily better than any other position.  

The existence of an "infinite number of optima" may be attributed to the fact that Pareto did not make a separation of the problems of allocation from those of distribution. As will be pointed out later in this section, the introduction of the compensation principle by Kaldor provided a tool which could be used to determine the efficiency of an economic reorganization from the standpoint of its contribution to allocative efficiency alone, without the necessity of involving the welfare theorist in the problem of 

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38 Ibid.
distributive efficiency. In this paper, the theoretical possibility of making such a separation will be assumed, though there will be no attempt to prove its theoretical validity.

The nature of the optimum position as far as the new welfare school was concerned has been indicated by Little. Reder has stated that the

...welfare of the community is said to be a maximum if its productive resources are utilized in such a way that it is impossible to make any one person more satisfied (put on a higher indifference surface) without making at least one other person less satisfied (put on a lower indifference surface).

He further comments that as he has defined it, "welfare can be increased only when (at least) one person is made more satisfied without making anyone else less satisfied."

Reasoning that there are few economic policies which do not involve injury to someone, he concluded that welfare economics would be "quite sterile," if the welfare criterion were applicable only to the few policies that harm no one.39

The compensation principle.- It is not necessary, however, according to the new school, to confine the application to that small number of economic reorganizations which do not inflict injury upon someone. Thus, much as

39Reder, op. cit., pp. 15, 16.
the old school relied upon the use of interpersonal comparisons of utility, the new school utilizes the compensation principle which is based on the concept of a "compensating tax (bounty)." With the use of this concept, it is possible to determine how an economic reorganization will affect the welfare of the community, and also to indicate whether or not the economy is at an optimum, since, when it is possible to increase welfare by this measure, the maximum position has not been reached. The gist of the use of the compensation principle as an indication of the effects of an economic reorganization upon the welfare of the economy is that

...if the state could collect enough revenue from those who benefited by a reorganization (without making any of them worse off than they would have been had the reorganization not occurred) to compensate fully those harmed by the reorganization (leave them as well off as they would have been in the absence of the reorganization) and return a surplus, it could, by distributing the surplus, increase welfare.

In more precise terminology, the compensation principle states that

...welfare will be increased, decreased, or left unchanged by a given economic reorganization depending upon whether the algebraic sum of all compensating taxes and bounties is positive, negative, or zero.\textsuperscript{41}

\textsuperscript{40}Ibid.

\textsuperscript{41}Ibid., pp. 16, 17.
As Kaldor points out, the use of this principle...simply amounts to saying that there is no interpersonal comparison of satisfaction involved in judging any policy designed to increase the sum total of wealth just because any such policy could be carried out in a way as to secure unanimous consent.42

The compensation principle has been attacked by certain writers, particularly on the grounds that it does not permit the judging of policies involving a redistribution of income. In this sense, Reder concludes that...a given reorganization might satisfy the compensation principle without increasing welfare; that is, the reorganization, coupled with the application of the compensation principle, would increase welfare; but without the application of this principle, it would merely benefit some persons at the expense of others. If some persons are made more satisfied, but others less, by a given reorganization, then that reorganization cannot be judged by the welfare criterion....But, it might be that if the compensation principle were applied, the given reorganization would [or would not] increase welfare; but it does not follow that without compensation the reorganization will [or will not] increase welfare.43

In reply to criticisms such as these, Kaldor stated that he was cognizant of the fact that he had concentrated on

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42Nicholas Kaldor, "Welfare Propositions of Economics and Interpersonal Comparisons of Utility," Economic Journal, Vol. XLIX, 1939, p. 551. It should be pointed out that this article contains a thorough discussion of the compensation principle in the words of its originator.

43Reder, op. cit., pp. 17, 18.
problems of production and not on problems of both production and distribution. In his words:

I suggested a test by which these two elements could be separated from each other. The important point surely is that, when the production of wealth goes up, some income distribution could be found which makes some people better off, and no one worse off than before.  

In commenting on the efficiency of the compensation principle, Hicks avers that it furnishes a "perfectly objective test" of productive efficiency.  

In this study, the concept of the compensation principle will be used to separate problems of production from those of distribution, but, more importantly, it will be utilized as a guide in the determination of the wisdom of economic reorganizations and thus of the position of the economy relative to optimum. In this latter usage, in the event that a contemplated economic reorganization would enhance welfare by "passing" the compensation test, it may be said that the economy is not at optimum.

External economies of consumption.- Both the old and the new schools of welfare economics considered the matter of external economies and diseconomies of production, but it has been pointed out that

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45 Hicks, "Rehabilitation of Consumers' Surplus," op. cit., p. 111.
...definitions of external economies are few and satisfactory. It is agreed that they mean services (and disservices) rendered free (without compensation) by one producer to another; but there is no agreement on the nature and form of these services or on the reasons for their being free. It is also agreed that external economies are a cause for divergences between private profit and social benefit and thus for the failure of perfect competition to lead to an optimum situation.46

The same generalizations could be used to refer to external economies and diseconomies of consumption. In fact, much less treatment in the literature has been given to the concept of external economies of consumption, though it seems to be deserving of more thorough consideration. In this respect, Baumol concludes that unless it is possible to "estimate the magnitude and effects of the external economies," or unless it is possible to show "that they are negligible," it is not possible to say anything at all in the sense of formulating conclusions in welfare economics. Later, he continues that "the fact that categories like 'external economies' and 'external diseconomies' remain largely empty economic boxes prevents any further application of welfare theory as it now stands."

As a final windup to his indictment of welfare theorists who neglect external economies, he states that if the subject of welfare theory "is to achieve primary importance for practical men," the question of whether there is "any

46 Scitovsky, op. cit., p. 143.
hope of further progress based on empirical investigations and analysis of the problem of the interdependence of activities of economic units" must be answered.  

Reder discussed essentially the same thing under the heading of "external repercussions of consumption." Pointing out that cases of "external repercussions of production" are the ones which are usually considered and that "external repercussions of consumption" are "rarely, if ever, recognized in discussions of welfare economics," he points out that the case occurs "where the utility function of one individual contains, as variables, the quantities of goods consumed by other persons." The presence of this type of interdependence is in contrast to the assumptions customarily made in economic theory to the effect that the "level of satisfaction attained by an individual depends solely upon the goods and services that he consumes and not upon those consumed by anyone else." This assumption, as Reder points out, is, in many instances, "obviously contrary to fact."  

It is hoped that one of the principal contributions of this study will be the development of information relative to the existence and magnitude of external economies

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\[47\] Baumol, *op. cit.*, pp. 165-167.

\[48\] Reder, *op. cit.*, pp. 64, 65.
of consumption in the feeder system and the determination of the implications thereof with respect to the formulation of public policy for the feeder industry. In particular, a consideration will be made of whether, in the provision of user benefits, the feeder system provides indirect benefits in the form of external economies of consumption. After the results of this consideration have been obtained, it will be possible, within the framework of welfare economics, to draw conclusions relative to the type of budget program which should be pursued in the financing of the feeder system with its subsidy requirements.

Though the major part of this consideration will deal with the existence of positive external economies of consumption, it should also be pointed out that external diseconomies of consumption may exist, at least in theory. In this paper, such diseconomies will be treated as "negative economies." Thus the term "external economies" will represent a "net" figure after external diseconomies have been deducted. In another sense, it might be said that external diseconomies represent losses which would have to be compensated by the gainers before the welfare implications of an economic reorganization could be

determined. Finally, though explicit consideration will not be given to external economies and diseconomies of production, it might be pointed out that they may be treated in the same manner theoretically that their consumption counterparts will be handled in this paper.

Characteristics of the Framework for the Conduct of a Costs-benefits Analysis

Separation of problems of allocation and distribution. - As has been intimated at earlier points in this chapter, the general conduct of this study will concern itself primarily with problems of allocation, or with the attainment of maximum efficiency in resource application, and will be concerned only incidentally with distributional problems. Thus, the problems of allocation will be separated from those of distribution. One of the earliest economists to give explicit consideration to this type of divorcement was Sidgwick, who discussed the "methodological gap which separates considerations concerning the ideal production from those concerning the ideal distribution of wealth." Not only did Kaldor, of the new welfare school, make a distinction between problems of production and those of distribution, but he also "suggested a test by which these two elements could be separated from each other." The test referred to was

50Myint, op. cit., p. 128.
the use of the compensation principle. In this study, then, the primary concern will be with the attainment of an allocative optimum. Though distributional problems will not be considered explicitly, it will be maintained that such matters can be handled through the development of the appropriate types of revenue-expenditure programs.

Conditions of optimum.- For the purposes of this study, it will be explicitly assumed that the desideratum for the conduct of operations of the feeder system is the attainment of an allocative optimum. Such an optimum may be defined as "a state of affairs starting from which it is not possible to make any single individual better off while leaving other individuals as well off as before." Optimum, then, has been reached when no allocative reorganization would increase welfare. On the other hand, when any given reorganization would increase welfare, it may be said that the system is not at a position of optimum and that the pursuit of certain maximizing courses of action would enhance welfare.

Generally, two avenues of approach to optimum will be considered. One of these will be the marginal approach


52 Myint, op. cit., p. 157. In addition, see Reder, op. cit., pp. 14, 15, for a very similar conceptualization of optimum.
which starts from a given amount of fixed investment and concerns itself with the problem of producing the "right" quantities of commodities within this framework. The other type of analysis, the total analysis, or "the surplus analysis,"\(^5\) as Myint terms it, permits the determination of whether the framework of fixed investment itself is the "right" one and whether an improvement in it would be possible through the increase or reduction of such fixed investment.

**Framework for consideration of factors necessary to determine the position of the economy relative to optimum.**—In the remainder of this section, the writer will construct a framework for the simultaneous consideration of all the magnitudes encountered in the making of a costs-benefits type study of the feeder system. Were the market structure possessive of all the characteristics necessary for the meeting of all the marginal conditions and thus for the attainment of optimum, then market measures would suffice for the conduct of this study. As it is, however, it seems that the market does not satisfy all the conditions necessary for the attainment of such an optimum, and thus it is necessary to rely

\(^5\)Ibid., p. 172. This particular term is used by Myint in referring to methods of determining whether new commodities should be introduced or suppressed, but it seems to apply as well theoretically to the treatment of changes in fixed investment.
upon the use of appropriate principles and guides taken from the literatures of welfare economies. The application of this framework will be made in Chapter VIII, after all relevant benefit and cost data have been introduced and discussed in the chapters intervening between the second and the eighth, to determine whether or not the feeder system, as it now stands, is making its maximum contribution to welfare. If it is not, the insights gained from the conduct of the study will be used for the purposes of making recommendations in Chapter XI for the making of the types of policy changes which would have the effect of enhancing the contributive value of the feeder system to the economy.

An initial step in the construction of the framework is the distinguishing of five hypothetical cases into which the feeder system might fit, such five cases being developed before the feeder system as it actually exists, relative to conformance to one or more of these five situations, is examined. Since different sets of analytical tools are required for different sets of market conditions, distinctions are made in the interests of simplifying the framework for the purpose of being able to draw more pointed conclusions as to what welfare tests are applicable, as to whether or not optimum is being achieved, as to what types of policy would be likely to result in the attainment of a maximum position, and as to the permissible scope of
government interference with the market in the interests of achieving optimum.

These cases are based upon the presence or absence of perfectly divisible factors, external economies of consumption, governmental programs designed for the satisfaction of collective wants, and non-user support of the system [subsidy]. In the absence of the first and in the presence of the last three, market measures alone are not deemed sufficient to determine whether the economy is at optimum. In such cases, the magnitudes and the effect of the existence, or non-existence, of these four factors must be considered. That, in large part, is the purpose of Chapters V, VI, and VII. Then, in Chapter VIII, they must be related to the market measures, developed in Chapters IV and VII, such comparison being based upon the tools developed in this framework.

The guides of welfare economics which will be utilized in this study include the alternatives of utilizing either interpersonal comparisons or utility, as a cardinalist measure, on the compensation principle, as an ordinalist measure, to determine whether an economic reorganization would increase welfare. If it would, then the system is not at an allocative optimum. Another method to be used in determining whether the system is at optimum is that of comparing the change in total benefits, including consumers' surplus and indirect [non-user]
benefits, which would result from a reorganization with the change in total costs, including subsidy, which would be incurred in such a reorganization. Whenever the change in total benefits would exceed the change in total costs from such a reorganization and the reorganization would thus enhance allocative efficiency, the system is not at an optimum. On the other hand, whenever the change in total benefits would not exceed the change in total costs, such a reorganization would not increase efficiency, indicating that the system is at optimum. Under this method, the consumers' surplus concept will be used to indicate the gain accruing to users from the reorganization. In similar manner, the measure of indirect benefits will be used to indicate the gains accruing to non-users from the reorganization, as when the feeder system provides external economies of consumption or satisfies collective wants. The subsidy measure is considered because it represents the non-user contributions made for the support of the system.

The remaining part of this section will consider the nature of the five cases in which the feeder system might fit and the implications, especially for government policy-making, of its falling into any one of these categories.
Case A. In Case A, let it be assumed that there are no external economies of consumption, that there is no government program designed to satisfy collective wants, and that the factors of production are perfectly divisible. In a case such as this, within a framework of perfect competition, the operation of the market alone leads to the satisfaction of the conditions necessary for the attainment of an allocative optimum. Under these conditions, the pricing formula for the attainment of such efficiency would be one of equating marginal costs and price. In a situation such as this, there would be no requirement for the government to intervene in the interest of attaining an allocative optimum. On the other hand, if the distribution of income were not "correct," then government revenue-expenditure programs might be designed to bring about the distributional optimum.

Case B. For Case B, it may be assumed that there are no external economies of consumption and no programs for the satisfaction of collective wants, but that there are factor indivisibilities. When there are indivisible factors of production, perfect competition is unattainable and thus the market alone can not serve as a guide.

to optimum, since it will not meet all the marginal conditions. In this type of situation, the existence of indivisible factors will mean, at least at times, that there will be unutilized capacity, particularly under an arrangement of average-cost pricing. Since industries so characterized may be decreasing-cost industries, it may be possible to enhance welfare by the equation, as in Case A, of marginal cost and price. The pursuit of marginal-cost pricing, though, within a decreasing-cost framework and as long as there is unutilized capacity, will lead to a situation in which average costs will be greater than marginal costs and deficits will be incurred. In such cases, it is necessary to apply the welfare tests to determine whether the system is at an optimum. The existence of conditions such as these under which welfare can be increased by marginal-cost pricing but only with the incurrence of deficits will necessitate the intervention of the government and the institution of a program of taxes and subsidies to achieve optimum.

Case C. Case C is one in which there are external economies of consumption and user revenues equal user costs [no subsidy requirement]. It is generally agreed that the market breaks down as a satisfier of the conditions of allocative optimum when external economies of

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55Reder, op. cit., pp. 45, 46.
consumption exist. As in Case B, the same general guides may be used to determine whether optimum is being attained by the system. In this case, when the system is at optimum, the argument will be made that non-user benefits can be treated as "free" additions to welfare and that non-user sharing of user costs is a distributional problem, since there is no subsidy. Thus, no non-user support is required to operate the system, but equity considerations might make it necessary that indirect beneficiaries help support the operations of the feeder system, though not as a condition for the attainment of allocative optimum. If, however, the system is not at optimum and subsidy is required for its attainment, a case may be made for the institution of a system of taxes and subsidy [non-user support] to aid in the attainment of optimum, such non-user support being furnished by those who accumulate consumers' surplus and by the indirect beneficiaries.

Case D. Case D is similar to Case C in that there are external economies of consumption, but in this case, user revenues are less than user costs and subsidy is required even before the application of the welfare tests. An application of the welfare tests must be made to determine the position of the system relative to optimum. When the system is not at optimum, an argument can be made for

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56Scitovsky, op. cit., p. 144.
non-user support of the system, such support being supplied by those who accumulate consumers' surplus and reap indirect benefits in the form of external economies of consumption, on the grounds that such an arrangement will contribute to the attainment of allocative optimum.

Case E. Case E is one in which there are government programs designed to satisfy collective wants. Cases such as these involve interference with the market, since it is unlikely that a given system will furnish as "by-products" the exact quantity and quality of service necessary to satisfy the collective wants in question. Even if it did, a case might be made for government interference, particularly on distributional [equity] grounds.

One of the major problems in the administration of programs such as these is the determination of the amounts and types of service, as in the case of national-defense protection, which are necessary to satisfy the collective wants. Theoretically, it would be possible for a non-political committee of experts to construct a "correct" program for the purpose of satisfying collective wants, as in the case of a plan for national-defense protection. In a system, however, which is based largely upon the right of individualistic self-determination, either through the market or through the voting mechanism, it is necessary to resort to either a market or a political process, or both, for the purpose of translating individual preferences,
If they are to continue to count in these specific areas, into concrete plans of action in terms of formulation, administration, and financing of such programs. The conduct of all of the processes necessary for the development of a program for the satisfaction of collective wants might be construed as an extension of the ballot expression of consumer preferences, if a liberal interpretation of the scope of authority given by the electorate to its representatives is assumed.

In the case of collective want satisfaction as applied to the feeder industry, both the market and the voting processes express consumer preference, as opposed to a system of pure governmental provision of such services, as in the case of the purchase of a battleship for national-defense purposes, in which situation only the political process registers consumer preference. This statement is true if the feeder system is designed to satisfy collective wants, while at the same time it is furnishing user benefits through its conduct of normal market-oriented operations. In this case, optimum is a rather evasive thing, its definition depending ultimately upon an almost mystic envisionment of the type of system which would meet the needs of both the users and the non-users, the latter type of needs being based on what "government" deemed necessary either to satisfy the
electorate or to develop an adequate program to satisfy collective wants, with the resulting programs being identical in those cases in which "government" interpretation of what the electorate "demanded" would result in the same type of system as that which would be forthcoming from a determination process based solely on what "government" considered was necessary as an adequate program to satisfy the collective wants in question.

In this case, it will be assumed that optimum continues to depend upon the existence of "a state of affairs starting from which it is not possible to make any single individual better off while leaving other individuals as well off as before." Implicit in this assumption is one to the effect that the government officials charged with the formulation of a program for the satisfaction of collective wants have on the drawing board a representation of the type of system necessary to attain such an optimum for both users and non-users. In fine, this is to say that optimum is definable. At this point, the welfare tests must be utilized to determine where the system stands relative to optimum. In these collective-want satisfaction cases, a very strong argument can be made for the provision of non-user support on the basis of the possibility of

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57 Refer to footnote 52.
relating such support to the indirect benefits received from the collective-want-satisfaction program.

Alternative Methods of Apportioning Total Costs to Non-user Beneficiaries

Nature of the Alternatives

As was indicated in the section of Chapter I relative to the scope of this study, there is no intent to conduct a detailed inquiry into the appropriate theory of taxation to be pursued in the financing of the operations of the feeder system by non-users. In the interest, however, of making this study more comprehensive, there will be a consideration of the two most important principles for the apportionment of governmental burdens, an expression of logical preference for one of these theories, and an examination of the rationale for the selection of this particular principle for the conduct of a study of this type.

The two theories referred to are the one based on ability-to-pay and the other on benefits received. According to the former theory, tax rates should be related to some indicator[s], such as property, wealth, or net income, of the ability of the contributor to pay the tax.\(^{58}\)

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Under the benefit theory, the contribution should be in accordance with the benefits received by the contributors from the expenditure of the tax revenues.59

The main distinction between these two principles rests on

...different views of the very nature of the public revenue-expenditure process. In the benefit approach, the relation of taxpayer and government is seen...in quid pro quo terms. Since the relation is one of exchange, the rules of the public household are taken to be more or less the same as those of the market. In the ability-to-pay approach, the proper contribution to public services is treated as an independent problem, quite separate from that of benefits received. Taxes are seen as compulsory payments, and the revenue-expenditure process is viewed as a planning problem not subject to solution by the automatic functioning of the market.60

In the treatment of problems of allocation in this study, it will be maintained that the benefit approach has the greatest applicability. At the same time, it will be held that the problems of distribution, or equity, can be handled most efficiently through separate revenue-expenditure programs.

Rationale for Selection of the Benefit Approach

As has been mentioned previously in this chapter, in the conduct of this study there will be a methodological

59Ibid., pp. 15, 16.

separation of the problems of allocation from those of distribution and a concentration on the problems of allocation. In view of this separation, it will be maintained that the benefit approach is the most appropriate one to be used in the treatment of allocative problems. As Musgrave points out, the benefit approach, "by its very nature, cannot solve the problem" of distribution, but it has a big advantage, in dealing with problems of allocation, of "tying the choice of public services to the preferences of the individual members of the community." Wicksell, in explaining his preference for the benefit approach, states that not only is it more suited to economic analysis, but it is also indicative of the spirit of modern democratic society. At the same time, Wicksell holds that budget determination is a political and not a market process. In this respect, political action is needed to translate individual preferences for social wants into a specific budget program. Since, however, the responsible organs of government in a democratic society are the electorate and their representatives, budget determination by these responsible organs is determination through the democratic

61Ibid., p. 62.
62Ibid., p. 71.
process, even if allowance is made for the role of execu-
tive leadership.  According to Musgrave, this satisfac-
tion of public wants on the basis of the preference of
individual consumers or voters is the essence of the benefit
approach.  

In the handling of collective wants, the problem is
made more complex by virtue of the difficulty of inducing
people to reveal their individual preferences. It seems,
however, that this problem can be handled by the design of
a voting process or group decision-making machinery that
offers the "best approximation to the solution (or one of
the solutions) that would be chosen if true preferences
were known." Again, a political process is substituted
for the market mechanism, and individuals must be required
to adhere to the group decision. This political process of
satisfying collective wants, characterized as it is by
equal "consumption" of services by all, will not lead to
a single most efficient solution. Thus, the use of the
voting process offers a means by which individuals can be
forced to reveal their preferences, but the budget which
results from this process will not satisfy everyone,

63 Ibid., p. 87.
64 Ibid., p. 86.
65 Ibid., pp. 11, 12.
except in Wicksell's "unusual case of unanimous consent." It has been pointed out that the ability-to-pay approach "collapses completely" if one accepts the hypothesis of the new school of welfare economics that interpersonal comparisons of utility are inadmissible. Without commenting on the possibility of making such comparisons, this writer will maintain that the benefit approach is more compatible with the use of the compensation principle. In this respect, when the tax and expenditure sides of the budget are determined jointly, it is possible to tell whether the benefits derived from public services will be worth the losses that result as other wants become unsatisfied. In the same sense, through the use of the compensation principle, it is possible to determine whether the potential gains will exceed the potential losses from any contemplated economic reorganization.

In summary, then, it may be said that in the problems of satisfaction of collective wants, the basic problem, insofar as the apportionment of governmental burdens is concerned, is that the same amounts of services are consumed

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66 Ibid., p. 117.
67 Ibid., p. 63.
68 Ibid., p. 70.
by all with the result that true individual preferences for such wants are not revealed at the market and there is no single optimal solution. Neither the benefit nor the ability-to-pay approach offers a complete solution to this problem. The former has the advantage of "tying the expenditure and tax sides of the budget together and relating both to individual preferences," but it fails in that it provides no way of ascertaining the true benefits. The ability-to-pay theory is less satisfactory, as it gives no "clear-cut principle of tax distribution and fails altogether to answer the problem of expenditure determination." In the end, it is necessary to design a voting mechanism by which individuals may be induced to reveal their preferences and to require a compulsory application of the thus-decided-on budget plan, with the implicit realization that the "necessity for compulsory application of a general tax formula means that the resulting solution will not be optimal."^69

Chapter Summary

This chapter has been developed for the primary purpose of conceptualizing some of the important matters, such as benefits, costs, and subsidy, which will be considered at length in this study. In addition, it has

^69Ibid., pp. 133, 134.
been designed to construct an analytical framework which will permit the comparison of total benefits and total costs, as will be done in Chapter VIII, for the purpose of determining the significance of the feeder system to the economy. In this sense, the crux of the analysis is whether the feeder system is making the maximum contribution to welfare.

In relation to costs, there was a consideration of the alternative cost-price relationships, including average-cost, marginal-cost, and discriminatory pricing, and of the types of situations to which each of these is most ideally suited. "Subsidy" was defined, and its historical significance to the operation of the feeder system was considered briefly. Finally, the nature of the common-cost allocation problem was outlined. It was determined that these costs should be allocated to users only - the Post Office Department and "commerce" - and that a bearing of such costs by any group[s] other than these two would be a problem of equity.

On matters of benefits, it was pointed out that at the same time the feeder system satisfies the wants of the direct consumers of its services, it also may provide indirect benefits to non-use beneficiaries. Two broad categories of non-user benefits were outlined. In the first of these, indirect benefits arose as by-products from the production of market-oriented services.
Thus, the feeder system might afford incidental national-defense protection to the nation. This is the external-economies-of-consumption case. In the second category of non-user benefits, the feeder system provided indirect benefits as a result of deliberate planning. That is to say, it was planned by "government" that the feeder system, at least in part, would furnish benefits which would provide want satisfaction to non-users of the feeder system. Thus, the feeder system might have been deliberately developed, at least partially, for the purpose of providing national-defense protection. In this satisfaction-of-collective-wants case, the indirect benefits accrue not as incidental by-products but as planned increments to collective satisfaction. It will be the purpose of this paper to determine whether the feeder system fits either, or both, of these cases, to analyze the nature and magnitude of benefits derived from these cases, and to consider the implications thereof from the public-policy standpoint. A brief consideration was also given in this chapter to the rationale both for government interference with the market and for non-user support of the feeder system.

In relation to the development of the analytical framework which will be used in Chapter VIII for the comparison of total costs and total benefits, the contributions of the "old" and the "new" schools of welfare economics to the conduct of such an analysis were outlined
and discussed. Of primary significance to this study were the concept of consumers' surplus developed by the former school, the compensation principle elaborated by the latter school, and the external-economies-of-consumption concept, which was considered briefly by both schools. The theoretical framework itself was established by the elaboration of five cases, those five being based on the presence and absence of divisible factors of production, on the presence of external economies of consumption under conditions in which, first, subsidy was required as a prerequisite to the continued operation of the system and, secondly, subsidy was not necessary as a condition of continued operation, and, finally, on the existence of a program designed for collective-want satisfaction. In each case, appropriate welfare tests were outlined by which it will be possible, in Chapter VIII, to determine whether the feeder system, after it has been determined in which of these cases it belongs, is making the maximum contribution to welfare.

Finally, this chapter considered the most important alternative methods - ability-to-pay and benefit - of apportioning governmental burdens. Although this paper will not undertake a resolution of apportionment problems, it will express a preference for the use of the benefit approach for the purpose of distributing a portion of the total costs of operation of the feeder system among
non-user beneficiaries. The use of this principle seems particularly appropriate in the conduct of a study which is based upon the assumed separability of problems of allocation from those of distribution.
CHAPTER III

MARKET STRUCTURE OF THE FEEDER SYSTEM

Introduction

According to Triffin, two purposes of an "industry" grouping are, firstly, to "narrow down the problems of general competitiveness to... more manageable dimensions," and, secondly, to "reduce to a standard and fairly simple pattern the infinite variety of competitive interrelationships." In these respects, the making of an industry classification serves as a methodological tool by which a grouping of "similar" firms can be delineated from the almost infinite number of firms in the economy. Orthodox economic theory has evolved the criteria of number of sellers, type of product, and conditions of entry as the primary factors upon which such a delineation should be made. The end result of this process of categorization is the development of a hypothetical, or real, group of firms about which generalizations can be formulated. Thus, it is possible to characterize in general terms the operating practices and the results thereof of either a small or a large group of "firms."

As has been indicated in Chapter I, this study is restricted in scope to a consideration of the feeder airline section, or industry, of the domestic, scheduled, common-carrier air transportation system. The implicit acknowledgment of the existence of a feeder "industry" was made in Chapter I, though the criteria for the development of such a grouping were not advanced nor was a market-classification label attached to the grouping. The purpose of this chapter is to survey briefly the characteristics of the criteria established by orthodoxy for the classification of markets and to analyze the theoretical equilibrium adjustment for the oligopoly structure, the category into which the feeder system will be placed. Then, by using the orthodox criteria as standards, the oligopoly nature of the feeder system will be explained, and the actual disequilibrium adjustment will be analyzed. To complete the chapter, there will be a consideration of the role of the Civil Aeronautics Board as it affects the structure of the industry and the disequilibrium adjustment through its control of various phases of feeder operations.

**Conceptualization of a "Commodity" and an "Industry"**

A very troublesome impediment to the classification of markets and to the development of price theory has
been the difficulty of elaborating definitions of a "commodity" and of an "industry." The formulation of a definition of the former is quite important, as the essence of the industry-delineation process has been the definition of a commodity, or product.

The classical economists developed price theory upon the basis of a one-commodity world. The industry, then, was coextensive with the commodity. Such a simple definition of a commodity did not persist, however, without arousing doubts as to its adequacy for explaining pricing policy in a market economy in which there was a number of recognizable commodities. Marshall, a neoclassicist, stated that the "question of where the lines of division between different commodities should be drawn must be settled by convenience of the particular discussion." The particular application of this statement was made in relation to an explanation of the effect on demand of price changes when there are substitute products, but a less restrictive application of the statement could probably be made in relation to the definition of a commodity.

2Ibid., pp. 79, 80.
More recent economists have explicitly recognized the non-identical nature of many products and have constructed theories to explain pricing behavior in such markets. Chamberlin developed his theory of monopolistic competition using as the bases for definitions of both commodities and groups the concepts of substitutability and technological similarity.\(^4\) Joan Robinson, in her development of the theory of imperfect competition, used the substitutability criterion. To her, a "commodity is a consumable good, arbitrarily demarcated from other kinds of goods, but which may be regarded for practical purposes as homogeneous within itself" and an "industry is any group of firms producing a single commodity." She continued to the effect that the correspondence of such an industry to a real-world industry is not very close.

But in some cases, where a commodity in the real world is bounded on all sides by a marked gap between itself and its closest substitutes, the real-world commodity will conform to the definition of an industry sufficiently closely to make the discussion of industries in this technical sense of some interest.\(^5\)

Triffin concludes that the definition of a commodity and the delineation of a group are of no value in the general

\(^4\)Triffin, op. cit., pp. 84, 85.

statement of value theory in abstract terms, but that the gains from setting up an industry classification appear most obviously in the conduct of an empirical study, the making of which is aided by reducing to "manageable size the research work involved, without any serious loss in precision or exhaustiveness."  

In the conduct of this study, it will not be necessary to attempt a resolution of this definitional conflict as a prerequisite to a determination of either the type of commodity furnished by the feeder system or of the nature of the industry itself. The commodity in question is a service in the form of air transportation—of people and of property. Though other carriers furnish this commodity besides the feeders, no other carriers furnish it under the same regulatory and spatial conditions as do the feeders. Other carriers do perform short-haul services in geographically limited areas, but no other carriers are designated by a regulatory agency—the Civil Aeronautics Board—as "feeders" nor receive operating rights under conditions similar to those under which the feeders operate. Thus, the commodity and the industry are unmistakably defined by a governmental agency.

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6Triffin, op. cit., p. 88.
Market Classification of the Feeder Industry

This section of Chapter III will consider the nature of the criteria utilized by orthodoxy in the classification of markets and determine the type of classification which is appropriate for the feeder industry, using the above-mentioned criteria as standards for such. Then the theoretical equilibrium adjustment for the industry category into which the feeder system sits will be compared with the actual disequilibrium adjustment for the feeder industry as it now operates.

Number of Sellers

One of the criteria used by orthodoxy in the classification of markets is the number of sellers. The primary significance of the number of sellers relates to the control of the market exercised by any one seller, such control generally being regarded as greatest when the number of sellers is smallest. Theoretically, the number of sellers may range from a pure monopoly structure, characterized by one seller, to a purely competitive structure, characterized by a large number of sellers. Of relevance to this study is an in-between structure with a relatively small number of sellers. This structure is usually designated as an "oligopoly" structure.7 Chamberlin

7Ibid., p. 99.
has referred to the structure as the "small group" case, such a designation having application to a situation in which "any adjustment of prices or of 'product' by a single producer spreads its influence over so many of his competitors that the impact felt by any one" is not negligible.8

In the feeder industry, the number of carriers is thirteen. On theoretical grounds, the seller in an oligopoly structure furnishes a significant enough portion of total industry output to be capable of exercising some control over the market.9 In the feeder industry, though, the ability of any one seller to exercise market control is severely restricted by the economic limitations imposed by the Civil Aeronautics Board. Besides, the presence of such control would not be of practical significance in the intra-industry rivalry sense because the feeders do not compete among themselves as a result of geographical limitations imposed by the Board. The maximizing behavior theoretically attributable to a firm is not so significant in the feeder oligopoly structure, since the feeder carriers do not have sufficient control over the input factors to be able to maximize profits by attempting to equate their marginal costs and marginal revenues.

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Type of Product

A second criterion for the classification of markets used by orthodox economists has been the type of product produced by one seller in relation to the types of products produced by the other sellers in the same industry. The essence of this criterion is whether or not one seller's product is differentiated from those of the other sellers in the industry. Generally, it may be stated that the greater the degree of differentiation, the greater the degree of control exercised by that seller over the market for his product. Thus, as Joan Robinson points out, "in actual markets the customer takes into account a great deal besides the prices at which rival producers offer him their goods." In short, a buyer may not shift from one seller to another seller as soon as price differences appear, because the buyer may have "a number of good reasons for preferring one seller to another."10 In the same vein, Chamberlin comments that a general class of product is differentiated if any significant basis, either real or fancied, exists for distinguishing the goods of one seller from those of another. "Where such differentiation exists, even though it be slight, buyers will be paired with sellers, not by chance and at random (as under pure competition), but according to their preferences."11

10 Robinson, op. cit., p. 89.
11 Chamberlin, op. cit., p. 56.
Product differentiation may take many forms. For example, it may be based upon certain characteristics of the product itself, such as trade marks, peculiarities of the package, or uniqueness in color and design. Such differentiation may also exist with respect to conditions surrounding its sale, such as the convenience of the seller's location, his way of doing business, his reputation for fair dealing, and all the personal links which attach his customers to the seller. Chamberlin concludes that all products are differentiated, at least slightly, and that over a wide range of economic activity differentiation is of "considerable importance."\(^\text{12}\)

The feeder industry is characterized by product differentiation. Possibly the most important element of differentiation is that of location.

The availability of a commodity at one location rather than at another being of consequence to purchasers, we may regard these goods as differentiated spatially and may apply the term 'spatial monopoly' to that control over supply which is a seller's by virtue of his location.\(^\text{13}\)

In this respect, the geographical uniqueness of the route structure constitutes a very important form of differentiation, since there is no overlapping in the authorization of routes by the Board to the feeder carriers. Other

\(^{12}\text{Ibid.}, \text{ pp. 56, 57.}\)

\(^{13}\text{Ibid.}, \text{ pp. 62, 63.}\)
specific types of differentiation arise from such factors as the design and interior luxuriousness of the plane, the quality of the food, the strength of the advertising, and the courtesy of the representatives of the carrier. Yet the real limiting factor is the spatial-monopoly control exercised by a particular feeder. Even though one carrier does have a quality of service which is more attractive to a traveler or a shipper than that of another carrier, this element of differentiation is unimportant if the first carrier does not have a route structure which meets the needs of the would-be traveler or shipper.

The existence of a spatial-monopoly situation in theory would be sufficient to give the possessor some control, possibly considerable, over the market. In this sense, he would not have to share sales because of the presence of another seller. In reality, however, the possibility of exercising a relatively high degree of output-price control is not realized by the spatial monopolist because he is controlled in the establishment of both price and output levels by the action of the Board. Thus, the theoretical advantage of market control usually associated with product differentiation is somewhat offset by the presence of a regulatory agency.
Conditions of Entry

A third standard used by the orthodox economists in the classification of markets is the condition of entry into the market. The dichotomy of entry conditions is structured in terms of "free" or "easy," on the one extreme, and "impeded" or "difficult," on the other. In general terms, the greater the difficulty of entering the industry the more powerful is the control of the market exercised by the existing sellers in the market.

Certain conditions must be met before entry conditions may be termed "easy." The absence of some, or all, of these conditions gives rise to the presence of barriers to entry, the significance of which depends on the number and strength of these entry impediments. A detailed listing of "the full conditions for 'easy' or 'free' entry" has been developed by Bain. They include situations in which:

1) the investment necessary to establish a firm is small enough that many potential entrants can obtain sufficient funds to establish a firm;

2) the increment to industry output resulting from the entry of one additional firm is so small as to have no perceptible effect on industry price, and thus the potential entrant is not deterred by fear of changing the existing price situation;

3) all potential entrants have free access to all resources or factors needed for production, at competitive market prices, since there is no monopolization of resource ownership or control by established firms;
4) there are no other artificial impediments to entry; and

5) new entrants can produce outputs identical to those of established firms.¹⁴

A consideration of these conditions in relation to the feeder industry leads to the conclusion that entry into the industry is difficult. As for condition (1), the necessary investment for feeder operations is not small, primarily as a result of the huge outlays which must be made for the purchase of operating equipment. Criteria (2) and (3) are satisfied by the nature of the market conditions in the feeder industry. In addition, (2) is satisfied by virtue of the regulatory control over price and output exercised by the Board. More important, however, is the failure of the industry to satisfy conditions (4) and (5). In fact, there is an artificial impediment to entry in the form of the Civil Aeronautics Board. This agency has the authority to determine whether a new firm may enter the industry. The actions of the Board may also prevent the satisfaction of condition (5), since this agency's control over routes and types of equipment utilized may prevent the production of outputs by new firms which are identical to those of the existing firms.

¹⁴Bain, op. cit., p. 130.
It may be seen, then, that the existence and actions of the Board may, and do, prevent the satisfaction of those conditions which qualify an industry for the application of the "easy-entry" label. In fact, the number of feeder carriers has declined from fifteen in 1954 to the present thirteen. Even though entry is relatively difficult, existing firms paradoxically do not have substantial control over the market because of the limitations imposed by the Board.

In summary, the feeder market structure is one of oligopoly. The rationale for this classification are the fewness of sellers, the differentiation of product, and the difficulty of entry. It should be realized that the structure of the industry may be attributed largely to the policies of the Board.

Theoretical Oligopoly Equilibrium Adjustment

Having classified the feeder industry as an oligopoly structure, it is now possible to develop the theoretical price-output equilibrium adjustment for this type of market. The framework for this analysis will be supplied by Chamberlin.15 It will be postulated that this oligopoly structure is one with a few sellers, a differentiated product, and relatively difficult entry conditions.

15Chamberlin, op. cit., pp. 100-104.
This type of structure will accommodate itself to any level of positive profits. It will be assumed that the sellers do not explicitly or implicitly agree to combine nor to formulate pricing-output policies in a monopolistic fashion. Such an assumption does not, however, rule out the possibility of recognition by each seller of both the direct effect of his actions upon the other sellers and the indirect effect upon himself of the actions taken by the other sellers as a result of his actions. The nature of the adjustment which takes place will depend on whether it is assumed that any one seller, in the formulation of price-output relationships, takes cognizance of both the direct and the indirect effects of his actions or only of the direct effects.\textsuperscript{16}

As an aid to an understanding of the rest of this section, it will be helpful to consider Figure 1, and the explanatory legend, on the following page. In the first instance, it will be assumed that the seller considers both the direct and the indirect effects of his actions, the only policy which is consistent with the profit-maximizing motive. Under these conditions, the price $BQ$ will be set, this price being the one which will contribute maximum profits to all. Any single seller, by reducing his price, could enlarge his profits, as is indicated by

\textsuperscript{16}Ibid., p. 54.
Figure 1: Theoretical Equilibrium Adjustment in the Oligopoly Market Structure.

DD' "shows the demand for the product of any one seller at various prices on the assumption that his competitors' prices are always identical with his."

dd' indicates "the increased sales which any one producer may enjoy by lowering his price, provided the others hold theirs fast at BQ."

PP' represents the cost curve for "the 'product' of each of the producers."

The dotted line shows the point below which price cuts will not "avoid losses and exactly cover... costs."

the demand curve $dd'$, provided that the others did not follow suit. In the small-group case, however, the losses which would be experienced ultimately as a result of this action would be considerable, with the result that each seller would maintain his price at $BQ$. The attainment, then, of this point of profit maximization for all is not reached as a result of each seller's independent pursuit of the maximization goal.\(^7\)

In the second instance, it will be assumed that the seller neglects his indirect influence upon the price, each seller assuming the other sellers to be unaffected by his own actions. In this respect, the outcome will be different depending upon whether each seller assumes that the policies of the other sellers will remain fixed with respect either to the amount he offers or to the price at which he offers it. If the seller assumes that rivals will maintain amounts offered at a constant level, and thus suffer price changes, a determinate solution may be reached. The price will settle at a determinate point between $BQ$, the monopoly-like solution, and $AR$, the tangency solution. On the other hand, if the seller assumes that rivals will maintain prices at a constant level, thus suffering output changes, the price will drop to $AR$ as a result of undercutting and may, for only two or a very few

\(17\text{Ibid.}, \text{pp. 100, 101.}\)
sellers, oscillate between BQ and AR. The greater the severity and the longer the duration of the price cutting, the more likely it is that the price will drop to the AR point of zero profits.\textsuperscript{18}

In addition to price rivalry, the oligopoly structure is characterized by non-price competition, primarily in terms of product improvement and increases in sales-promotion outlays. Generally, it may be said that there is a

\ldots \text{recognized interdependence of products and of sales-promotion outlays in oligopoly, just as there is of prices. Sellers, therefore, will not necessarily pursue independent product and sales-promotion policies, overlooking induced reactions. The determination of their products and sales-promotion outlays is subject to the same general set of considerations as the determination of their prices and outputs.}\textsuperscript{19}

\textbf{Uncertainty considerations.}— Up to this point, the theory of pricing has been developed in such a way that the degree of determinacy and the position of the equilibrium adjustment have depended on the assumptions made by each seller relative to the conduct of his rivals. In this section, brief consideration will be given to the manner in which the element of uncertainty may arise and becloud the decision-making process.

\textsuperscript{18}\textit{Ibid.}, p. 101.
\textsuperscript{19}\textit{Bain, op. cit.}, p. 309.
One of the main elements of uncertainty appears in regard "to the degree of intelligence and far-sightedness of the competitors." In this respect, any one seller may be cognizant of his total influence upon the price, but he may be uncertain as to how many of his competitors are aware of their total influence upon the price. This being the case, the first seller "will be in doubt as to the effectiveness of his own foresight in maintaining the price, and therefore in doubt as to whether he should lower or maintain it."\(^{20}\)

A second element of uncertainty arises "when numbers are such as to leave doubt in the mind of any one [seller] as to the extent of the incursions which his move will make upon the sales of the others." In this case, it may be assumed that each seller is aware of both his direct and indirect influence upon the price. The range of possible incursions by any one seller upon the sales of the others because of a price cut is relatively great, depending on the number of sellers. If the number of sellers is "fairly small, any one seller can be certain" that his price cuts will induce other sellers to reduce their prices; under these circumstances, no one seller will lower his price. On the other hand, if the number of sellers is "very large, any one seller can be certain"

\(^{20}\)Chamberlin, \textit{op. cit.}, p. 52.
that his incursions will be of such negligible significance to each other seller that no other seller will follow his lead in reducing prices; under these circumstances, every seller will lower his price. It is in between these extremes, however, that a wide range of doubt exists, and within these extremes, the results are "unpredictable." 21

A third element of uncertainty relates to a situation in which "there is 'friction' in the working of the market. It arises with regard to the length of the time lag." In this respect, "the 'immediate' effects of a price cut (i.e., those enjoyed before the rival also cuts)" tend not to be realized immediately; instead, their realization tends to come about only after a delay the length of which depends on the "rapidity with which knowledge of the cut spreads and buyers are brought to alter established relationships." A consideration of this element

...creates uncertainty as to the result of a price cut by one seller, even though his rival were sure to maintain his prices; but especially important is the added uncertainty as to (a) how soon pressure will actually be brought to bear upon the other, by the reduction in his sales, to follow suit, and (b) the degree to which he will anticipate it.

Thus, each competitor is left in doubt, "not as to what his rival will do, but as to when he will do it, which

21Ibid., pp. 52, 53.
suffices, however, to make him uncertain as to what to do in the first place." In this case, no endowment of intel-
ligence "short of omniscience" would be compatible with a
determinate outcome.  

Artificial Equilibrium Adjustment in 
the Feeder Industry

In the oligopoly structure, the theoretical means 
of attaining equilibrium are the changes in the product-
price-output arrangements. In the feeder industry, though, 
the price and the quantity of output units are controlled 
rather rigidly by the Civil Aeronautics Board. This is 
not to say that additional passengers and property may 
not be transported, but it is to say that this transpor-
tation must be provided by the existing units, unless the 
Board approves changes in the number and/or types of such 
units. Within limits imposed by the Board, changes may be 
made in the type of the product, as exemplified by a change 
which results in the acquisition of a large-capacity plane 
to replace one with a smaller amount of capacity, but such 
changes in the product may not be accompanied by changes 
in prices without the Board's approval. It is possible, 
however, that product changes will change either total 
revenues or total costs, or both. In respect, then, to

22 Ibid., p. 53.
product differentiation and the point of profit maximization for the firm, the primary problem of the carrier is to select the type of product which will return the greatest amount of profit [or the least amount of loss] when the price and the number of operating units are "given."

Under these circumstances, the equation of marginal cost and marginal revenue as a maximizing formula is largely replaced by the controls of the Board, which controls do not necessarily result in the achievement of a position of maximum profits or minimum losses. As has been pointed out previously, the actions of other carriers in the industry are inconsequential because each carrier is producing in a geographically distinct market. The guide to the offering of service in terms of number of operating units is supplied by the route and equipment authorizations of the Board. Within the framework of these operating authorizations, it is possible to consider the nature of the disequilibrium adjustment in the feeder industry. Figure 2 on the following page will illustrate the nature of this adjustment.

All carriers collectively furnish OE amounts of service at a break-even cost of EH, but they are able to break even under these conditions only because they receive subsidy, since user revenues at ED are not great enough to cover the total costs [EH] for that level of
Figure 2: Artificial Equilibrium Adjustment in the Feeder Oligopoly Market Structure.

**RR** indicates the average revenues for the feeder carriers taken collectively.

**CC** represents the average costs for the feeder carriers taken collectively.

The use of these types of curves is designed to permit a consideration of the "equilibrium" adjustment for all the feeder carriers taken collectively. In the construction of these curves, there has been a deliberate neglect both of the existence of differentiated products and of the absence of homogeneous production functions among the various carriers.
service. The service-offering and the price are at this level as a result of the controls imposed by the Board. The rectangular area OEHNP represents the total revenues needed by the carriers to break-even at their present level of operations. The smaller rectangle NDHP depicts the amount of subsidy required by the feeders to enable them to break even. Under present regulatory conditions, the Civil Aeronautics Board uses funds provided by Congressional appropriations to supply the amount of revenues needed, as indicated by NDHP, to enable the carriers to meet their break-even needs. The receipt of this subsidy has the effect of increasing total revenues and of shifting the RR' curve upward to the right until it intersects the CC' curve at EH. This externally-supplied revenue "forces" an equilibrium adjustment under which the feeder carriers, as a whole, do not necessarily earn pure profits.

In summary, it may be pointed out that the attainment of equilibrium in the feeder industry depends on the injection of subsidy by the federal government. Under non-subsidy conditions, the individual carriers would, in most cases, show considerable losses. Clearly, the feeder system, as it now stands, could not continue to operate for a very long period of time. It is important to analyze the implications of this set of conditions. In particular, it will be advantageous from the public-policy standpoint to determine what contributions the
feeders are making to the economy to justify the receipt of subsidy payments. It will also be worthwhile to consider the prospects of the feeder carriers for reducing their reliance on subsidy.

Managerial Role of the Civil Aeronautics Board

Economic theory has attached considerable importance to the role played by the entrepreneur in the conduct of economic affairs. Guided primarily by the motive of profit maximization, the entrepreneur has been credited with the making of the initial decision to enter an industry, with the formulation of the initial and all subsequent investment decisions, both as to types and amounts, with the determination of the type[s] and amount of product that are to be offered, and with the development of pricing policy for that product. His decisions were tested in the market. If he had made the "correct" decisions, his firm covered its total costs of operation and possibly earned a pure profit. If he had made "wrong" decisions, his firm incurred losses which necessitated the making of policy adjustments. In certain cases, these policy adjustments did not always improve the firm's position enough to prevent its being a failure.

While the entrepreneurial functions are still being performed in the feeder industry, it should be pointed
out that the power to exercise the major ones is at least partially under the control of the Civil Aeronautics Board. In addition to being an "impartial" regulator of the economic affairs of the feeder carriers, it is more than that, as it substitutes many of its decisions for those of the airline managers. At the same time, the Board, at the behest of Congress, makes annual subsidy payments to the carriers of a magnitude sufficient to enable them to perform the services authorized by the Board. Thus, the feeder carriers, if their managements have been "efficient," do not need to fear the threat of failure. The market alone does not indicate for these carriers the types and amounts of service, and the charges therefor, which are demanded by the public. Instead, these indications are furnished by both the market and the Board.

To complete the analysis of the structure and equilibrium adjustment of the feeder industry, it will be helpful to consider in a general way the manner in which the Board functions in the guiding, and in the actual making, of managerial decisions.

**Entry and Exit Controls**

With respect to conditions of entry, the Board exercises a very significant amount of control. The prospective entrant into the feeder system has not satisfied the most important entry requirement, regardless of
all the other arrangements he has made, until he has obtained a certificate of public convenience and necessity from the Board. In the language of the Civil Aeronautics Act of 1938, "no air carrier shall engage in any air transportation unless there is in force a certificate issued by the Board authorizing such air carrier to engage in such transportation."\(^{23}\) As to the criteria to be observed by Board in the selection of the carrier, the Act states that

\[
...the Board shall issue a certificate authorizing the whole or any part of the transportation covered by the application, if it finds that the applicant is fit, willing, and able to perform such transportation properly, and to conform to the provision of this act and the rules, regulations, and requirements of the Board hereunder, and that such transportation is required by the public convenience and necessity; otherwise, such application shall be denied.\(^{24}\)
\]

The Postmaster General may also provide the impetus for the inauguration or extension of service. Thus,

\[
...whenever...the Postmaster General shall find that the needs of the Postal Service require the transportation of mail by aircraft between any points within the United States...in addition to the transportation of mail authorized in
\]

\(^{23}\)Civil Aeronautics Act, 59, Stat. 977 (1938), Title IV, Section 401(a). It should be pointed out that though this act was repealed by the Federal Aviation Act of 1958, the sections to be cited hereinafter have not been changed. The changes in legislation which are pertinent to this study will be considered in Chapters IX and X.

\(^{24}\)Ibid., Section 401(d) (l).
certificates then currently effective, the Postmaster General shall certify such finding to the Board and file therewith a statement showing such additional service and the facilities necessary in connection therewith....

to the Board, which is to conduct the usual hearing relative to the requirements of public convenience and necessity. If new service is required, it is then to issue a new certificate[s] or amend an existing certificate[s].

Initially, then, it must be shown by a prospective entrant that the "public convenience and necessity" requires the service. Then, the carrier must prove that it is "fit, willing, and able" to perform such service. It may be seen that these stipulations provide the Board with the authority to blockade effectively entry into the feeder system. A negative ruling by the Board in the first instance cited above rules out any new service. Even with an affirmative ruling in the first instance, a negative ruling in the second case will eliminate a particular prospective carrier.

Finally, the Board has the authority to require carriers to modify, suspend, and even abandon routes. In this respect the Act stipulates that

...the Board, upon petition or complaint or upon its own initiative, after notice and hearing, may alter, amend, modify, or suspend any such certificate, in whole or in part, if the public convenience and necessity so require.  

25 Ibid., Section 401(n).  
26 Ibid., Section 401(h).
Finally, the Act states that

...no air carrier shall abandon any route, or part thereof, for which a certificate has been issued by the Board, unless, upon the application of such air carrier, after notice and hearing, the Board shall find such abandonment to be in the public interest.27

Product Differentiation Controls

Not only is the Board authorized to control entry, but also it is given control over the degree of product differentiation. As was indicated earlier, the primary type of product differentiation in the feeder industry is spatial differentiation. Such differentiation is a function of the configuration of the route structure, over which the Board exercises primary control. The present configuration confers monopoly status upon each feeder carrier, insofar as intra-industry rivalry is concerned, because of the absence of overlapping in the route structures of the various carriers. Thus, product differentiation, as a competitive device, is of significance only insofar as inter-industry rivalry is concerned, as between a feeder carrier and a railway carrier.

The Act of 1938 states that

...each certificate issued under this section shall specify the terminal points and intermediate points, if any, between which the air carrier is authorized to engage in air

27Ibid., Section 401(k).
transportation and the service to be rendered; and there shall be attached to the exercise of the privileges granted by the certificate, or amendment thereto, such reasonable terms, conditions, and limitations as the public interest may require.28

A broad interpretation of the last half of this provision would permit the Board to determine, as examples, whether meals could be served on feeder flights, what types of equipment could be used, and when planes could arrive and depart. In the exercise of its authority, the Board has made rulings on such matters as these and has, in this manner, controlled product differentiation. Such changes in product as those just mentioned do not have significant intra-industry effects, because of the non-duplicating nature of the route structure. Thus, through regulation of the type of product, including the route configuration, the Board may directly control both inter-and intra-industry route rivalry and indirectly control the degree of product differentiation of other types, which may be of some significance insofar as inter-industry rivalry is concerned.

**Pricing Controls**

The Civil Aeronautics Act outlines the scope of regulatory power delegated to the Board in matters of

28Ibid., Section 401(f).
determination of rates for property and fares for passengers. If a carrier wishes to modify any rate, fare, or charge, it must give thirty days' notice of the proposed change. "Such notice shall plainly state the change proposed to be made and the time such change will take effect." If, after notice and hearing, either upon complaint or upon its own initiative,

...the Board shall determine any fare or rate for interstate...air transportation, or any rule or practice affecting such fare or rate, to be unjust and unreasonable, or unjustly discriminatory, or unduly preferential, or unduly prejudicial, the Board shall set a new lawful rate (or the maximum or minimum, or the maximum and minimum thereof) or stipulate a new rule or practice....

In the determination of such rates and fares, "...

the Board shall consider, among other factors,

1) the effect of such rates upon the movement of traffic.

2) the need in the public interest of adequate and efficient transportation of persons and property by air carriers at the lowest cost consistent with the furnishing of such service.

3) legal standards of character and quality of air carrier service.

4) the inherent advantages of transportation by aircraft.

5) the need of each air carrier for revenue sufficient to enable the carrier, under honest, economical and efficient management, to provide adequate and efficient air carrier service.

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29Ibid., Section 403(c).
30Ibid., Title X.
31Ibid.
Finally, the Board has the power to "suspend newly filed tariffs for a maximum of 180 days pending a hearing."\footnote{Ibid.}

This recital of the Act does not indicate the actual utilization by the Board of the power delegated to it; such evidence will be presented later in this study. It does indicate, however, the fact that the prerogative of pricing, while devolving to management in theory, may not be of great significance in the feeder industry because of the power of the regulatory agency to determine not only maximum and minimum rates and fares but also the actual rates and fares for the performance of transportation services.

**Investment Controls**

Besides the making of many of the general types of managerial investment decisions that are necessary to enter the feeder industry and to perform the authorized services, the Board also indirectly makes more specific types of investment decisions for the managers of the feeder carriers. That is to say, the Board historically has designated the number and types of equipment units to be used by the feeder carriers. The techniques pursued
to accomplish this result are those of disallowing the expenditures for certain types of equipment to enter the investment base for the purpose of calculating a return on the average recognized investment and of refusing to recognize as authorized expenses those incurred in the maintenance of such aircraft, such as depreciation expenses. Thus, a carrier may purchase and retain new equipment, but only that part of the new equipment which is considered necessary for the performance of authorized service may enter the investment base for rate-making purposes and only those expenses incurred on such equipment are considered as legitimate expenses.

Some of the guides followed by the Board in this respect may be gleaned from a consideration of the following statements taken from an economic hearing before the Board. In effect, the Board declared that every carrier requiring subsidy support must make management decisions only after careful consideration of their effects on subsidy requirements. Airline prestige and competitive advantage must give way to the effect on required subsidy. It stated that such a ruling was necessary "to protect the Federal treasury and to preserve the inherent benefits of a competitive service."33 Needless to say, an observance

of guides such as these often places the Board in a difficult policy-making position when it is required at the same time to "develop" the air transportation system.

To indicate the specific nature of the Board's treatment of investment, two representative cases will be considered. In prescribing air mail rates for North Central Airlines, a feeder carrier, the Board stated that

"...upon examination of the scheduling pattern operated, the equipment, turnaround problems involved, and the maintenance standards required, we find that the recognized volume of mileage could reasonably have been operated with a maximum of seventeen aircraft during the fiscal year ended June 30, 1954. Accordingly, we have disallowed two DC-3 aircraft for this period.

The results of this ruling were the elimination of the depreciation expenses due to the operation of the excess aircraft during the fiscal year and the reduction of air mail pay as a result of the elimination of those costs related to the operation of the additional aircraft not recognized during the fiscal year. In addition, the purchase prices of the excess aircraft were not included in the average recognized investment base, on which the annual return was based."

In a second case, the management of Southwest Airways, another feeder carrier, had acquired some Martin-202 aircraft to be used on part of their routes instead of DC-3 aircraft. The Board pointed out that while it had continuously recognized that encouragement of the development of new types of suitable aircraft for local-service operations is in the interest of the objectives of the act, the underwriting of an increased mail-pay need for the use of Martin-202's would not further such policy.

Thus, any future operations with Martin-202 aircraft, "being a matter of managerial discretion and responsibility, would be undertaken as a risk of management without recourse to additional mail-pay subsidy." Similar cases could be cited to illustrate the fact that the managers of the feeder carriers do not have effective control over many of their investment decisions.

Chapter Summary

Using as a standard for market classification the criteria set forth by the orthodox economists, it has been determined that the feeder industry fits the oligopoly category. The number of sellers is few, thirteen in all; the product is differentiated, primarily because each carrier occupies the position of a spatial monopolist; and

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entry is difficult, the chief entry impediment being the legal limitations imposed by the Civil Aeronautics Act of 1938, as interpreted by the Civil Aeronautics Board, the economic regulatory agency.

The theoretical explanation of the equilibrium adjustment under oligopoly provides for the reaching of an equilibrium which is compatible with a wide range of pure profits. As a result of the pursuit of a pattern of output planning on the part of each seller by which he considers both the direct and the indirect effects of his actions, it is possible for the profits of all sellers to be maximized. If, however, each seller neglects his indirect influence upon the price, prices and profits will be lower, and the determinancy of the adjustment will be dependent upon the assumptions made by each seller about the price and output policies of the other sellers.

In the feeder industry, the amount of service to be performed by each carrier is dependent on the route authorizations of the Board. At any one time, each carrier is confronted with given prices, in the form of approved rates and fares, for the performance of the authorized service. To maximize profits, the individual carrier, within the authorized route configuration and rate structure, must attempt to perform the designated services at the lowest possible costs. Historically, the
adjustment in the feeder industry has been one of an artificial nature, depending on the governmental injection of subsidy revenues into the industry. Such injections tend to increase total revenues by a sufficient amount to force a type of adjustment which is characterized by an equality of total costs and total revenues. The size of the subsidy payments is based upon the need of the carriers for revenues to permit them to perform the authorized services and to attract capital.

Not only does the Board provide subsidy revenues for the conduct of feeder operations but it also makes many of the decisions which directly or indirectly influence the amount of such subsidy. In this respect, the Act empowers the Board both to determine whether the public convenience and necessity requires the performance of additional service and to select the particular carrier for the performance of such service. Thus, the Board controls entry into the industry.

Through its control over both the authorization of routes and the amounts and types of service to be performed over such routes, the Board may stipulate the specific nature of the services that are to be performed by the feeder carriers. Through the exercise of such powers, then, it may determine the type and degree of product differentiation.
Upon complaint or on its own initiative, the Board may investigate the prices [rates and fares] of feeder carriers. Upon finding that such rates are unreasonable or discriminatory, the Board may prescribe maximum and minimum, or even specific, rates and fares. In this manner, the Board may determine the prices to be applicable in the conduct of feeder operations.

In addition to these relatively direct decision-making functions performed by the Board, there are also powers of a more indirect type which are exercised by the same agency. In its conduct of mail-rate hearings, the Board makes rulings which are commentaries on the judgment of management relative to the incurrence of certain expenses and to the making of certain investments, primarily in operating equipment, and which may also be indirect causes of the cessation of those activities which have been deemed "unwise." By disallowing "objectionable" expenses and equipment purchases, the Board eliminates them for rate-making purposes. The managers of the carriers who, in effect, have been reprimanded may continue to incur similar expenses and use disallowed equipment, but they do so without recourse to government funds.
CHAPTER IV

POSTAL AND COMMERCIAL USAGE OF THE FEEDER SYSTEM

Introduction

Once again it might be pointed out that this study is designed to determine as one of its major findings the contribution being made by the feeder system to the economy. These data will aid in the determination of whether the feeder system, as it now stands, is making the maximum contribution to the economy. In the conduct of a study of this nature, especially when the criteria of the market are not sufficient indicators of whether the system is at an optimum, an integral part of the analytical procedure will be the introduction of data relative to the benefits and costs of the operation of the system and the evaluation of these magnitudes within the framework of welfare economics. This chapter will consider the direct benefits received by the users of the feeder system, such users being categorized into the two broad groups of air-mail and "commercial" users. Chapter V will consider the contributions of the feeder system as far as national defense is concerned, and Chapter VI will analyze the requirements, both present and future, of national defense upon the feeder industry. Thus, Chapters IV, V, and VI will consider
the user and non-user contributions being made to the economy by the feeder system, the breakdown of such contributions being structured to conform to the section of the Civil Aeronautics Act which called for the "encouragement and development" of an air transportation system which would meet the "present and future needs of the foreign and domestic commerce of the United States, of the Postal Service, and of the national defense...."^1

By far the greatest amount of utilization of the system is made by that category which will be designated as "commercial" usage, which class of users will be treated as exclusive of the postal and military users. The second most important user category is the postal group. The extent of actual military usage of the feeder system, as will be seen in the next chapter, is virtually nil. Thus, the direct-user benefits being received from the operation of the feeder system are confined almost exclusively to the commercial and postal users.

Based as it is on usage data, this chapter will be largely descriptive and statistical in nature. Specifically, it will consider the facilities presently being made available by the feeder system for the satisfaction of user demands and, more importantly, the extent of the

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^1Civil Aeronautics Act, 59 Stat. 977 (1938), Title I, Section 2.
usage which is being made by the postal and commercial beneficiaries of these facilities. The data developed in this chapter will become an integral part of Chapter VIII, in which all benefits, both direct and indirect, will be related, within the framework of welfare economics, to all the costs of operation of the feeder system for the purpose of determining the significance of this industry to the economy.

Definition of Terms to be Used in Consideration of Availability and Usage of Feeder Facilities

It will be advantageous at this point to define the operational and financial terms which will be utilized in the presentation of the statistical data of this chapter. This terminology will be based upon the definitions used by the Air Transport Association of America in the presentation of data which it has compiled from the reports filed with the Civil Aeronautics Board by the feeder carriers.²

The two terms most frequently used to describe availability of service are available seat-miles and available ton-miles. The former refers to total seat-miles available for sales in scheduled service, whereas the latter pertains to total ton-miles of lift capacity available for

sales in scheduled and charter services. There are several unit measures which are useful in the description of the operations of the feeder carriers. Of these, seat-mile is used to designate one passenger seat, whether it is filled or unfilled, which is flown one mile. The other four unit measures of usage — passenger-mile, express ton-mile, freight ton-mile, and mail ton-mile — are used when referring to the actual movement over a distance of one mile of one passenger, one ton of express, one ton of freight, and one ton of mail, respectively.

In the consideration of revenue received in relation to mileage flown, revenue plane-miles is used to measure the aircraft miles flown in scheduled service. Revenue passenger-miles is the term which is used to indicate the number of fare-paying passengers flown times the length of trip in miles. As such, it describes the amount of the available seat-miles which are sold. Passenger-miles may also be converted into ton-miles. In the making of this calculation, passenger-miles are converted to ton-miles on a ratio of approximately ten to one, which is to say that ten passengers, with the stipulated amount of free baggage, are equivalent to one ton. Finally, revenue ton-miles is used to refer to all ton-miles sold in scheduled and charter service.

As indicators of the actual utilization of available capacity, and thus of the efficiency of utilization,
the passenger load factor and the ton-mile load factor are the two most frequently used measures. The former pertains to the percentage of available seat-miles actually sold in scheduled service, while the latter measures the percentage of available ton-miles sold in scheduled and charter service. Reference again will be made to these terms in Chapters IX and X.

Selected Route Pattern Data

At this point, it will be helpful to consider the general scope of operations of the feeder system in terms of the availability of facilities, the number of cities served, and the size of the population served. The above-mentioned data is presented in Table 1 on page 138. In succeeding sections of this chapter, data will be developed to indicate the availability of feeder facilities and the extent of the usage thereof according to the types of users.

The 247 aircraft operated by the feeder carriers are available for the transportation of both passengers and property, with most of the planes being used in scheduled, common-carrier service. Some, however, also may be utilized for charter operations. These aircraft, along with the ground facilities and personnel, are potentially available for national-defense purposes. The
<table>
<thead>
<tr>
<th>Carrier</th>
<th>Number of Aircraft Operated</th>
<th>Population Served (000)</th>
<th>Number of Cities Served</th>
<th>Number of Cities Served Exclusive</th>
<th>Number of Cities Served % of Total Exclusive</th>
<th>Route Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allegheny</td>
<td>23</td>
<td>18,041.3</td>
<td>55</td>
<td>24</td>
<td>43.6</td>
<td>2,154</td>
</tr>
<tr>
<td>Bonanza</td>
<td>10</td>
<td>3,692.0</td>
<td>26</td>
<td>16</td>
<td>61.5</td>
<td>2,076</td>
</tr>
<tr>
<td>Central</td>
<td>14</td>
<td>4,969.7</td>
<td>37</td>
<td>17</td>
<td>45.9</td>
<td>3,548</td>
</tr>
<tr>
<td>Frontier</td>
<td>17</td>
<td>2,206.4</td>
<td>58</td>
<td>42</td>
<td>72.4</td>
<td>4,080</td>
</tr>
<tr>
<td>Lake Central</td>
<td>10</td>
<td>12,016.1</td>
<td>41</td>
<td>18</td>
<td>43.9</td>
<td>1,961</td>
</tr>
<tr>
<td>Mohawk</td>
<td>21</td>
<td>13,631.8</td>
<td>34</td>
<td>8</td>
<td>23.5</td>
<td>1,908</td>
</tr>
<tr>
<td>North Central</td>
<td>31</td>
<td>9,860.3</td>
<td>62</td>
<td>36</td>
<td>58.1</td>
<td>3,510</td>
</tr>
<tr>
<td>Ozark</td>
<td>24</td>
<td>10,411.3</td>
<td>54</td>
<td>21</td>
<td>38.9</td>
<td>3,557</td>
</tr>
<tr>
<td>Pacific</td>
<td>19</td>
<td>4,115.2</td>
<td>33</td>
<td>20</td>
<td>60.6</td>
<td>1,712</td>
</tr>
<tr>
<td>Piedmont</td>
<td>23</td>
<td>4,730.7</td>
<td>53</td>
<td>14</td>
<td>26.4</td>
<td>2,748</td>
</tr>
<tr>
<td>Southern</td>
<td>16</td>
<td>3,839.1</td>
<td>35</td>
<td>15</td>
<td>42.9</td>
<td>2,753</td>
</tr>
<tr>
<td>Trans-Texas</td>
<td>20</td>
<td>5,313.6</td>
<td>51</td>
<td>29</td>
<td>56.9</td>
<td>3,556</td>
</tr>
<tr>
<td>West Coast</td>
<td>19</td>
<td>1,619.7</td>
<td>43</td>
<td>27</td>
<td>62.8</td>
<td>2,322</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>247</strong></td>
<td><strong>51,907.7</strong></td>
<td><strong>516</strong></td>
<td><strong>283</strong></td>
<td><strong>54.8</strong></td>
<td><strong>35,586</strong></td>
</tr>
</tbody>
</table>

significance of this availability will be considered in Chapters V and VI. The other columns should be self-explanatory. Even though the feeders actually serve a considerable segment of the population, it should be pointed out that many people are served under relatively costly operating conditions and that the feeders do not serve a very large number of the important city-pairs between which there is heavy traffic density. These factors, and their significance, will be considered in greater detail in Chapters IX and X.

Postal Usage of the Feeder System

One of the most important users of the feeder system is the "Postal System," or, to put it more correctly, those persons who avail themselves of the services offered by the Post Office Department. In the Civil Aeronautics Board economic hearings which preceded the authorization of feeder service for the first time, the Board, being guided by the Declaration of Policy of the Civil Aeronautics Act, took the potential users of the postal system into consideration when it finally made the decision to authorize such service on an experimental basis. It seems, however, that the Board was not too explicit in

its statements about the extent of usage of feeder air-mail service which could be expected to take place. In commenting on the probability of success of the entire experiment, however, the Board stated that "in going into the small-city, short-haul market, the airplane will be faced with the most intense kind of competition, with its principal selling point, speed, greatly diminished in value." Nevertheless, charged with an obligation to foster the development of air transportation and comforted by the fact that the provision of feeder service was to be "only" an experiment, the project was authorized. Of course, the expectation of considerable commercial usage and the possibility of military usage were of considerable significance as contributing factors to the approval of the experiment.

Admittedly, even after about fifteen years of operation, it is relatively difficult to determine just how much benefit is derived from the provision of air-mail service by the feeders. It is possible to introduce statistical data relative to usage, as will be done in this section, but it is not nearly so easy to obtain data relative to the matter of whether or not the transportation of mail is expedited by the use of feeder service. In this respect, the pertinent question to be resolved is

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Ibid., pp. 2, 3.
whether or not feeder air transportation furnishes a more efficient movement in terms of both relative speed and relative costs than do the alternative modes of transportation. Though this matter will not be considered in this paper, it is believed that the conduct of empirical research in this area would provide some enlightening and valuable data.

The carriage of "mail" is generally considered under two separate headings based upon the priority rating of the transported mail. "Priority" mail includes air mail and air parcel post, whereas "non-priority" mail is first-class mail which is flown by air. It might be pointed out that currently non-priority mail is being flown only on an experimental basis between certain selected cities.\(^5\) In return for their performance of the service of transporting mail, the feeder carriers receive mail revenue in the form of a service rate, which will be considered, as does the Post Office Department consider it, as compensation devoid of subsidy. As was pointed out in Chapter I, the so-called "subsidy" payments are separated from the air mail service rate and are based upon the "needs" of the carriers in question.

In the analysis of the usage being made of the feeder services by the Post Office Department, treating it

\(^5\)Air Transport Facts and Figures, op. cit., p. 3.
as the buyer of air mail space, it will be advantageous to refer to Table 2 on page 143. Table 3 on page 144 will indicate the significance of the mail operations to the feeder system with respect to operating revenues.

In terms of either mail revenue ton-miles carried or of operating revenues derived from the conduct of mail operations, exclusive of public service revenue [subsidy], it may be seen that the mail operations do not make significant contributions to the feeder carriers. Aside from the usage data which have been presented in these tables and measured in terms of physical-operating and monetary units, the feeder system also allegedly contributes to the economy through the expedition of mail. As was pointed out earlier in this section, no attempt will be made to evaluate the significance of this type of contribution. The data presented in this section, particularly that relative to operating revenues, will become more meaningful for the purposes of this study when they are compared, in Chapter VII, with the monetary costs of offering the air mail service.

"Commercial" Usage of the Feeder System

Since neither the Civil Aeronautics Act nor the Civil Aeronautics Board specified the types of categories of service which were to be included under the heading of
### TABLE 2

**AVAILABLE FEEDER SERVICE AND MAIL UTILIZATION OF THESE FACILITIES**

<table>
<thead>
<tr>
<th>Feeder Airlines</th>
<th>Available Ton Miles Flown (000,000)</th>
<th>Revenue Ton Miles Flown (000,000)</th>
<th>Priority U.S. Mail (000)</th>
<th>Non-Priority U.S. Mail (000)</th>
<th>Total U.S. Mail Revenue Ton Miles of Traffic Carried</th>
<th>Ratio of Total U.S. Mail Revenue Ton Miles of Traffic Carried to Total Revenue Ton Miles Flown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>46.4</td>
<td>14.2</td>
<td>428</td>
<td>*</td>
<td>428</td>
<td>3.01</td>
</tr>
<tr>
<td>1955</td>
<td>121.9</td>
<td>55.3</td>
<td>928</td>
<td>328</td>
<td>1,256</td>
<td>2.27</td>
</tr>
<tr>
<td>1956</td>
<td>145.6</td>
<td>66.8</td>
<td>1,192</td>
<td>344</td>
<td>1,536</td>
<td>2.30</td>
</tr>
<tr>
<td>1957</td>
<td>170.7</td>
<td>78.5</td>
<td>1,174</td>
<td>345</td>
<td>1,519</td>
<td>1.93</td>
</tr>
<tr>
<td>1958</td>
<td>185.4</td>
<td>86.6</td>
<td>1,330</td>
<td>395</td>
<td>1,725</td>
<td>1.99</td>
</tr>
</tbody>
</table>

*Prior to inauguration of this type of service.

### TABLE 3
OPERATING REVENUES FROM MAIL OPERATIONS

<table>
<thead>
<tr>
<th>Feeder Airlines</th>
<th>Public Service Revenue [Subsidy] (in thousands)</th>
<th>U.S. Mail Revenue (in thousands)</th>
<th>Ratio of Total U.S. Mail Revenue to Total Feeder Operating Revenues</th>
<th>Ratio of Total Public Service Revenue [Subsidy] to Total Feeder Operating Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>13,533</td>
<td>*</td>
<td>13,533**</td>
<td>**</td>
</tr>
<tr>
<td>1955</td>
<td>1,084</td>
<td>101</td>
<td>1,185</td>
<td>20,923</td>
</tr>
<tr>
<td>1956</td>
<td>1,004</td>
<td>102</td>
<td>1,106</td>
<td>23,211</td>
</tr>
<tr>
<td>1957</td>
<td>1,108</td>
<td>103</td>
<td>1,211</td>
<td>29,651</td>
</tr>
<tr>
<td>1958***</td>
<td>1,254</td>
<td>116</td>
<td>1,370</td>
<td>32,523</td>
</tr>
</tbody>
</table>

* Prior to inauguration of this type of service.  
** Prior to separation of public service revenue [subsidy] from total mail pay.  
*** Preliminary.

"commerce," this study will interpret the Act to the effect that it was intended to encompass all types of service other than those performed for the "Postal System" and "national defense." For convenience in assemblage of statistical data, commercial users will be designated as those who avail themselves of the services of the passenger, the freight, the express, and the "other" operations. The nature of the last-mentioned type of service will be considered in detail at a later point in this section. As the preceding section was designed primarily to indicate the extent of direct usage of the feeder system by the Post Office Department, this section will be developed to indicate the amount of direct utilization of the system by non-military and non-Post Office Department users. The type of usage considered will be that which furnishes quantifiable benefits to the purchasers of the service. In this category of users will be included the passengers and shippers who receive services in exchange for fares and rates. To be excluded from consideration in this chapter, then, are the benefits, if any, which accrue to non-users of the service. Into this latter category, for example, should be placed such intangible benefits as national-defense protection and the whole range of alleged community benefits, such as the contribution made by the feeder system in the attraction of industry to a city. These benefits will be considered in Chapters V, VI, and VIII.
Passenger Usage

As may be seen from the following data, the usage by passengers constitutes the most important single source of revenues for the feeder carriers. It might be pointed out that the significance of passenger usage to the trunk-line carriers is even greater, since they do not receive public service revenues. To gain an indication of the availability of passenger facilities and the utilization thereof, it will be helpful to consider Table 4 on page 147. Insofar as passenger revenues are concerned, Table 5 on page 148 will be indicative of the considerable importance of passenger revenues to the operations of the feeder system. In 1958, for example, the operating revenues from the passenger service comprised almost 60 per cent of total operating revenues, including subsidy.

Express, Freight, and "Other" Usage

As classes of traffic, these three categories are separable, but it will be convenient to combine them in the statistical exposition of this section. The category of "other" operations is a catch-all one into which all non-military operations not previously described in this chapter will be placed. As a revenue measure, it includes revenues from excess baggage, chartered services, penalties for failure to cancel reservations, service charges on
TABLE 4
AVAILABLE FEEDER SERVICE AND PASSENGER UTILIZATION OF THESE FACILITIES

<table>
<thead>
<tr>
<th>Feeder Airlines</th>
<th>Available Ton Miles Flown (000,000)</th>
<th>Revenue Ton Miles Flown (000,000)</th>
<th>Passenger Revenue Ton Miles of Traffic Carried (000)</th>
<th>Available Seat Miles Flown (000,000)</th>
<th>Revenue Passenger Miles Flown (000,000)</th>
<th>Ratio of Passenger Revenue Ton Miles of Traffic Carried to Total Revenue Ton Miles Flown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>47.4</td>
<td>14.2</td>
<td>12,796</td>
<td>477.9</td>
<td>134.7</td>
<td>90.11</td>
</tr>
<tr>
<td>1955</td>
<td>121.9</td>
<td>55.3</td>
<td>49,713</td>
<td>1,161.4</td>
<td>523.3</td>
<td>89.90</td>
</tr>
<tr>
<td>1956</td>
<td>145.6</td>
<td>66.8</td>
<td>60,156</td>
<td>1,385.0</td>
<td>633.2</td>
<td>90.05</td>
</tr>
<tr>
<td>1957</td>
<td>170.7</td>
<td>78.5</td>
<td>71,079</td>
<td>1,655.8</td>
<td>747.3</td>
<td>90.55</td>
</tr>
<tr>
<td>1958</td>
<td>185.4</td>
<td>86.6</td>
<td>78,055</td>
<td>1,793.5</td>
<td>820.2</td>
<td>90.13</td>
</tr>
</tbody>
</table>

### TABLE 5
OPERATING REVENUES FROM PASSENGER OPERATIONS

<table>
<thead>
<tr>
<th>Feeder Airlines</th>
<th>Passenger Revenues (000)</th>
<th>Total Feeder Operating Revenues (000)</th>
<th>Ratio of Passenger Revenues to Total Feeder Operating Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>7,362</td>
<td>21,418</td>
<td>34.37</td>
</tr>
<tr>
<td>1955</td>
<td>32,840</td>
<td>57,450</td>
<td>57.16</td>
</tr>
<tr>
<td>1956</td>
<td>40,166</td>
<td>67,712</td>
<td>59.32</td>
</tr>
<tr>
<td>1957</td>
<td>47,464</td>
<td>82,139</td>
<td>57.78</td>
</tr>
<tr>
<td>1958</td>
<td>56,421</td>
<td>94,654</td>
<td>59.61</td>
</tr>
</tbody>
</table>

non-revenue transportation of employees, and special services, such as crop-dusting and aerial photography.\textsuperscript{6}

To consider the availability of capacity and the usage being made of it by these three classes of traffic, it will be advantageous to consult Table 6 on page 150. With respect to revenue data for these three classes of traffic, it will be helpful to consider Table 7 on page 151. It may be seen from Tables 6 and 7 that the express, freight, and "other" operations, either individually or collectively, furnish relatively small percentages of the total feeder revenue ton-miles of traffic flown (carried) and of the total feeder operating revenues, the relevant collective figures for 1958 having been 7.9 per cent and 4.6 per cent, respectively. These three, in combination with the mail operations, supplied in 1958 only about 10 per cent of the total feeder revenue ton-miles of traffic flown and approximately 6 per cent of the total feeder operating revenues. These data will be considered again in the summary of this chapter.

\textsuperscript{6}Ibid.
<table>
<thead>
<tr>
<th>Year</th>
<th>Available Ton Miles Flown (000,000)</th>
<th>Revenue Ton Miles Flown (000,000)</th>
<th>Express Revenue Ton Miles of Traffic Carried (000)</th>
<th>Freight Revenue Ton Miles of Traffic Carried (000)</th>
<th>&quot;Other&quot; Revenue Ton Miles of Traffic Carried (000)</th>
<th>Ratio of Express Revenue Ton Miles of Traffic Carried to Total Revenue Ton Miles Flown</th>
<th>Ratio of Freight Revenue Ton Miles of Traffic Carried to Total Revenue Ton Miles Flown</th>
<th>Ratio of &quot;Other&quot; Revenue Ton Miles of Traffic Carried to Total Revenue Ton Miles Flown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>46.4</td>
<td>14.2</td>
<td>320</td>
<td>436</td>
<td>254</td>
<td>2.25</td>
<td>3.07</td>
<td>1.79</td>
</tr>
<tr>
<td>1955</td>
<td>121.9</td>
<td>55.3</td>
<td>1,403</td>
<td>1,355</td>
<td>1,583</td>
<td>2.54</td>
<td>2.45</td>
<td>2.86</td>
</tr>
<tr>
<td>1956</td>
<td>145.6</td>
<td>66.8</td>
<td>1,687</td>
<td>1,624</td>
<td>1,840</td>
<td>2.53</td>
<td>2.43</td>
<td>2.75</td>
</tr>
<tr>
<td>1957</td>
<td>170.7</td>
<td>78.5</td>
<td>1,642</td>
<td>2,082</td>
<td>2,188</td>
<td>2.09</td>
<td>2.65</td>
<td>2.79</td>
</tr>
<tr>
<td>1958</td>
<td>185.4</td>
<td>86.6</td>
<td>1,801</td>
<td>2,241</td>
<td>2,771</td>
<td>2.08</td>
<td>2.59</td>
<td>3.20</td>
</tr>
</tbody>
</table>

TABLE 7
OPERATING REVENUES FROM EXPRESS, FREIGHT AND "OTHER" OPERATIONS.

<table>
<thead>
<tr>
<th>Year</th>
<th>Express (000)</th>
<th>Freight (000)</th>
<th>&quot;Other&quot; (000)</th>
<th>Total Feeder Operating Revenues (000)</th>
<th>Ratio of Express Revenues to Total Feeder Operating Revenues</th>
<th>Ratio of Freight Revenues to Total Feeder Operating Revenues</th>
<th>Ratio of &quot;Other&quot; Revenues to Total Feeder Operating Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>114</td>
<td>138</td>
<td>271</td>
<td>21,418</td>
<td>0.53</td>
<td>0.64</td>
<td>1.27</td>
</tr>
<tr>
<td>1955</td>
<td>665</td>
<td>556</td>
<td>1,281</td>
<td>57,450</td>
<td>1.16</td>
<td>0.97</td>
<td>2.23</td>
</tr>
<tr>
<td>1956</td>
<td>775</td>
<td>750</td>
<td>1,704</td>
<td>67,712</td>
<td>1.14</td>
<td>1.11</td>
<td>2.52</td>
</tr>
<tr>
<td>1957</td>
<td>725</td>
<td>1,049</td>
<td>2,039</td>
<td>82,139</td>
<td>0.88</td>
<td>1.28</td>
<td>2.48</td>
</tr>
<tr>
<td>1958*</td>
<td>796</td>
<td>1,183</td>
<td>2,361</td>
<td>94,654</td>
<td>0.84</td>
<td>1.25</td>
<td>2.49</td>
</tr>
</tbody>
</table>

*Preliminary.

Nature and Significance of Feeder Interline Traffic

One of the most important reasons for the inauguration of feeder service was to permit the development of a connecting link between the smaller and the larger cities in the nation. This new type of system was envisioned in 1944 as one which would originate passengers and cargo in small communities and "feed" them to the trunk lines for more extensive movements. In addition, the feeders would terminate flights which had been originated by the trunk carriers. Thus, the "feeder" carriers would not only perform a service to the users of their operations but also to the trunk lines and to the entire scheduled, common-carrier air transportation system, particularly if it were assumed that these users would not utilize air transportation at all in the absence of such feeder service; that is to say that the patronage of these users would be directed to alternative surface modes of carriage in the absence of the feeder system. To this writer's knowledge,

7Interline traffic, in this section, will refer to passenger traffic transported by one or more feeder carriers and one or more trunk carriers, regardless of which class of carriers originated the passengers. Unfortunately, data of this type are not available for movements of classes of traffic other than passengers. The loss in comprehensiveness and exactness caused by the absence of such data is mitigated, however, by the fact that the predominant amount of user revenue of both the trunks and the feeders is derived from passenger traffic.
no study has been made to determine what the effect on the usage of the trunk lines would be if there were no feeder service. It is very doubtful, however, that these lines would lose all of the traffic originated and terminated by the feeders. Currently available data indicate only the dollar amounts of traffic originated by the feeders and "fed" to the trunks, which terminate the movements. It does not furnish information relative to the dollar amounts of revenues received by the trunks from that portion of traffic which the trunks originate but which the feeders terminate.

In this study, no attempt will be made to determine the efficiency of the carriers of the feeder and the trunk systems relative to that of alternative surface modes of transportation for the purpose of drawing conclusions as to whether or not it is desirable from an efficiency standpoint to have users patronize the feeders and trunks rather than to utilize alternative surface modes. It will be assumed, however, that the usage of these two systems indicates a consumer preference for air movement over movement by alternative surface modes and that the absence of such air service would result in a diminution of consumer satisfaction.

As indications of the importance of interline traffic to both the feeders and the trunks, the data presented in Table 8 on page 154 will be helpful. Several
### TABLE 8

**Analysis of Interline Revenues Exchange Ratios and Percentages Year 1958**

<table>
<thead>
<tr>
<th>Local Carriers</th>
<th>Passenger Revenues</th>
<th>Percent of Total</th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From Locals To Trunks</td>
<td>From Trunks To Locals</td>
<td>Ratio</td>
<td>From Trunks</td>
</tr>
<tr>
<td>Allegheny</td>
<td>3,443,174</td>
<td>2,377,243</td>
<td>1.448</td>
<td>5,820,417</td>
</tr>
<tr>
<td>Bonanza</td>
<td>1,231,180</td>
<td>845,070</td>
<td>1.458</td>
<td>2,076,930</td>
</tr>
<tr>
<td>Central</td>
<td>1,757,384</td>
<td>1,331,425</td>
<td>1.320</td>
<td>3,088,809</td>
</tr>
<tr>
<td>Frontier</td>
<td>2,080,114</td>
<td>1,524,938</td>
<td>1.364</td>
<td>3,605,052</td>
</tr>
<tr>
<td>Lake Central</td>
<td>1,374,846</td>
<td>1,010,347</td>
<td>1.361</td>
<td>2,385,193</td>
</tr>
<tr>
<td>Mohawk</td>
<td>2,377,753</td>
<td>2,188,514</td>
<td>1.086</td>
<td>4,566,267</td>
</tr>
<tr>
<td>North Central</td>
<td>5,091,531</td>
<td>3,834,283</td>
<td>1.328</td>
<td>8,925,814</td>
</tr>
<tr>
<td>Ozark</td>
<td>3,949,644</td>
<td>2,675,993</td>
<td>1.476</td>
<td>6,625,637</td>
</tr>
<tr>
<td>Pacific</td>
<td>3,308,777</td>
<td>1,124,514</td>
<td>2.793</td>
<td>4,493,291</td>
</tr>
<tr>
<td>Piedmont</td>
<td>2,793,550</td>
<td>2,359,432</td>
<td>1.184</td>
<td>5,152,982</td>
</tr>
<tr>
<td>Southern</td>
<td>1,642,806</td>
<td>1,312,373</td>
<td>1.252</td>
<td>2,955,179</td>
</tr>
<tr>
<td>Trans-Texas</td>
<td>2,276,673</td>
<td>1,390,564</td>
<td>1.633</td>
<td>3,669,237</td>
</tr>
<tr>
<td>West Coast</td>
<td>1,617,655</td>
<td>665,554</td>
<td>2.431</td>
<td>2,283,209</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32,945,767</strong></td>
<td><strong>22,702,250</strong></td>
<td><strong>1.451</strong></td>
<td><strong>55,648,017</strong></td>
</tr>
</tbody>
</table>

*Includes passenger revenues collected for trunklines.*  
conclusions may be drawn from the data presented in this table. Although this section of the study is not designed to consider the "feeder" significance of the trunk lines to the feeder carriers, it might be pointed out that the feeders derived a little over one-fourth of their total revenues, including passenger revenues collected for the trunk lines, from the interline passenger traffic originated by the trunks and fed to them. Also of significance in this respect would be the availability of data which would indicate the loss of revenues to the feeders and the decrease in consumer satisfaction which would have been suffered as a result of the absence of the trunk system and thus of the absence of the share of the revenues received by the feeders from the flights which had been originated by them but terminated by the trunks.

What is more important to this study is the fact that in 1958 the trunk lines obtained only about 2 percent of their total revenues, including subsidy, from the traffic fed to them by the feeders. 8 If, however, these revenues were deducted from total trunk revenues, the net operating income figure for 1958 would have been $61,587,233, instead of $94,533,000. 9 The trunk carriers would not have

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8 These data were derived from the statistics presented in *Air Transport Facts and Figures*, op. cit., p. 17 and in Table 8.

9 *Air Transport Facts and Figures*, op. cit., p. 22.
incurred an operating loss as a result of the loss of this interline traffic fed to them by the feeders, but their net operating incomes and their rates of return on investment would have been lowered. Again, it should be pointed out that the above data do not reveal the total loss to the trunks which would have resulted from the absence of the feeder system, since it does not consider the effect on the trunks of having lost their share of the revenues from the flights which had been originated by them but terminated by the feeders, the assumption being made that the trunks would have lost some revenues due to the non-existence of the feeder system.

Tax Payments Made by the Carriers of the Feeder System

The feeder carriers pay taxes to the local, state, and federal governments, as is indicated by types and amounts for 1957 in Table 9. These taxes, especially the figure of $1,973,599, which was paid to the federal government, might be considered as offsets to the subsidy payments made by the federal government to the feeders. In 1957, at the same time that the federal government was contributing $29,651,000 in subsidy to the feeder carriers,\textsuperscript{10} these carriers were remitting a total of $2,710,794, or

\textsuperscript{10}\textit{Ibid.}, p. 17.
TABLE 9
TAXES LEVIED ON "FEEDER" AIR CARRIERS
CALENDAR YEAR 1957*

<table>
<thead>
<tr>
<th>Type of Tax</th>
<th>Taxing Authority</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Federal</td>
<td>State</td>
<td>Local</td>
</tr>
<tr>
<td>Property</td>
<td>$</td>
<td>$ 104,415</td>
<td>$ 70,563</td>
</tr>
<tr>
<td>Franchise</td>
<td>--</td>
<td>25,037</td>
<td>--</td>
</tr>
<tr>
<td>Fuel</td>
<td>1,088,424</td>
<td>195,720</td>
<td>1,782</td>
</tr>
<tr>
<td>Lubricating oil</td>
<td>31,810</td>
<td>1,098</td>
<td>--</td>
</tr>
<tr>
<td>Gross receipts</td>
<td>--</td>
<td>36,828</td>
<td>--</td>
</tr>
<tr>
<td>Normal income</td>
<td>19,882</td>
<td>33,093</td>
<td>6</td>
</tr>
<tr>
<td>Capital</td>
<td>--</td>
<td>1,813</td>
<td>--</td>
</tr>
<tr>
<td>Payroll</td>
<td>832,472</td>
<td>235,663</td>
<td>--</td>
</tr>
<tr>
<td>Other</td>
<td>1,011</td>
<td>30,418</td>
<td>759</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$ 1,973,599</td>
<td>$ 664,085</td>
<td>$ 73,110</td>
</tr>
</tbody>
</table>

*Data for 1958 are not yet available.

Source: Compiled by the Civil Aeronautics Board from CAB Form 41 reports.
about 7 per cent of the subsidy figure, to the three levels of government. Thus, while users, and possibly non-users, of the feeder system received benefits from the provision of subsidy by taxpayers, it might be said that the users of feeder service made contributions at least a part of which were used for the provision of benefits to other persons in the economy. Since, in the feeder industry, the relationship between benefits, on the one hand, and costs, a portion of which takes the form of subsidy borne by taxpayers, on the other, is not determinable through the use of market measures alone, this relationship will be treated through an application of the principles of welfare economics in Chapter VIII.

Chapter Summary

This chapter has been designed to present data, largely of a statistical nature, which would be indicative of the direct usage being made of the feeder system by non-military users, categorized under the headings of "mail" and "commercial" users. These statistics will furnish the most significant data relative to the direct usage being made of the feeder system, since direct military usage is almost nil.

Tables 10 and 11 on pages 159 and 160 summarize both the percentage of total usage being made of the feeder system by each of the various classes of users and
TABLE 10
RATIOS OF REVENUE TON-MILES OF TRAFFIC CARRIED IN EACH USER CLASS TO TOTAL REVENUE TON-MILES OF TRAFFIC CARRIED BY THE FEEDERS FOR SELECTED YEARS

<table>
<thead>
<tr>
<th>Year</th>
<th>Mail</th>
<th>Passenger</th>
<th>Express</th>
<th>Freight</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>3.0</td>
<td>90.1</td>
<td>2.2</td>
<td>3.0</td>
<td>1.7</td>
<td>100.0</td>
</tr>
<tr>
<td>1955</td>
<td>2.3</td>
<td>89.9</td>
<td>2.5</td>
<td>2.4</td>
<td>2.9</td>
<td>100.0</td>
</tr>
<tr>
<td>1956</td>
<td>2.3</td>
<td>90.1</td>
<td>2.5</td>
<td>2.4</td>
<td>2.7</td>
<td>100.0</td>
</tr>
<tr>
<td>1957</td>
<td>1.9</td>
<td>90.6</td>
<td>2.1</td>
<td>2.6</td>
<td>2.8</td>
<td>100.0</td>
</tr>
<tr>
<td>1958</td>
<td>2.0</td>
<td>90.1</td>
<td>2.1</td>
<td>2.6</td>
<td>3.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Summarized from the data presented in Tables 2, 4, and 6.
<table>
<thead>
<tr>
<th>Year</th>
<th>Mail</th>
<th>Subsidy</th>
<th>Passenger</th>
<th>Express</th>
<th>Freight</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>63.2</td>
<td>*</td>
<td>34.4</td>
<td>0.5</td>
<td>0.6</td>
<td>1.3</td>
<td>100.0</td>
</tr>
<tr>
<td>1955</td>
<td>2.1</td>
<td>36.4</td>
<td>57.2</td>
<td>1.1</td>
<td>1.0</td>
<td>2.2</td>
<td>100.0</td>
</tr>
<tr>
<td>1956</td>
<td>1.6</td>
<td>34.3</td>
<td>59.3</td>
<td>1.2</td>
<td>1.1</td>
<td>2.5</td>
<td>100.0</td>
</tr>
<tr>
<td>1957</td>
<td>1.4</td>
<td>36.1</td>
<td>57.8</td>
<td>0.9</td>
<td>1.3</td>
<td>2.5</td>
<td>100.0</td>
</tr>
<tr>
<td>1958</td>
<td>1.5</td>
<td>34.4</td>
<td>59.6</td>
<td>0.8</td>
<td>1.2</td>
<td>2.5</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Prior to separation of subsidy from total mail pay.

Source: Summarized from the data presented in Tables 3, 5, and 7.
the percentage of total revenues being contributed to the feeder carriers by each of these categories of users and by the federal government through subsidy payments.

Table 10 indicates for each of the five years the ratio of revenue ton-miles of traffic carried for each of the five classes of users to the total number of revenue ton-miles of traffic carried. Thus, the figure of 90.1 per cent for passenger ton-miles carried in 1958 indicates that of the total ton-miles sold in 1958, a little over 90 per cent were sold to passengers. Of importance to this study is the fact that passenger usage is of such tremendous importance relative to that of the other classes. It should be remembered also that a portion of the total of the category of "other" revenue ton-miles of traffic carried is attributable to passenger operations, especially that arising from the transportation of excess baggage. It may be concluded, then, that the passenger users are by far the most significant direct beneficiaries of the system according to the standard presented in Table 10.

Table 11 details the ratio of operating revenues derived from each of the five classes of users and from the federal government through subsidy payments to the total dollar operating revenues obtained from all operations for each of the five years. It may be seen from this table that the only significant shifts in the last
ten years have occurred in the passenger and subsidy classes of contributors, with the reliance on the latter having decreased considerably in percentage terms. Of greater significance at this point is the fact that passenger users and taxpayers (subsidy providers), the latter possibly being indirect beneficiaries of the feeder system, supplied 94 per cent of the total feeder operating revenues in 1958, whereas all other classes provided only 6 per cent of such total.

It was pointed out that the feeder system contributes to the well-being of the trunk-line system through its origination and termination of flights either terminated or originated by the trunk-line carriers. Although the revenue contributions of the feeders to the trunk carriers comprise only about 2 per cent of the total revenues received by the latter, the effect of the loss of these dollars of revenue would be reflected noticeably in both the net operating incomes and the returns on investment of the trunk carriers. Unfortunately, there are no measures available which would indicate the total loss to the trunk-line carriers and to consumer satisfaction which would result from the non-existence of the feeder system.

Finally, the tax contributions made by the feeder system to the local, state, and federal levels of government were presented. It was maintained that these contributions might be considered as offsets to the subsidy
being received by the feeders. In a sense, at the same time that taxpayers are supplying funds which help make possible the furnishing of direct, and possibly indirect, feeder transportation benefits to certain groups in the economy, the users of the feeder service are paying rates and fares, a portion of which is being used to furnish various types of benefits to the groups in the economy which are the beneficiaries of the expenditures made from feeder-derived tax funds.
CHAPTER V

MILITARY CAPABILITIES OF THE FEEDER SYSTEM

Introduction

As was pointed out in Chapter IV, the framers of the Civil Aeronautics Act of 1938 instructed the Civil Aeronautics Board to encourage and develop an air transportation system which would meet the needs, both present and future, of "the...domestic commerce of the United States, of the Postal Service, and of the national defense."\(^1\) This study will not attempt to determine whether the development of the entire air transportation system is meeting the present and future needs of national defense. The feeder system comprises only one segment of the whole air transportation network, and the development of a feeder system which would adequately meet the current and foreseeable future needs of national defense would by no means insure that the whole system had attained the desired adequacy status.

This chapter will examine the capabilities of the feeder system for national-defense purposes and the

\(^1\) Refer to Chapter IV, footnote 1. The Federal Aviation Act of 1958, which repealed the Civil Aeronautics Act of 1938, retained these promotional provisions without the changing of a single word.
utilization currently being made of the available facilities. These capabilities will be expressed primarily in terms of present route configuration and of the air and ground facilities available for the movement of traffic over these routes. The military usage currently being made of the system is expressable in terms of utilization by passenger-miles, ton-miles, and dollar operating revenues.

Chapter VI will consider primarily the present requirements and the possible future requirements of the feeder system insofar as national defense protection is concerned. Included in Chapter VI will be a consideration of the nature of the programs operated exclusively for the transportation by air of military cargo, especially the Military Air Transport Service and the Logair operations. The probable adequacy of these programs, particularly within the framework of foreseeable requirements under varying degrees of emergency conditions, will be analyzed. Then, the possible national-defense requirements of the feeder system, especially the probable future requirements under different types of emergency conditions, will be discussed. Finally, the merits and shortcomings of the feeder system in terms of both present and future national-defense requirements will be considered.
Explanation of the Military "Capabilities" and "Requirements" Concepts

Usage will be made in this and the following chapters of the terms "military capabilities" and "military requirements." The latter term will be used to refer to the estimates of resources needed to carry out a particular military task, whereas the former term will be used to refer to the estimates of resources available to meet the requirements. Together,

...the requirements and capabilities of a security program, and of each component part thereof, constitute an equation which should be approximately in balance at any time; that is:

\[ \text{SUM OF REQUIREMENTS} = \text{SUM OF CAPABILITIES}. \]

Otherwise, the program is a highly questionable one.\(^2\)

A closer scrutiny of these two concepts is desirable. It should be observed that requirements are couched in terms of estimates of resources needed to perform a particular task. In this context, the "resources" will be the feeder industry, and the "particular task" will be construed as that of helping meet the national-defense needs of the economy, insofar as the feeder system is concerned. An explicit exposition of the requirements of national defense upon the feeder system can not be set forth in this

paper since there have been no specific plans developed by the government which would indicate the nature of such needs. The absence of such a plan may be attributed in part both to the absence of any current usage of the feeder facilities by the military and to the expectation that no utilization will have to be made of this system in the foreseeable future. Thus, in this respect, the lack of a stated plan may indicate the fact that no utilization of feeder facilities is planned under present and foreseeable future conditions. Though this may be the case, the failure to state a plan, even of anticipated non-usage, is confusing from a policy-formulation standpoint, particularly for an industry which partially justifies its existence on national-defense grounds.

The estimates of "resources" available are relatively easily determinable, since the size and scope of operations of the feeder system can be measured, but the degree of national-defense adequacy of these resources presents another problem. The difficulty of assessing the adequacy of the system is understandable in view of the absence of a plan which outlines the requirements. Thus, there is no model along whose lines the feeder system may be molded for national-defense purposes. Under conditions such as these, it becomes relatively difficult to "solve" the capabilities-requirements equation.
Available statistics for 1958 do not indicate any military usage of the feeder system. That is to say, these data reveal that usage is confined to the categories of users considered in Chapter IV, namely, "mail" and "commercial" users. A detailed consideration of the implications of this non-usage of feeder facilities by the military will be undertaken in succeeding chapters of this study. For the moment, it might be pointed out, however, that the test of whether or not the feeder system does have national-defense value will depend on whether or not it makes contributions of other than a direct-use nature. In this respect, the emphasis will have to be placed either on present "deterrence" value insofar as the avoidance of foreign aggression is concerned or on potential value either of a deterrence or a usage nature, such utilization being most likely to take place in the event of actual conflict with another nation[s]. The problem of whether the feeder system can justify its classification as an industry which has national-defense value will be considered in detail in Chapter VI. Needless to say, the results of such an analysis should have considerable significance with respect to the future financing programs for a subsidized industry which, partially at least, defends its receipt of government aid on national-defense grounds.
Military Capabilities of the Present Feeder System

Total Capabilities of the System

In this section, the plan will be one of outlining the total capabilities of the feeder system, particularly in terms of lift capacity. The reasons for examining such total capabilities are twofold. In the first place, such a presentation will give an indication of the maximum contribution which could be made by the feeder system in the event of the outbreak of an emergency which required the use of all currently existing air facilities of the type which could be furnished by the feeder system. Obviously, any required degree of usage short of this maximum capability would be obtainable with less difficulty. The available facilities may then be compared with the demands which might be expected to be made upon them under emergency conditions of varying degrees of seriousness for the purpose of obtaining an idea of the adequacy of the feeder system under such conditions. Secondly, these total-capability data provide a basis for the measurement of current stand-by feeder capabilities. In this respect, the ratios of current usage of the feeder system to currently available facilities, commonly expressed in terms of load factors, will indicate the amount of available facilities which might be used by the military as a result of a national
emergency. Though the tangible value accruing from these stand-by facilities arises out of actual usage, some intangible national-defense value may be attributable to the mere existence, and relatively instant readiness for use, of such facilities. The following chapter will analyze the readiness value of these facilities insofar as national defense is concerned.

**Route configuration.** In analyzing the significance of the feeder system to national defense, it is necessary to examine where the feeder carriers operate geographically and to determine whether current and potential national-defense requirements coincide with the points actually served by the feeder system. The absence of current usage indicates either the lack of coincidence of capabilities and requirements insofar as the route pattern is concerned or the availability of alternative modes of transportation which are more "satisfactory," for whatever reasons, for military purposes. The reasons for the use of alternative modes will be considered in Chapters VI and VII.

**Availability of facilities.** In relation to available facilities, the objective of this section is to consider briefly the nature of the feeder operational equipment and the number of personnel who conduct the operations over the feeder route pattern. At the end of 1958, the feeder industry operated 247 aircraft. The majority of
these planes were of the DC-3 variety. In the next section of this chapter, the amount of lift capacity made available for sale by these planes will be considered. In looking at the number of aircraft operated, it is important to consider the fact that all, or any part thereof, of them could be used for national-defense purposes in the event that an emergency arose which required the utilization of such facilities. In this respect, these aircraft comprise a potential stand-by fleet available for whatever use might be required in the name of national defense. The likelihood of use and the probable effectiveness of this fleet is another matter which will be considered in detail in the succeeding chapter.

To perform all of the functions necessary for the conduct of the total operations of the feeder system, the feeder carriers employed approximately 9,000 personnel in 1958. Again premising the occurrence of an emergency requiring the services of the entire feeder system, these employees would immediately become involved in national-defense activities of a type for which they presumably had some ability which had been acquired as a result of training and experience. If the data to be presented in

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Chapter VI indicate, though, that the feeder system would not be used for national-defense purposes under any conditions, then the existence of this complement of "trained" personnel would be of no national-defense significance, except in the event that the services of some of the specially trained personnel, particularly pilots, were needed for national-defense purposes in other than feeder operations.

Finally, it might be helpful to refer to Table 12 on page 173 for the purpose of gaining an indication of the value of the assets, especially flight equipment and ground property and equipment, which were used through the first nine months of 1958 in the provision of feeder service. Of particular significance to this study are the values, after the reserves for depreciation have been deducted, of flight equipment and ground property and equipment, such values having been $18,133,000 and $2,955,000, respectively. In the event that emergency conditions were to develop which would necessitate the use of the entire feeder fleet, the depreciated value of such fleet, together with ground property and equipment, would be slightly in excess of $21,000,000. Under these conditions, then, the feeder system could have offered for national-defense purposes a fleet whose potential stand-by value, as of September 30, 1958, was just in excess of $21,000,000. As has been pointed out previously
## TABLE 12
### TOTAL ASSETS OF THE FEEDER AIRLINES
**[AS OF SEPTEMBER 30, 1958]**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Assets</td>
<td>$17,522</td>
</tr>
<tr>
<td>Investments and Special Funds</td>
<td>$3,358</td>
</tr>
<tr>
<td>Flight Equipment</td>
<td>$37,335</td>
</tr>
<tr>
<td>Reserve for Depreciation and Maintenance</td>
<td>$19,202</td>
</tr>
<tr>
<td>Ground Property and Equipment</td>
<td>$7,035</td>
</tr>
<tr>
<td>Reserve for Depreciation</td>
<td>$4,080</td>
</tr>
<tr>
<td>Other Property</td>
<td>$1,620</td>
</tr>
<tr>
<td>Deferred Charges</td>
<td>$2,141</td>
</tr>
<tr>
<td>Other Assets</td>
<td>---</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td><strong>$45,729</strong></td>
</tr>
</tbody>
</table>

in this section, an examination of the likelihood of emergency use of all, or of a part, of the feeder fleet will be conducted in Chapter VI.

**Availability of space.**—To obtain an idea of the total airlift capacity of the feeder system, it will be advantageous to analyze Table 13 on page 175. Total ton-mile availability is indicated by the Available Ton-Miles Flown column. Thus, in 1958, 185,400,000 ton-miles of lift capacity were available for sale. The second column of Revenue Ton-Miles Flown indicates the number of the available ton-miles which were actually sold; in 1958, 86,600,000 ton-miles were actually sold. From column three, Ton Mile Load Factor, it is possible to determine the ratio of ton-miles sold to the ton-miles available for sale. For 1958 again, the percentage figure of 46.71 indicates that there was almost a 47 per cent utilization of existing ton-miles, or that nearly one-half of available capacity was sold.

In like manner, it is possible to consider the same type of data for the passenger portion of feeder operations. Thus, column four, Available Seat Miles Flown, provides a measure of total seat-miles available for sale, whereas column five, Revenue Passenger Miles Flown, indicates the amount of available seats actually sold. Finally, the Passenger Load Factor, in column six, reveals the ratio of seats sold to those available for
<table>
<thead>
<tr>
<th>Feeder Airlines</th>
<th>Available Ton Miles Flown</th>
<th>Revenue Ton Miles Flown</th>
<th>Ton Mile Load Factor (%)</th>
<th>Available Seat Miles Flown</th>
<th>Revenue Passenger Miles Flown</th>
<th>Passenger Load Factor (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>46.4</td>
<td>14.2</td>
<td>30.69</td>
<td>477.9</td>
<td>134.7</td>
<td>28.18</td>
</tr>
<tr>
<td>1955</td>
<td>121.9</td>
<td>55.3</td>
<td>45.36</td>
<td>1,161.4</td>
<td>523.3</td>
<td>45.06</td>
</tr>
<tr>
<td>1956</td>
<td>145.6</td>
<td>66.8</td>
<td>45.91</td>
<td>1,385.0</td>
<td>633.2</td>
<td>45.72</td>
</tr>
<tr>
<td>1957</td>
<td>170.7</td>
<td>78.5</td>
<td>46.00</td>
<td>1,653.8</td>
<td>747.3</td>
<td>45.19</td>
</tr>
<tr>
<td>1958</td>
<td>185.4</td>
<td>86.6</td>
<td>46.71</td>
<td>1,793.5</td>
<td>820.2</td>
<td>45.73</td>
</tr>
</tbody>
</table>

sale. The passenger load factor of 45.73 per cent for 1958 indicates that almost 46 per cent of available seat-miles were sold. As presented here, these data indicate the total current availability of space which could be used in the event that the exigencies of emergency conditions required such utilization.

Stand-by Capabilities of the System

In this section, the primary objective will be one of indicating the stand-by capabilities of the feeder system from the standpoint of direct usage of those facilities which are not currently being sold in revenue operations of the feeder carriers. Whereas the preceding section considered the maximum potential availability of service for direct usage, this section will consider only the availability of service which exists as a result of the inability of the feeder carriers to sell such space to users. In this sense, this space represents unutilized capacity.

Availability of stand-by facilities.— It will be assumed for the purposes of this chapter that the number of aircraft and the complement of personnel used in the furnishing of the total available capacity considered in the preceding section must be used regardless of the percentage of utilization being made of the existing facilities.
The making of such an assumption is tantamount to saying that there are indivisibilities in the factors of production which may result in the creation of unutilized capacity. While such an assumption might not conform strictly to the facts, particularly in the event of a low degree of utilization, in which case some personnel, particularly ground employees, might be expendable, it probably has a relatively high degree of validity in view of both the unsatisfactory design of the feeder aircraft and the nature of the operating stipulations imposed by the Civil Aeronautics Board upon the conduct of feeder operations.

**Availability of stand-by space.**—Utilizing the assumption of the preceding section, it may be inferred that any unutilized capacity of the feeder system would be a by-product of the furnishing of service in the conduct of its authorized commercial operations. The drawing of such an inference would be acceptable theoretically except in a situation in which all, or some, of such unutilized capacity was in existence as a result of a governmental plan which was designed to provide a given level of service for its national-defense value, such level of service generally being greater than that needed to meet the commercial requirements of the feeder system. In this case, then, it would be necessary to say that, as a result of governmental planning, the nature of the route configuration and the magnitude of the operational
facilities, or both, were such that unutilized capacity was supplied by the feeder system. This is the case of a program designed for the satisfaction of collective wants. In the former case, in which unutilized capacity which is of national-defense value is considered to have been developed as a by-product of the conduct of commercial operations, the indirect national-defense benefits may be considered as incidental, and the case is one of the feeder system's providing external economies of consumption, such external economies taking the form of national-defense protection. One of the results of the analyses of this and the following chapters will be the development of data which will indicate whether, with respect to the provision of national-defense benefits, the feeder system belongs in the satisfaction-of-collective-wants case or the external-economies-of-consumption case, or possibly both. Insofar as the mere existence of stand-by capacity is concerned, no significance will be attached to such a categorizing of the feeder system. However, as will be seen in Chapters VIII and XI, where the feeder system is placed in this dichotomy, if it is placed at all, may be of considerable import insofar as the formulation of public policy, especially with respect to the financing of a subsidized industry, is concerned.
As may be observed from a consideration of Table 13 on page 175, there was in 1958 a considerable amount of unutilized capacity in the feeder system. With a ton-mile load factor of 46.71 per cent, the feeder system had unutilized ton-mile capacity of slightly over 50 per cent. With respect to unutilized passenger capacity, the passenger load factor of 45.73 per cent indicates that slightly over 50 per cent of available seat-miles were unutilized. In general terms, it may be concluded that slightly over one-half of the available feeder system lift capacity was unutilized, but that it was capable of being utilized. It should be pointed out, however, that a 100 per cent load factor may not be desirable. In this respect, it has been mentioned that "experience seems to indicate... that the best load factor from the standpoint of airline operations is not far from 70 per cent, varying with circumstances for individual operations." In general, the possible disadvantage of having a load factor which is too high is that the "unavailability of space causes certain costs to increase more than in proportion to the number of passengers, or passenger miles." An example is furnished by a consideration of the fact that the handling of the reservations procedure for passengers who must be refused
because of space limitations increases the reservation expense per passenger carried.⁵

This paper will not undertake a determination of the percentage magnitude of the optimum load factor, but regardless of what it is, it may be concluded that the feeder system was characterized in 1958 by the presence of considerable unutilized capacity. Of importance to this paper is a determination of the value of this capacity for national-defense purposes. Insofar as current actual usage is concerned, the data for 1958 indicate that this unutilized capacity was of no value. In this respect, the absence of military utilization leads to the drawing of the conclusion that such unutilized capacity possessed no direct usage value. This is not to say that such unutilized capacity could not make some direct-usage contribution to national defense in the future. In Chapter VII, part of the analysis will be directed towards the affixing of a monetary value to the amount of unutilized capacity which existed in 1958. This monetary figure will be indicative of the potential direct-usage value of the unutilized feeder capacity which existed in 1958, and which has probably not changed to any significant degree since 1958.

In addition to direct-usage national-defense benefits which may accrue to the military users of feeder services, indirect national-defense benefits, both current and potential, may be attributed to the existence of the feeder system. As far as current indirect benefits are concerned, their existence must be based upon the deterrence value of the feeder system. In this sense, the question to be resolved is whether the existence of the feeder system, with or without unutilized capacity, provides a deterrent to enemy aggression. In general terms, General Curtis E. LeMay has stated that deterrence is achieved by the capacity to inflict a level of damage which an enemy would consider unacceptable. He also maintains that he has seen no way of attaining this result except through absolute numerical superiority of our long-range striking force. Of significance also is his statement that "...the first thing that must be done in modern war is to win the airpower battle." It is not inconceivable that the feeder system might contribute to the achievement of the type of total national-defense structure which would deter enemy aggression. In view of this possibility, part of the following chapter will be devoted to an analysis of the deterrence value of the feeder system.

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Finally, with respect to future [potential] indirect national-defense benefits that may be derived from the existence of the feeder system, particularly with unutilized capacity, the burden of any inquiry made to determine whether the feeder system would make any national-defense contribution must rest upon a consideration of whether the system will provide future deterrence value.

In the consideration of this matter in the succeeding chapter, it will be necessary to postulate varying conditions of emergency, ranging from cold war to all-out attack, and to consider the possible contributions which may be made to the economy through the national-defense medium in each of these types of conditions.

It may be seen, then, that the feeder system conceivably could make indirect contributions to national defense of both current and future value, as well as direct contributions, also for both the present and the future, particularly when it is being operated under conditions characterized by the existence of unutilized capacity.

Chapter Summary

One of the primary reasons advanced for the inauguration of feeder service was the anticipated contribution that the feeder system could make to national defense. Today, the argument for continuation of government support
to the feeder industry is based largely upon the value to national defense of the existence of the feeder system. Even though the inauguration and continuation of feeder service have been partially justified on the basis of the national-defense value of the system to the economy, no data are available which would indicate the real significance of the feeder industry insofar as national defense is concerned. This chapter primarily has been designed to explore the capabilities of the feeder system with respect to its actual and its potential national-defense value of both a direct and an indirect nature. Chapter VI will consider the present and probable future requirements of national defense on the feeder system and then compare such requirements with feeder capabilities.

In assessing the value of the feeder system to national defense, one of the first steps taken in this chapter was that of measuring the actual military usage of the feeder system. It was found that there had been no military usage through 1958, the last year for which data were available. Under such conditions, any national-defense significance of the system would have to be attributed to the deterrence value of the industry, either with or without unutilized capacity, and to the stand-by value of the system, such value arising from the possibility of using, in the event of the outbreak of emergency conditions, either the total capabilities or the unutilized capabilities of the feeder system.
The remaining sections of the chapter were devoted to a consideration of the military capabilities of the feeder system as it stood at the end of the 1958 calendar year. Such a consideration was divided into two parts, the first one considering the total capabilities of the system and the second one being devoted to an analysis of the stand-by, or unutilized capacity, capabilities of the system. With respect to total capabilities, there was an examination of the nature of the feeder route configuration. An inventory was taken of the total feeder facilities available for the performance of commercial service. Involved in this inventory was a determination of the magnitude and approximate dollar value, as of the end of 1958, of the feeder fleet, together with ground equipment. In the same section, there was a determination of the number of personnel available for the operation of the feeder facilities. Finally, the total amount of space provided by the feeder system, measured primarily in terms of available ton-miles flown, was detailed. The entire description of total capabilities was presented for the purpose of indicating the maximum usage which could be made of the feeder system, within the limitations imposed by the complement of facilities and personnel which were available at the end of 1958, in the event that emergency conditions warranted such usage. In addition, the
presentation of these total-capabilities data was useful in providing a picture of the nature of the deterrent force which the feeder industry constitutes.

In the analysis of the stand-by capabilities of the feeder system, which capabilities were expressed in terms of unutilized capacity, it was assumed that, as a result both of indivisibilities of the factors of production used in the feeder industry and of the nature of the operating conditions imposed by the Civil Aeronautics Board, the same number of aircraft and personnel would be needed to perform a given level of service regardless of the percentage of usage being made of such facilities. Under these conditions, the amount of available stand-by space at any particular time depends upon the amount of usage which is being made of the available facilities at that same time. For 1958, it was found that the ton-mile and passenger load factors were just under 50 per cent, such statistics indicating that slightly over 50 per cent of total feeder capacity was unutilized.

It was pointed out that the feeder system currently might have some indirect national-defense value if it can be determined that the existence of the feeder system, with or without unutilized capacity, constitutes a deterrent to foreign aggression. It was concluded that the continued existence of unutilized capacity
might be of future direct-usage value, depending upon whether or not future national-defense requirements might necessitate the use of such facilities. Finally, it was indicated that the feeder system, with or without unutilized capacity, might be of future indirect significance, such value again depending upon whether its existence might be likely to result in the deterrence of enemy attack.
CHAPTER VI

NATIONAL DEFENSE REQUIREMENTS OF THE FEEDER SYSTEM

At the beginning of Chapter V, it was indicated that a part of this paper would consider the contributions, both current and potential, of the feeder airline system to national defense. At the same time, it was stated that the analytical procedure would involve a consideration of both the total and stand-by capabilities of the feeder system and of the requirements which the military might be expected to make of such facilities under varying degrees of emergency conditions ranging from deterrence to total mobilization. Whereas Chapter V undertook an examination of the national defense capabilities of the feeder system, it will be the purpose of this chapter to examine the national defense requirements and to relate them to the feeder capabilities for the purpose of gaining an indication of the overall significance of the feeder system to national defense. In addition, the most important advantages and shortcomings of the feeder system insofar as national defense is concerned will be analyzed in this chapter.
World War II National Defense Usage of the Facilities of the Trunkline Airline Carriers

As an approach to the development of data relative to the usage which might be made of the feeder facilities under emergency conditions, it will be helpful to investigate the extent of the usage which was made of the trunk air carriers' facilities during World War II. Such an investigation will be conducted with an awareness of the possibility that a future emergency might not make the same types of demands on the trunk facilities as were made during World War II. It should be kept in mind that feeder service was authorized in 1944, but that feeder operations were not initiated until World War II had terminated. Thus, it is not possible to consider the contributions of the feeder system to the war effort in World War II. The rationale for examining the wartime utilization of the trunk carriers is to develop data which will indicate the nature and magnitude of military demands on the scheduled common carriers during such an emergency under the assumption that the feeder carriers, as part of the common-carrier system, might be faced with similar types of demands in the future, either because of a specific need for the feeder types of service or as a result of a requirement that the feeder carriers transport some of the traffic which the trunk system would not be
able to handle because of the magnitude of the total requirements imposed upon it.

Available data for this period indicate that the military utilization of the trunk carriers was very heavy. As early as February, 1942, the War Department requested that these carriers make available to it certain amounts of aircraft and complementary equipment. Then, on May 6, 1942, a reserve fleet of two hundred aircraft was set up and held within the United States for use in emergency military air transportation. Of the reserve fleet of two hundred planes, 35 planes were retained for use as cargo-carrying craft for the Air Transport Command and operated by the carriers with their own personnel. The remaining 165 planes were utilized in scheduled air transportation. The scheduled air transportation operations were conducted, however, under conditions in which the services were limited to those required by the war program. Thus, in addition to the imposition of controls on the nature of the service to be performed, there also was a prescription both of the number of schedules to be operated and of the specific stops to be made on those routes which were considered to be essential. All trunk-line planes except those in the reserve fleet of two hundred, such planes outside the reserve fleet numbering
nearly one-half of the total which had been owned by the trunks, were sold outright to the government.\footnote{Civil Aeronautics Board, \textit{Annual Report of the Civil Aeronautics Board, 1942} (Washington: Government Printing Office, 1942), pp. 1, 2.}

It may be seen, then, that the requirements of the war effort resulted in the sale of nearly one-half of the planes of the trunk system to the government and in the operation of the remaining part of the fleet under conditions in which the conduct of trunk service was limited to the provision of those types of movement required by the war effort. It may be surmised that considerable utilization would have been made of the feeder system during this period, particularly on the routes over which there was duplication of feeder and trunk service. Even greater benefit probably would have been derived from the feeders had they been conducting operations under conditions in which they had not been confined to a given route configuration.

With regard to the commercial transport service pattern recommended by the Civil Aeronautics Board and approved by the Military Director of Civil Aviation, there were requirements to the effect that certain routes be totally suspended and that schedules on other routes be curtailed. In the determination of the routes and
schedules to be eliminated, the controlling factors were the elimination of (a) all schedules which would not carry enough persons or business essential to the war effort to warrant continuance, (b) short-haul traffic for which there were suitable alternative surface modes, and (c) recreational travel. Even on the remaining routes, carriers were authorized to suspend operations at points where the major part of the traffic being served was not essential to the war effort. In the light of these curtailments in the service offerings of the trunk carriers, it should not be surprising to learn that they frequently had to refuse passengers and tenders of cargo for transportation. Load factors during these war years were very high. For example, for the twelve-months ended September 30, 1943, the overall passenger load factor was 86 per cent, for the twelve-months' period which terminated on September 30, 1944, it had increased slightly to 90 per cent. The magnitude of usage of the scheduled airlines during the Second World War, expressed in terms of passenger-miles, express ton-miles, and mail ton-miles is indicated in Table 14 on page 192.

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2Ibid., p. 3.

### TABLE 14

SELECTED DATA RELATIVE TO UTILIZATION OF SCHEDULED AIRLINES DURING WORLD WAR II

<table>
<thead>
<tr>
<th>Year</th>
<th>Passenger-Mile Utilization</th>
<th>Express Ton-Mile Utilization</th>
<th>Mail Ton-Mile Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>755,118</td>
<td>2,713,009</td>
<td>8,610,726</td>
</tr>
<tr>
<td>1940</td>
<td>1,157,900</td>
<td>3,476,224</td>
<td>10,117,858</td>
</tr>
<tr>
<td>1941</td>
<td>1,506,303</td>
<td>5,258,551</td>
<td>13,118,015</td>
</tr>
<tr>
<td>1942</td>
<td>1,501,279</td>
<td>11,901,793</td>
<td>21,162,102</td>
</tr>
<tr>
<td>1943</td>
<td>1,670,935</td>
<td>15,139,359</td>
<td>36,061,868</td>
</tr>
<tr>
<td>1944</td>
<td>2,211,905</td>
<td>16,991,598</td>
<td>51,139,973</td>
</tr>
<tr>
<td>1945</td>
<td>3,408,290</td>
<td>22,196,852</td>
<td>65,092,921</td>
</tr>
</tbody>
</table>

In addition to direct utilization of available facilities, the war effort also made other demands on the trunk-line carriers. The armed forces called into active duty all pilots and other personnel who were reserve officers and who were expendable as a result of the reductions in the size of the airline fleets. The airlines performed other types of service for the armed forces, including the flight instruction of army personnel, the training of various types of specialists, such as meteorologists, and the repair and overhauling of military aircraft engines and other equipment.\(^4\)

It may be concluded from these data that the trunk lines were relied upon very heavily in the conduct of the Second World War. From December 13, 1941, when the President issued Executive Order No. 8974, which directed the Secretary of War to assume control of the civil aviation system to the extent considered necessary to prosecute successfully the war effort,\(^5\) until the cessation of hostilities, there was heavy direct and indirect usage of the capabilities of the system. Though their magnitude and value are not readily ascertainable, there can be no


\(^5\)Ibid., pp. 269, 270.
question that these services were of considerable significance, particularly if the shortages of trained personnel and suitable equipment are kept in mind.

Though the feeder airlines were not in existence, it is possible to surmise the extent of the usage which would have been made of them during World War II. Unquestionably, the feeders could have furnished equipment and personnel in the same manner that the trunk carriers supplied them. The direct utilization which would have been made of the feeders, particularly if they had confined their operations to a route pattern similar to that under which they currently operate, is not so estimable, however, since there is some doubt as to whether the feeder route pattern covers points which would have been essential to the war effort, especially in relation to areas in which there is no duplication of trunk and feeder services. In view, however, of a considerable amount of discretionary power which was given to the Secretary of War to control civil aviation, it is conceivable that the feeders would not have been required to confine their operations to a set route pattern, but that they could have concentrated their operations in areas which would have been considered essential to the war effort. Had they not performed war-essential flying, they could have performed some of the non-military services which the trunk lines could not have handled. Under a system of wartime
administration in which the feeders would not have been confined to a servicing of feeder points only, it seems very probable that near-capacity utilization would have been made of their facilities which had not been sold outright to the military.

Korean War National Defense Usage of the Feeder Air Carriers

Inasmuch as the feeder carriers were in existence during the Korean War, it is possible to develop data which will indicate the contributions which they made in the course of that conflict. Initially, it will be advantageous to consider very briefly the national defense contributions which commercial air transportation in general made during the Korean War. Civil air carriers were organized "immediately upon the outbreak of hostilities" to operate an airlift to Japan, such airlift being integrated with the operations of the Military Air Transportation Service and directed by the Military Air Transportation Service. This service was performed on the trunkline routes between the west coast and Tokyo and was not employed between Japan and

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the Korean combat area. During the Korean operation, the average number of commercial aircraft augmenting the Military Air Transport Service capability was sixty, with the number of commercial aircraft reaching the peak figure of sixty-six in August, 1950. During this same period, the Military Air Transportation Service worldwide operational transport fleet consisted of 317 four-engine aircraft. Thus, the ratio of commercial aircraft to the total number of four-engine aircraft available to the MATS was 16 per cent. An analysis of traffic movement data reveals the fact that the commercial airlift capacity transported 25 per cent of worldwide military requirements during the period between July, 1950 and June, 1953. It should be pointed out that these figures reflect a higher rate of utilization of each commercial aircraft than of each MATS craft and a dispersion of MATS craft over areas in addition to those of the Korean sector.7

With reference to the usage of feeder facilities during this period, correspondence reveals that "during the Korean War, the local carriers were not called upon to contribute any aircraft for national defense purposes."8 If it is concluded that there is some reason to think that

7Ibid., p. 783. Department of Defense data.
8Personal correspondence of March 10, 1959, from John W. Dregge, Chief, Routes Division, Bureau of Air Operations, Civil Aeronautics Board, Washington, D. C.
the most likely future war need of air carriers will be
for support in limited conflicts, such as Korea and Suez, then it would appear that the feeder system will contribute virtually nothing in the way of equipment and performance of transportation service to the waging of these limited-war outbreaks, especially if past usage data are indicative of probable future utilization. Data which will be considered later in this chapter relative to planned utilization of commercial aircraft under various types of war conditions will tend to verify this tentative conclusion. Two significant factors may be used to explain the absence of utilization of the feeders during the emergency. First, it may be inferred from available data that they were not needed because of the availability of the MATS fleet and of commercial augmentation by the contract carriers which supplemented the operations of the MATS. The utilization of these contract carriers was particularly advantageous since their absence from the domestic system did not seriously, if at all, lessen the capability of the domestic carriers to perform the services demanded of them. Secondly, it

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9Dr. Allen R. Ferguson, Director of Research, The Transportation Center, Northwestern University, drew this conclusion in an address before the National Convention of the Air Force Association's Reserve Forces Seminar and Workshop, at Dallas, Texas, on September 25, 1958. The address was reprinted in The Journal of Air Law and Commerce, Volume 25, Autumn, 1958, p. 1482.
should be mentioned again that the feeder carriers perform their operations over specifically designated routes. As long as they are required to adhere to the route configuration which is in existence at the time of a particular emergency, any military traffic which these carriers transport will be that which requires air movement over the specific areas which they serve. Available statistics for the period covered by the Korean War do not reveal any direct military usage of the feeder carriers over the feeder route configuration as it existed at that time.

It seems, then, that the only possible national defense contributions which the feeders could have made during that period would have taken the form of making available their facilities for the domestic transportation of any non-military traffic which would have required movement over their routes as a result of the Korean emergency. Unfortunately, there is no way of determining directly whether the existence of emergency conditions necessitated the transportation of traffic in amounts greater than those which would have been transported in the absence of such emergency conditions. To get some conception of the rates of utilization of the feeders during the years of the Korean War and of those immediately preceding it, it will be helpful to consider Table 15 on page 199. The statistics in this table indicate the absolute and percentage changes which took place in both
<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue Passenger-Miles Carried [000]</th>
<th>Yearly Percentage Change in Revenue Passenger-Miles Carried</th>
<th>Total Revenue Ton-Miles Carried [000]</th>
<th>Yearly Percentage Change in Total Revenue Ton-Miles Carried</th>
</tr>
</thead>
<tbody>
<tr>
<td>1945</td>
<td>1,312</td>
<td>-----</td>
<td>202</td>
<td>-----</td>
</tr>
<tr>
<td>1946</td>
<td>6,812</td>
<td>419.2 %</td>
<td>688</td>
<td>240.6 %</td>
</tr>
<tr>
<td>1947</td>
<td>46,418</td>
<td>581.4</td>
<td>4,682</td>
<td>580.5</td>
</tr>
<tr>
<td>1948</td>
<td>87,928</td>
<td>89.4</td>
<td>9,040</td>
<td>93.1</td>
</tr>
<tr>
<td>1949</td>
<td>134,691</td>
<td>53.2</td>
<td>14,197</td>
<td>57.0</td>
</tr>
<tr>
<td>1950</td>
<td>188,782</td>
<td>40.2</td>
<td>20,307</td>
<td>43.0</td>
</tr>
<tr>
<td>1951</td>
<td>289,644</td>
<td>53.4</td>
<td>30,651</td>
<td>50.9</td>
</tr>
<tr>
<td>1952</td>
<td>339,763</td>
<td>17.3</td>
<td>35,471</td>
<td>15.7</td>
</tr>
<tr>
<td>1953*</td>
<td>391,384</td>
<td>15.2</td>
<td>40,147</td>
<td>13.2</td>
</tr>
</tbody>
</table>

*Preliminary figures.

revenue passenger-miles and total revenue ton-miles, including passenger revenue ton-miles, carried by the feeder airlines between 1945 and 1953. For both of these indicators, it may be seen that, except for the year 1951, the utilization for each of the years between 1947 and 1953 was increasing at a decreasing rate. These statistics do not reveal the causes for such changes, but they do reflect the fact that even with the addition of traffic, if any, which moved solely as a result of the Korean War, the rates of utilization did not increase for any year of the Korean War as rapidly as they had increased for any one of the years prior to the Korean War. On the basis of a consideration of these data, it seems that the Korean emergency did not require a significant, if any, increase in the utilization of available feeder facilities, particularly if it were assumed that non-emergency traffic had maintained something approaching its pre-Korean War rate of growth.

As it is argued today that the stand-by capacity of the feeder system has national defense value, it might have been argued prior to the beginning of the Korean War hostilities that the availability of such stand-by facilities also had national-defense value. Looking at this argument in retrospect, however, it might just as easily be argued that the significance of such facilities was nil in view of the usage made of them.
Available data do not indicate that the facilities of the feeder system were required for the performance of the Berlin airlift operations. As far as can be determined, Defense Department "records of commercial augmentation during the period of the Berlin airlift have been retired." In the conduct of the airlift operations, trunk-line routes were followed, with all commercial flights terminating at Frankfort. There were no contract carriers making flights through the "corridor" to Berlin itself.10

Current and Future Military Airlift Requirements and the Types of Programs Designed to Meet These Requirements

Thus far it has been determined that there is no current military usage of the facilities of the feeder system and that the feeders did not make any direct national defense contributions in any of the emergencies which developed during their existence. As far as usage value is concerned, then, any direct utilization of the feeder system will be potential utilization which will take place in the event of the outbreak of emergency conditions of such a nature that the utilization of the feeder facilities is required. For the purpose of obtaining a notion of the

10Military Air Transportation, op. cit., p. 783.
national defense demands which may be made upon the feeder system in the event of future emergencies, it will be helpful to consider the nature of the procedures which will be followed to arrive at the wartime requirements. "Under present procedures, the development of wartime airlift requirements is approximately as follows:

1. The Joint Chiefs of Staff prepare war plans.

2. The three military departments compile the logistic requirements they consider necessary to perform their wartime tasks.

3. The JCS put these requirements together, producing a total requirement to support the war plans. [It should be pointed out that this requirement is classified 'top secret'.]

4. The airlift portion of total requirements, expressed in ton-miles, is then handed over to the Air Force and MATS translates these ton-miles into specific aircraft capabilities.

5. That portion of the JCS airlift requirement which is left after subtracting MATS capabilities is referred to ODM [Office of Defense Mobilization] and the Department of Commerce.

6. Within the Department of Commerce, the Defense Air Transportation Administration [comprising four professional persons] works with the civil transport industry and the military authorities to develop the annual CRAF [Civil Reserve Air Fleet] program.

7. These yearly allocations of civil planes to CRAF are then 'approved' by ODM, which does not participate in the allocations process.

8. The remaining civil capacity theoretically is redistributed also with ODM 'approval,' for essential wartime needs; this responsibility
is delegated by the Secretary of Commerce to the chairman of the Civil Aeronautics Board. The 'remaining civil capacity' constitutes the War Air Service Pattern [WASP].

It should be stressed that much of the requirements data is classified information and that complete requirements data are unobtainable. Obviously, the nature of war conditions is such that a whole range of requirements must be formulated in anticipation of a wide variety of emergency conditions. It has been pointed out by General Woolnough, Director of Plans, Office of the Deputy Chief of Staff for Military Operations, that the military has plans which "cover a wide variety of situations, such as moving a small force a short distance to moving a large force a long distance." As a result of the unpredictability of the nature of the emergencies which might arise, General Woolnough asserts that "the total airlift requirements can vary by a factor of four in the plans which I have in my office."

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12Military Air Transportation, Hearings, op. cit., p. 473.
The Military Air Transportation Service

Before considering the position which the feeders might be expected to occupy in the wartime requirements plans of the military, it will be advantageous to consider the types of programs which have been developed to supply airlift and the order of usage of the groups of carriers included in these programs. In this manner, it will be possible to get a clearer picture of the likelihood of use of the feeder system in the event of emergency. The first of these programs to be considered is that of the Military Air Transportation Service [MATS]. It is an organization which controls aircraft employed in varied technical services, such as Air Photography and Chartering Service, Air Rescue Service, Airways and Air Communication Service, training and testing, troop carriage, aeromedical evacuation, special air missions, and scheduled transportation of passengers and cargo for military and other operations. According to the statistics made available to the Committee on Government Operations, the operations of the MATS in fiscal year 1957 involved the employment of more than 1,400 aircraft, the utilization of personnel in excess of 120,000, and the incurrence of costs in excess of $700,000,000. Of importance for the purposes of this analysis is the fact that the MATS is engaged in overseas transportation on scheduled, worldwide routes,
such operations involving the use of approximately 600 aircraft in fiscal year 1957. As far as the movement of people and cargo is concerned, the MATS "provides overseas airlift services to the Department of Defense and (when authorized) other Government agencies through its own fleet and also procures supplemental service from commercial carriers." Thus, the Air Force is the "single manager" for overseas airlift services, and the MATS is its operating agent.

Though not germane to the conduct of this study, it might be mentioned that the Committee on Government Operations made the charge that

Department of Defense directives and Air Force regulations add up to a policy of full and preferential use of the MATS resources in peacetime military airlift before resorting to the services of commercial air carriers.

It continues that by "running a scheduled airline for overseas transportation, the MATS is in effect preempting a field which should be occupied by the commercial air carriers." The position of the Air Force is that "it finds no place for, and does not plan on, the use of civil aircraft in advance strategic deployment or immediate emergency airlift." According to the Air Force, the size of the MATS fleet is associated with military airlift capabilities

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13Military Air Transportation, Report, op. cit., p. 5.
14Ibid., p. 11.
15Ibid., p. 5.
regarded as "irreducible and irreplacable," and it "will concede no reduction in MATS lest its wartime mission be jeopardized."  

It should be indicated, however, that the MATS procures commercial airlift services to supplement its own transport operations, these purchases being made on a contractual basis. Thus, for fiscal year 1957, the MATS' dollar procurement of commercial airlift was $49,746,935, while for 1958 and 1959 it was estimated that the amounts of dollar procurement of commercial airlift would be $69,832,000 and $84,000,000 respectively.  

The Logair Operations

The operations of the MATS, as has been seen, do not involve the performance of domestic transportation services. In the United States, there are several programs which are designed specifically to provide transportation services for the military. Whereas the Air Force is the "single manager" for overseas airlift services and the MATS is its operating agent, the Army is the "single manager" for domestic transportation and the Military Traffic Management Agency [MTMA] is its agent. Among other duties, the Military Traffic Management Agency arranges for the movement

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16 Ibid., p. 84.
17 Ibid., p. 19.
of military passengers in groups of fifteen or more and supervises Air Force and Navy contracting operations for domestic cargo airlift. With specific reference to domestic military air transportation, the important programs are classified under the headings of Logair and Quicktrans for the movement of cargo and Commercial Air Movement [CAM] for the movement of passengers. The latter abbreviation is used to identify a "group military commercial air movement, comprising fifteen or more individuals." The arrangements for CAM flights are made by the MTMA, such movements being made on the basis of either charter operations, in which the entire capacity of a plane is procured, or block-purchasing procedures, under which a block of seats is purchased from the scheduled air carriers.

In making the arrangements for any particular CAM movement, the MTMA determines initially whether the requirement is for the use of air services. If this is the case, the nature of the requirement is made known to the air-carrier association which, acting as an agent for its member carriers, submits schedules and costs pertinent to the desired movements. The quotations and schedules are evaluated as to service and cost, and the movement is awarded to the "air carrier or carriers offering the

18Ibid., p. 11.
19Military Air Transportation, Hearings, op. cit., p. 459.
service at the least cost to meet the requirement." If the movement does not of necessity require air transporta-
tion, then the same selection procedure which was utilized
to determine the specific carrier or carriers for the per-
formance of the air service is applied in the selection of
the specific carrier or carriers from among both the air
and surface modes of transportation.\textsuperscript{20}

Logair and Quicktrans are long-term contract air
operations which were established by the Air Force and
the Navy, respectively, for the purpose of meeting Air
Force and Navy air-freight requirements within the United
States.

The nature of the Logair operations, the more im-
portant of these two, will be considered in more detail
in the next paragraph. It might be pointed out that the
present Logair and Quicktrans contracts were executed
prior to the inauguration by the MIMA of the policy of
evaluating such long-term contracts. In view of this
fact, the MIMA is currently preparing a study to determine
the need for and the desirability of the continuance of
such contracts upon their expiration. The main objective
of the MIMA study is to determine whether the contract
approach is the most economical and satisfactory way of
meeting the military requirements or whether alternatives,

\textsuperscript{20}Ibid., pp. 459, 460.
such as the use of existing common-carrier air services, would be likely to bring better results.\textsuperscript{21}

The Air Materiel Command [AMC] of the Air Force manages the Logair operations, which operations provide domestic cargo airlift to some fifty air force bases and installations in the United States on the basis of contracts negotiated with four commercial carriers. The AMC also manages a domestic cargo service operating between both coasts with intermediate pick-up and delivery points under contract with one carrier, this being the Quicktrans service. As the more important of these two programs is Logair, the remainder of this section will be devoted to a brief consideration of the nature of its operations.

The Logair airlift is a scheduled cargo operation performed by four commercial air carriers. Whereas the original Logair contracts were let on a competitive-bid basis for a period of one year, the present contracts are negotiated contracts with a two-year option clause which is contingent upon such factors as possible reductions in plane-mile rates, the specific military requirements, and the availability of funds. The fifty bases and installations are served under a pattern of special routes and

\begin{flushright}
\textsuperscript{21}Ibid., p. 460. Statement of Major General Paul F. Yount, Chief of Transportation, Department of the Army.
\end{flushright}
flight frequencies. Using their own fleets which are com­posed entirely of C-46's and C-54's, the contractors fur­nish all personnel, equipment, materials, and supplies necessary to provide these services, except that the gov­ernment provides communications facilities along the routes flown, gasoline, oil, and emergency maintenance services at cost. In addition, it performs loading and unloading operations at the Air Force bases. Table 16 on page 211 will indicate the magnitude of Logair operations.

At this point, it might be concluded that the major effect on the feeder carriers of the conduct of the Logair operations is a possible diversionary effect, especially if it is assumed that the feeder service is responsive to military needs. At this juncture, also, it might be men­tioned that the Air Materiel Command does not consider that the common-carrier facilities in general are responsive to military requirements. The reasons for this belief will be treated in a later section of this chapter in which greater consideration will be given to the air-transporta­tion philosophy of the AMC and to some of the specific reasons for usage of Logair facilities instead of utiliza­tion of the feeder carriers.

22Military Air Transportation, Report, op. cit., p. 27.
TABLE 16
AIR FORCE LOGAIR DATA FOR FISCAL YEARS 1955 - 1959

<table>
<thead>
<tr>
<th></th>
<th>Fiscal Year 1955</th>
<th>Fiscal Year 1956</th>
<th>Fiscal Year 1957</th>
<th>Fiscal Year 1958 (Budget Estimate)</th>
<th>Fiscal Year 1959 (Estimate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonnage</td>
<td>44,598</td>
<td>97,828</td>
<td>131,309</td>
<td>163,373</td>
<td>----</td>
</tr>
<tr>
<td>Plane-miles</td>
<td>7,120,727</td>
<td>17,616,591</td>
<td>24,200,682(^1)</td>
<td>27,731,879</td>
<td>28,000,000</td>
</tr>
<tr>
<td>Ton-miles Flown</td>
<td>42,816,998</td>
<td>96,131,852</td>
<td>126,588,556</td>
<td>-----</td>
<td>60,982,408(^3)</td>
</tr>
<tr>
<td>Direct Cost</td>
<td>$5,317,050</td>
<td>$14,001,000</td>
<td>$18,030,000</td>
<td>$21,700,000(^2)</td>
<td>$22,200,000</td>
</tr>
<tr>
<td>Cost Per Ton-mile</td>
<td>$0.124</td>
<td>$0.146</td>
<td>$0.142</td>
<td>-----</td>
<td>$0.139(^3)</td>
</tr>
<tr>
<td></td>
<td>$0.120(^3)</td>
<td>$0.141(^3)</td>
<td>$0.137(^3)</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Number of Bases Served</td>
<td>11(^4)</td>
<td>19(^5)</td>
<td>34(^6)</td>
<td>50(^7)</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>15(^5)</td>
<td>31(^6)</td>
<td>47(^7)</td>
<td>52(^8)</td>
<td>----</td>
</tr>
</tbody>
</table>

\(^1\)Estimate.
\(^2\)Does not include all Logair expansion during current fiscal year 1958.
\(^3\)Without 3 per cent transportation tax.
\(^4\)July, 1954.
\(^6\)July, 1956.
\(^7\)July, 1957.
\(^8\)January, 1958.
\(^9\)First quarter of 1959 only.

The Civil Reserve Air Fleet

It may be recalled from an earlier section that the Joint Chiefs of Staff prepare war plans and consolidate them with the logistic requirements formulated by the three military departments to produce a "total requirement to support the war plans," which requirement is then labeled as "Top Secret." These requirements are given to the Air Force, and the MATS determines its capability of fulfilling them. The difference between the MATS capability and the total requirements is the Civil Reserve Air Fleet [CRAF] requirement, which is classified as "Secret" information. It may be inferred that the CRAF requirement is likely to vary from year to year, such fluctuations being dependent largely on the yearly total requirements and on the size and rate of utilization of the MATS fleet. It should be kept in mind that the Department of Defense policies and directives indicate that, within the United States, commercial transportation will be used to the maximum extent possible, but that, outside the United States, military facilities will be used, as long as they are available, prior to the utilization of commercial transport.

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The CRAF plan represents the assignment of suitable four-engine aircraft to a mobilization fleet prepared to respond to wartime demand within forty-eight hours. The craft in the CRAF plan are owned and operated by commercial carriers, but they have been or are to be modified at government expense to permit ready adaptation to military-transport needs. The government also furnishes certain strategically located spare parts and facilities for use in emergencies.\textsuperscript{25} At the present time the CRAF cannot be utilized unless a national emergency is declared. As a result, it is the responsibility of the MATS prior to the declaration of a national emergency to be prepared to carry out any necessary missions without the CRAF.\textsuperscript{26} It has been stated that the emergency missions for both the MATS and the CRAF are predicated upon the existence of a condition of full-scale mobilization. However, according to Assistant Secretary of the Air Force, Dudley C. Sharp, the Air Force has been having "some second thoughts" in this respect. Possibly, he suggests, the airlift requirements for local war might equal or exceed those for

\begin{footnotesize}
\textsuperscript{25}Military Air Transportation, Report, op. cit., p. 31.
\textsuperscript{26}Military Air Transportation, Hearings, op. cit., p. 510. Statement of Brigadier General Albert T. Wilson, Jr., Deputy Chief of Staff, Operations, Headquarters, MATS.
\end{footnotesize}
all-out war. In addition, if a condition of local war were accompanied by the continued threat of general hostilities, then the CRAF might be needed to permit the retention of the MATS fleet in a position which would enable it to be deployed strategically. 27

The assignments of aircraft to the CRAF are made by the Defense Air Transportation Administration [DATA] in the Department of Commerce. An Allocation Advisory Committee in the DATA, comprised of civil and military government representatives and airline executives, makes proposed allocations based upon statements of requirements submitted by the Department of Defense. After receipt of the proposed allocations, a logistics working group within the DATA proposes an operating plan and a logistics support plan for the period under consideration and then publishes the revised allocation, which becomes the yearly CRAF plan. In the event of war, the logistics working group will be transformed from a planning body into an operating one, consisting of one member from each participating airline and of representatives from the MATS, the AMC, and the DATA. In the event of utilization, each carrier would perform service in accordance with a contract separately entered into with the government. Under the terms of the contract, each carrier would use its own

27 Ibid., p. 501.
aircraft, personnel, repair and maintenance installations, and other ground facilities in the operation of the CRAF. However, these carriers would be required to enter into arrangements for the pooling of such services and personnel for the purpose of accomplishing their assigned tasks.28

To obtain an indication of the number and types of aircraft which are allocated to the CRAF, it will be advantageous to consider Table 17 on page 216. The number of planes in the CRAF reached a peak of 368 in 1958, and it will decrease to 309 in 1959 and to 281 in 1960. The available ton-miles also will drop from 8.71 millions in 1958 to 7.56 millions in 1959, but they will rise to 7.93 millions in 1960, this increase reflecting the increased capacity of the types of planes which will comprise the 1960 CRAF fleet. It might be pointed out that the original allocation to the CRAF consisted of 40 per cent of the four-engine aircraft of the civil carriers. The figure for 1958 was around 33 per cent; for 1959 it will be approximately 28 per cent; and, for 1960, it is estimated at about 26 per cent. These decreases have been occasioned by the acquisition of airlift capability by the airlines in amounts which are increasing more rapidly than are the military requirements of the CRAF increasing. From July,

### TABLE 17

**ALLOCATIONS OF AIRCRAFT TO THE CIVIL RESERVE AIR FLEET**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Heavy Cargo:</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Lockheed L-1049H</td>
<td></td>
<td>140</td>
<td>115</td>
<td>123</td>
<td>125</td>
<td>119</td>
<td>124</td>
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<td>72</td>
</tr>
<tr>
<td>Douglas DC-6A</td>
<td></td>
<td>14</td>
<td>10</td>
<td>13</td>
<td>27</td>
<td>32</td>
<td>46</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Douglas DC-4</td>
<td></td>
<td>27</td>
<td>33</td>
<td>40</td>
<td>27</td>
<td>32</td>
<td>46</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td>140</td>
<td>129</td>
<td>133</td>
<td>138</td>
<td>150</td>
<td>183</td>
<td>164</td>
<td>166</td>
</tr>
<tr>
<td><strong>Million Ton-miles</strong></td>
<td></td>
<td>2.12</td>
<td>2.16</td>
<td>2.16</td>
<td>2.28</td>
<td>2.73</td>
<td>3.66</td>
<td>3.67</td>
<td>3.92</td>
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<tr>
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<td>33</td>
<td>5</td>
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<tr>
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<td>56</td>
<td>57</td>
<td>61</td>
<td>24</td>
<td>39</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Douglas DC-7/7B</td>
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<td>47</td>
<td>49</td>
<td>43</td>
<td>39</td>
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<td>12</td>
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<tr>
<td>Lockheed L-049</td>
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<tr>
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<td>47</td>
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</tr>
<tr>
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<td>Boeing B-377</td>
<td></td>
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<td>24</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td></td>
<td>331</td>
<td>294</td>
<td>308</td>
<td>317</td>
<td>350</td>
<td>368</td>
<td>309</td>
<td>281</td>
</tr>
<tr>
<td><strong>Million Ton-miles</strong></td>
<td></td>
<td>5.79</td>
<td>5.98</td>
<td>6.18</td>
<td>6.40</td>
<td>7.65</td>
<td>8.71</td>
<td>7.56</td>
<td>7.93</td>
</tr>
</tbody>
</table>

1 Years are for calendar years 1951-55; 1956-57 extended 18 months to convert to fiscal years; 1958-60 are for fiscal years ending June 30 of the year shown.
2 In millions of available ton-miles per 10-hour day as reported for same aircraft in commercial service. These are not the capabilities on CRAF routes which are classified "secret," and these figures are only shown for a very general idea of the relative capacities of CRAF aircraft as presently employed on commercial routes.

1952, through the 1958 fiscal year, it was estimated that the CRAF cost the government $38,735,000, including $6,950,000 for group A modification; $6,880,000 for group B parts; $22,400,000 for route logistics support in the form of the stockpile requirement; $1,000,000 for planning; $370,000 for preparation of the overseas CRAF bases; and $1,135,000 for maintenance of the stockpile for the overseas CRAF bases.

Before the planes in the CRAF are used in military operations, they must receive group A and group B modifications. The former type of modifications include all wiring and brackets in the planes, whereas the group B type includes navigation equipment, radio equipment, survival gear, and one piece of equipment - IFF - which is classified and kept by the Air Force, and not by the airlines. The remainder of the group B equipment is stored at the airlines' main bases, where the airlines come to bring in the CRAF planes, "plug in the group B, and take off on their missions." The group B equipment is basically a responsibility of the Air Force insofar as procurement and placement with the airlines are concerned, but

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there are contract problems involved relative to the storage of this equipment and to security clearance.\(^{30}\)

In relation to the procurement of personnel, the following information will be indicative of the plans for the obtaining of pilots and mechanics for the CRAF. Insofar as pilots are concerned, about 3,500 out of some 14,000, or approximately 25 per cent of the total airline pilots now in the airline industry, would be needed in the CRAF. About 33 per cent of the pilots are now in the military reserves, with the likelihood being that only a "relatively small portion" of them would be called up in the ready reserve. The others are in the inactive reserve, and though it is unlikely to be necessary to do so, it is possible that these inactive reservists "could be called up, put in their blue suits and put on CRAF planes." There are approximately 50,000 mechanics in the airlines, whereas the number of CRAF mechanics needed overseas would be about 700, or less than two per cent of the total number of available mechanics. It is estimated that there would be "plenty" from among those who are presently stationed overseas and from volunteers. If not, those who are in the inactive reserves could be "called up and put in blue suits and stationed in the CRAF if necessary, as well as others

\(^{30}\text{ibid.}, pp. 233, 234. Statement of David W. Bluestone.\)
subject to selective service who would have occupational deferments which could be canceled." Thus "700 out of 50,000 doesn't seem to be a very critical problem." The DATA has given priority to the assignment of airline personnel to the CRAF, so that whatever shortage there is will actually be left in the domestic War Air Service Pattern [WASP], which will be considered in the next section of this chapter.

The general tenor of the Military Air Transportation hearings insofar as much of the military testimony was concerned was to the effect that a trained and ready nucleus of military airlift is necessary for the successful execution of current war plans and that a civil reserve air fleet can not perform "substantially more" of the emergency airlift task than is now planned for it, particularly as performance relates to "reaction time, responsiveness, and types of aircraft." It may be concluded, however, from Secretary Sharp's testimony that the military airlift forces, as augmented by the CRAF, are "generally adequate" to meet the airlift requirements which arise from current plans.

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32Ibid.
For the fiscal year beginning July 1, 1959, no aircraft of the feeder lines were assigned to the CRAF. The primary reasons for the presentation of these data relative to the nature and requirements of the MATS, Logair, and the CRAF were to develop data relative to the nature of the current and future emergency airlift requirements and to provide insights both into the probable use of feeders under emergency conditions and into the shortcomings of the feeder operations and facilities insofar as the satisfaction of military requirements is concerned.

The War Air Service Pattern

The War Air Service Pattern [WASP] is a program for the utilization of the commercial fleet for the performance of domestic transportation in the event of an emergency. The "operational plan for WASP is really the day-to-day operations of the airlines as they exist today."

Thus, in the event of "need," the CRAF requirements are subtracted from the total commercial airlift capability, and the remainder constitutes the WASP fleet, which the carriers will operate essentially as they do at the present time. The only significant government control which

34 Personal correspondence of May 26, 1959, from Warner H. Hord, Chief, Office of Carrier Accounts and Statistics, Civil Aeronautics Board, Washington, D. C.
will be exercised over this fleet will be that administered by the Civil Aeronautics Board in transferring airlift from one carrier to another in such a way as to meet the highest priority airlift needs. The Civil Aeronautics Board, as a result of delegation of power from the Secretary of Commerce to the Chairman of the Board, has authority

...to formulate plans and programs for, initiate actions for, and carry out such distribution and redistribution of civil aircraft among the civil air carriers as may be necessary to assure the maintenance of essential civil routes and services after allocation has been made to the Department of Defense.35

Thus, after consideration has been given to this power of the Civil Aeronautics Board to manipulate the craft of the commercial fleets, it may be seen that for the WASP "the operating plan as such is what the airlines operate, day after day." In this respect, "there is no new system to be set up for that, the way there is for CRAF," as "it is running right now."36 The Civil Aeronautics Board control would permit operational flexibility, as it would make it possible for the Board to shift civil operations from one route to another route and from one carrier to another carrier in such a way that the essential


wartime traffic movements could take place as required. There is no plan, under the WASP,

...to suddenly change the air carrier system or the route structure. What we have done is plan out a system by which we will correct and make more adaptable to the needs of wartime the actual system which we have today.\(^{37}\)

In this respect, any planning has to count on a great deal of flexibility between the CRAF and the WASP. Thus, if national survival should require that the CRAF suddenly be increased, it would be possible to transfer whatever is needed from the WASP over to the CRAF. On the other hand, if this country were to be bombed very heavily, it might be that the WASP would have to be increased at the expense of the CRAF. Thus, the

WASP is always potentially additional CRAF, and CRAF is always potentially additional WASP. It is one big pool and you operate them separately, but one of our problems is to make it easy to switch from one to the other.\(^ {38}\)

The civil air carrier system would be "absolutely imperative in time of war to provide transportation to the priority traffic." In fact, "the concern of the WASP program" is the establishment and operation of a wartime transportation system for the purpose of transporting priority traffic primarily in the United States.\(^ {39}\)

\(^{37}\text{Ibid.}, p. 310.\) Testimony of Joseph H. Fitzgerald.

\(^{38}\text{Ibid.}, p. 259.\) Statement of David W. Bluestone.

It seems, then, from a consideration of the data presented in this and the preceding chapters that the only contribution of a direct-usage nature which the feeder system will make to national defense is that which it might make through the WASP if the nature of emergency conditions warranted such usage. It has already been indicated that a local war, such as the Korean conflict, did not require the utilization of the feeder system. As far as plans for the future are concerned, not even the CRAF is to be called into use unless a national emergency is declared. Then, the emergency needs for the CRAF would be met from the civil fleet, and the remainder of the commercial planes would constitute the WASP. The actual wartime utilization of the WASP fleet would depend, then, on the seriousness of the emergency which confronted the economy. Utilization of the feeder fleet conceivably could run the gamut from no utilization at all to possible utilization of all the feeder craft in the system. In this latter respect, it has been stated that "we probably would" utilize any plane in the United States for airlift purposes in the event of "an emergency," its nature not being specified.\(^4\) A summary statement at this point would

indicate that the feeder system performs no direct-use services for national defense at the present time and that any future national defense usage would be made only in the event of the declaration of a national emergency and the existence of conditions which were critical enough to require such utilization, an eventuality the likelihood of which is highly unpredictable.

The Deterrence Concept

For the attainment of a comprehensive coverage of the actual and potential contributions of the feeder system to national defense, it seems that some consideration should be given to the deterrence value of such system insofar as national defense is concerned. In this respect, the problem is to determine whether it can be said that the existence of the feeder system constitutes an asset which would be assigned some weight by a potential aggressor nation as a part of the total capability of the United States to deter any advances which such nation might consider making. If the answer to this problem is in the affirmative, then it might be said that the feeder system contributes deterrence value to national defense. To this writer's knowledge, no consideration of the deterrence value of any part of the common-carrier air transportation system has ever been undertaken.
Before considering the deterrence threat which the feeder system poses, it is necessary to define the deterrence concept. Such conceptualization is no easy matter inasmuch as there is no unanimity of opinion, even among military experts, either as to what deterrence is in the abstract or as to what should be the specific components of an "adequate" deterrent force. No doubt a part of this ambiguity stems from the impossibility of determining precisely the goals of a potential enemy and the lengths to which such enemy would go in its attempt to attain such objectives. The nature of the particular problem may be epitomized in the words of Henry Kissinger, who states that "...strategy can only count with a somewhat rational enemy; nothing can deter an opponent bent on self-destruction." 41

General Curtis E. LeMay avers that a deterrent force is one that is

...large enough and efficient enough that no matter what the enemy force does, either offensively or defensively, he still will receive a quantity of bombs or explosive force than is more than he is willing to accept. Therefore, he never starts a war. 42

According to Kissinger, deterrence is "the attempt to keep an opponent from adopting a certain course of action by posing risks which will seem to him out of proportion to any gain to be achieved." It is achieved when the "opponent cannot calculate any gain from the action we seek to prevent...." Inasmuch, however, as "what is considered gain is, for purposes of deterrence, determined by his criteria, not ours," our doctrine must pay "particular attention to determining how the other side calculates its risks." Further, "maximum deterrence can be equated with the threat of maximum destructiveness," but "...deterrence is greatest when military strength is coupled with the willingness to employ it."

Inasmuch as this section of the study is designed to analyze the deterrence value of the feeder system, it is necessary in the analytical process to determine what expert opinion considers to be the essential components of the deterrent force and then to determine whether the feeder system does make any contribution to the deterrent base. In fine, the question to be answered is whether our deterrence program benefits from the existence of the feeder

\[43\] Kissinger, op. cit., p. 96.
\[44\] Ibid., p. 405.
\[45\] Ibid., p. 132.
system. General LeMay has stated that there is no way of achieving deterrence except through absolute numerical superiority of our long-range striking force. According to him, "the first thing that must be done in modern war is to win the airpower battle." Doubtlessly, General LeMay would fail to receive unqualified acceptance of these statements, particularly since they contain the seeds for inter-service rivalries. Kissinger, for example, argues that under modern conditions, characterized by large numbers of nuclear weapons,

...deterrence can no longer be measured by absolute number of bombs and planes. To seek safety in numerical superiority, or even in superior destructiveness, may come close to a Maginot-line mentality - to seek in numbers a substitute for conception.

He does concede, however, that "the key to survival is the possession of an adequate retaliatory force. Without a powerful SAC no other measures are possible."

The frequent appearance of terms such as "long-range striking force" and "adequate retaliatory force" seems to indicate the essence of a deterrence program. Just as frequently as deterrence is identified with some variation of the concept of strategic striking power, such striking

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47 Ibid., p. 102.
48 Kissinger, op. cit., p. 60.
power seems to be identified with the possession of and willingness to use such instruments as ballistic missiles, thermonuclear bombs, and nuclear weapons. Thus, the British Statement on Defence for 1956 stated that: "the increased power of the deterrent, that is the nuclear weapon and the means of delivering it, has made global war more frightening and less likely." The British White Paper of April, 1957, continued this trend of thinking by placing almost exclusive reliance on strategic striking power, particularly on intermediate-range missiles. 49

A deterrent force should be effective in "deterring" both all-out and limited wars. In this respect, it is important to indicate that: "limited war is...not an alternative to massive retaliation, but its complement. It is the capability for massive retaliation which provides the sanction against expanding the war." 50 Limited war

...reflects an attempt to affect the opponent's will, not to crush it, to make the conditions to be imposed seem more attractive than continued resistance, to strive for specific goals and not for complete annihilation. 51

49 Ibid., p. 275.
50 Ibid., p. 145.
51 Ibid., p. 140.
As Kissinger views it, the problem in a limited war is to apply "graduated amounts of destruction for limited objectives and also to permit the necessary breathing spaces for political contacts." The development of one weapons system for limited conflict and of another for all-out war also has the advantage of not utilizing, and thus of not revealing the nature of, the massive retaliatory force in a limited-war situation, but of "reserving" it for later use, under the assumption that such a reservation will have the effect of preventing a limited war from becoming an all-out war. Whereas the weapons system for all-out war is designed "to inflict maximum destruction in the shortest time," the weapons system for a limited war must be "flexible and discriminatory," such a system being composed of units of "high mobility and considerable firepower which can be quickly moved to trouble spots and which can bring their power to bear with discrimination."\(^{32}\)

It yet remains to consider the possible contributions that the feeder system can make to the United States deterrent force. As has been seen from a consideration of the material presented up to this point, the strength of the deterrent may be said to depend upon the composition and strength of our strategic striking power or upon the capability of our retaliatory force. The key to a "satisfactory" deterrent program seems to reside, then, in the availability of and the willingness to use such things as nuclear weapons, thermonuclear bombs, and ballistic missiles. As Kissinger states, "...from the point of view of deterrence, the availability of a wide spectrum of nuclear weapons increases the aggressor's risks."\(^{53}\) Insofar as the ability to wage an offensive war is concerned, assuming that willingness accompanies ability, the two basic advances in the near future are likely to take place in the development of the nuclear-powered aircraft and the ballistic missile.\(^{54}\) Defensively, enemy attacks on the United States will become subject to heavy interceptor attacks in the form of "anti-aircraft fire, which by 1959 will be almost entirely composed of guided missiles...." These missile defenses are becoming increasingly formidable, especially with the use of atomic warheads.\(^{55}\)

Additional data may be introduced to indicate the probable large-scale substitution of the weapons system of modern warfare for that of conventional warfare. Thus, it is maintained that the speed of missiles and the possibility

\(^{32}\text{Ibid., pp. 156, 157.}\)

\(^{53}\text{Ibid., p. 191.}\)

\(^{54}\text{Ibid., p. 120.}\)

\(^{55}\text{Ibid., p. 107.}\)
of launching them in large quantities are so great "as to make the survival of manned bombers exceedingly difficult." It has been further pointed out that the attrition rate of the air defense against manned planes, however powered, is "sufficiently high so that a strategic attack carried out with conventional explosives would be uneconomical and even thermonuclear attack with manned planes may in time become very difficult."56

As may be inferred from a consideration of the foregoing data presented with reference to deterrence, probably the only contribution that the feeder system would make in any future conflict would be the transportation of persons and cargo. It is likely that the modifications which would be required to equip the feeder craft with striking power would be either impossible to make or too time-consuming to effect, particularly in a serious emergency. Assuming away present route and operational requirements, the feeder system could perform any amount of transportation service for national defense until it reached the physical limit imposed by the number and capacity of its facilities. With these data in mind, the possible contributions of the feeders may be considered under both limited-and all-out war conditions. In the past, the feeder system, as has been seen, has not

56Ibid., pp. 121, 122.
been used in any of the local conflicts, even for cargo carriage, and current CRAF plans do not contemplate its usage except in the event that an emergency develops which is of such a nature that the WASP would have to be put into effect, the usage of both the CRAF and the WASP being predicated upon the declaration of a national emergency. Depending, then, upon how a "limited war" is conceptualized, it might be possible that the feeder system would not be used at all. Thus, under present plans, it is very unlikely that it would be used in any outbreak short of the "national-emergency type," and even then it might not be put into use. The awareness by a potential enemy of such plans for usage of the domestic fleet, especially of the feeder carriers, is likely to lead such an enemy to assign little, if any, value to the feeder system as a deterrent to the initiation of a limited war.

The significance of the feeder system as a deterrent to all-out war seems to depend upon the manner in which the deterrent force is defined. If it is stated in terms of a concept such as strategic striking power, then the feeder system probably has nothing to contribute to such a striking force. That is to say, the nature of the feeder equipment does not qualify it for a position in the striking-force capability, nor is it very likely that the nature of all-out war conditions would permit the expenditure of time
necessary to modify the craft, even in the event that such modifications would permit the development of the types of planes that could occupy a position as a part of the strategic striking force.

On the other hand, if a potential aggressor conceives of the deterrent as being composed of the strategic striking force and also its military and civil complement, such a conceptualization might result in the assigning of some deterrence value to the feeder system by such a potential aggressor nation, though no possession of knowledge short of omniscience would permit the development of standards by which it would be possible to measure the magnitude of this value. The enemy's conception of this deterrent threat probably would be largely dependent upon its estimates of how destructive its attack would be and of the duration of any resulting conflict. If the potential aggressor nation envisioned our near annihilation and a short conflict as a result of her attack, then the existence of the feeder system would probably not constitute very much, if any, of a deterrent. The probable value which would be assigned to the feeder system would tend to increase as there was a decrease in the amount of damage expected to be inflicted and as there was an increase in the anticipated duration of the resulting conflict, inasmuch as such conditions would be more likely to necessitate the utilization of the passenger- and cargo-carrying capacity
of the feeder system. However, even in the latter case of a relatively long conflict, it seems that the significance which would be assigned by a potential aggressor to the deterrent value of the feeder system would be relatively insignificant, generally because of the equipment limitations of the feeder carriers in the meeting of the requirements which an all-out war would be likely to impose, unless, of course, the emergency would be so critical as to require the utilization of feeder airlift regardless of its limitations.

Salient National Defense Advantages and Disadvantages of the Feeder System

This chapter and the one preceding it have been concerned primarily with the significance of the feeder system insofar as national defense is concerned. In the consideration of this matter, there has been little explicit consideration of the particular advantages and disadvantages of the feeder system insofar as national defense is concerned. It should be mentioned in this respect that many of the advantages of the feeder system for national defense are the same types of advantages that may be attributed to commercial air transportation in general and that most of the differential advantages of feeder air transportation constitute advantages only when compared to surface modes of transportation. On the other hand, most
of the disadvantages of the feeder system as far as national defense is concerned are peculiar to the operation of the feeder system and account in large part for the failure of the military to utilize this system.

National Defense Advantages of the Feeder System

If current utilization is used as an indication of the contributions [and advantages] of the feeder system to national defense, then it would appear that the system does not possess the types and magnitudes of advantages which would qualify it for serious consideration as a vital force in our national defense pattern. Instead, it seems that the inadequacies of the system prevent its achieving such a status. Relative to the future, available data indicate that the feeder system will be a component of the War Air Service Pattern, but that it will be used only in the event of the declaration of a national emergency and then only if the emergency conditions necessitate its usage.

Assuming the need for utilization of the feeder system, its salient advantages appear to be its speed, especially relative to alternative surface modes of transportation, its relatively high degree of readiness, its operational flexibility, and its relatively high degree of unutilized capacity, at least under present load-factor conditions. These characteristics would be more significant,
of course, if the carriers were not required to adhere to current route and operational requirements. Depending on the nature of the emergency, however, to argue for the advantages of the feeder system might amount to little more than engaging in mere sophistry, inasmuch as an all-out war emergency could lead to conditions under which the feeder system, or that part of it which survived an enemy attack, would be pressed into service regardless of whether or not it possessed any differential advantages as a tool of national defense. The mere existence of the feeder system would constitute a national defense asset. In the same sense, though, it is likely that the mere existence of any mode of transportation, air or surface, would constitute an advantage. It is enlightening to note that the concept of a specific military stand-by value of the airways has been rejected by the Federal Coordinator of Transportation, the Board of Investigation and Research, and the 1953 staff study of the Department of Commerce on user charges. The rationale for this rejection were that the airways are not unique in contributing to national defense and that, during war, all our resources and industries become instruments of national defense. This type of reasoning was used to point out the fact that the defense argument for subsidizing air transportation was no stronger for air transportation than it was for any other means of
transportation. In the event, then, that all available modes of transportation would have to be called into use, the feeder system would be utilized regardless of whether or not it possessed outstanding advantages for national defense purposes.

On the other hand, in emergency conditions of a nature which did not demand utilization of all existing transportation facilities, the advantages of air transportation might lead to a concentrated usage of this mode, though not necessarily to a utilization of the services performed specifically by the feeder carriers. Even under these conditions, though, a careful evaluation should be made of the arguments which dwell on the outstanding merits of air transportation. Admittedly, a departing feeder aircraft with unutilized capacity constitutes a readily available means of transportation, but the same statement is applicable to departing motor and rail carriers with unutilized capacity. It seems, then, that the real merit of the feeder system must lie in its potentiality for high speed and flexible operations, assuming, of course, an abandonment of the fixed-route requirements under which the feeders now operate. Even here, the same statement would

have validity when applied to other types of air carriers. As far as a differential advantage of the feeders over other types of air carriers is concerned, the only significant one might be that the feeder carriers would possess a high degree of unutilized capacity and thus have greater stand-by value. It should be indicated, though, that for a particular period of time, the load factors of the feeder carriers might not be any lower than those for the other types of air carriers. These advantages are being mentioned, however, in vacuo, whereas they should be considered in relation to the airlift requirements insofar as it is possible to determine them from available national defense plans. It might be found, after a consideration of the matter, that the advantages arising from the utilization of feeder airlift are more than offset by the disadvantages, with the result that it would be likely that the feeders would be used only under conditions of all-out war, at which time all available transportation facilities might also be utilized in the interests of national defense.

National Defense Disadvantages of the Feeder System

Before proceeding directly into a consideration of the specific disadvantages of the feeder system for national defense purposes, brief attention will be devoted to the philosophy of the Air Materiel Command [AMC] insofar as
military airlift requirements are concerned. As has been pointed out in an earlier section of this chapter, the overseas airlift requirements will be met insofar as possible by the utilization of the Military Air Transportation Service. Should the MATS airlift capability be insufficient, the Civil Reserve Air Fleet will be called upon to furnish aircraft. Inasmuch as the feeder carriers contribute no craft to the Craf, they will not be expected to make any contribution, even under emergency conditions, to overseas airlift capacity. In the event of the declaration of a national emergency which requires the utilization of the WASP, the feeders might be expected to make a contribution, the extent of such contribution depending on the gravity of the emergency. The pertinent question to be answered is why the feeders are to be utilized only under these rather critical conditions, or, more importantly, why are they not utilized in the performance of peacetime, domestic military transportation, especially in view of the fact that they possess relatively large amounts of unutilized capacity.

The philosophy of the Air Materiel Command.— In this paper, there will be no attempt to determine the wisdom of the philosophy underlying the formation and utilization of either the MATS or Logair. As a result, the philosophy will be taken as given, and the shortcomings of the feeder
system will be considered in the light of the requirements in terms of types of services needed to satisfy this philosophy. The Air Materiel Command of the Air Force is very strong in holding to the belief that not "just any form of air transportation will satisfy the Air Force requirements," particularly in view of the fact that today's logistics support program has been "irrevocably committed" to an air pipeline. This philosophy embodies the substitution of high-speed reaction for inventory, with a resultant reduction in procurements and the aggregation of stocks. A vital link in the overall program is the domestic Logair system which, since it is centrally managed, is capable of reacting to all situations which might arise. According to AMC testimony, Logair has been developed into an "integral part of the weapon systems" as much so as the bomber, the fighter or the tanker themselves.


60 Ibid., p. XI-7.

61 "The Air Force is committed to a weapon system concept as a device of management. A weapon system is composed of equipment, skills, and techniques, the composite of which form an instrument of combat, usually but not necessarily having an air vehicle as its major operational element. It is a self-sufficient unit of striking power." Ibid., p. I-7.

62 Ibid., pp. XI-7 and 8.
One of the keys to the value of the Logair operation is the fact that the movement of air cargo is made on a point-to-point (source-to-user) basis. Thus, in 1958, about 90 per cent of the bases served by Logair were provided direct service from the storage site to the using activity. The remaining bases were served with a maximum of one transfer between the source and the user. As will be seen later, such a movement would not usually be possible if common-carrier aircraft were utilized. It is for reasons of "control, security, vulnerability, economy, speed of delivery," and the meeting of "overall logistics responsibilities" that such point-to-point movement is desired. It is maintained, also, that the "flexibility and reliability" which are achieved through the utilization of Logair would not be attained through the utilization of common-carrier service. In short, the AMC seeks the type of transportation service which is "responsive" to its needs. In expressing this idea, the Vice Commander of the Air Defense Command stated that

...the value of the Logair system as a highly responsive element in the support of the weapon system requirements is realized throughout this command...As the Logair system grows and more bases are served, refinement and control should continue to increase in order to maintain the necessary responsiveness.

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63Ibid., p. X-2.
64Ibid., pp. XI-8 and 9.
65Ibid., p. XI-2.
Specific shortcomings of the feeder system for national defense purposes.- The most obvious deficiency of the feeder system is its non-strategic route configuration and its rigid schedule pattern. As was indicated in Chapter III, the points served by the feeder carriers are determined by the Civil Aeronautics Board. As long as the feeders are required to continue to serve only those points approved by the Board, they are likely to fail to meet the military requirements insofar as airlift, especially cargo, is concerned for two major reasons. The first of these relates to the simple fact that the feeder carriers may not provide service to the points required at the times required by the military. As the Air Materiel Command has stated, the Strategic Air Command, the Tactical Air Command, the Air Defense Command, the Air Research and Development Command, and even the Military Air Transportation Service, Aerial Ports of Embarkation, and the AMC Air Materiel Areas and Depots are often remote to the areas served by the scheduled carriers.66

Even though the feeder carriers should happen to provide service to the general areas to which military airlift is destined, the service may still not meet the

66 The AMC considered scheduled carriers in general, but the application in this paper will be made to the feeder group of scheduled carriers. Ibid., p. XI-8.
requirements of the military. The major reason for this shortcoming is the distance that usually separates the feeder airports from the air bases. For example, from seventeen selected Logair stations, it was found that the geographical location of the airports, though not necessarily feeder airports, in relation to the air bases varied from six to 160 miles. This shortcoming is particularly critical when the commercial terminals do not provide pick-up and delivery service, inasmuch as the most important factor in the Logair operation is the ability to provide source-to-user service. Even when pick-up and delivery services are provided, there is usually a loss in time and a greater possibility of security leaks than would be likely under direct source-to-user service.\(^67\) Thus, for strategic and security reasons, it is probably undesirable to place complete reliance on a commercial fleet which is not centrally managed.

Even assuming the complete adequacy of equipment and reliability of personnel and the instant readiness of the feeder carriers, these carriers might not satisfy the requirements of the military insofar as security considerations are concerned. According to 1958 data, Logair consignees were an average of nearly 24 miles from the nearest

\(^67\)Ibid., pp. IV 2-4.
commercial airport, again not necessarily a feeder airport. Under conditions such as these, the greater the distance between the Logair consignee and the commercial fields, the greater would be the security risk involved in a shipment made by feeder carriers, and the greater would be the loss in terms of capability for rapid and strategic deployment. Of course, for some shipments of classified cargo, it is possible that for security reasons the military would be reluctant to use feeder carriers even if direct point-to-point service could be provided.

A related objection pertains to the infrequency of scheduling of feeder flights. In many cases, the feeder carriers may have only one arriving and one departing flight from a given airport in a given direction during a given twenty-four hour period. Since the published flight schedules are adhered to, the urgency of the demand on the part of the military for the movement of a particular emergency shipment would not result in a response from the feeders which would be different from that which would result in cases in which no emergency movement was involved. Thus, the movement of cargo would depend not on what the military needed in terms of rapid transportation but on what the feeders could offer, given their route and schedule.

patterns. This infrequent scheduling could be a major draw-
back inasmuch as the "Air Force distribution system is one
of instant reaction to consumer demand," the development of
such a system being dictated by the necessity of maintaining
a constant state of readiness of the combat units in view of
the "unstable and unpredictable consumption of 85 per cent
of stocks for support of first-line weapons." In addition
to the scheduling problems created by the instability of
consumer demand, the frequency philosophy is "required to
assure adequate support of the weapons assigned in lieu of
a large stockage program," the dollar cost of which would
"more than offset" the cost of the Logair program.69

Besides the primary shortcomings of the use of the
feeder system which lie in the route configuration and the
schedule pattern, another very serious deficiency may be
attributed to the nature of the feeder equipment. The
feeder fleet is composed primarily of DC-3's, although
some of the carriers are purchasing more modern aircraft.70
By most commercial-usage standards, however, the DC-3 is an
obsolete aircraft. Insofar as the CRAF is concerned, the
DC-4 is obsolescent, but a few of them are still maintained
in the CRAF. The MATS operates the C-133, C-124, C-121C,

69Ibid., p. X-4.

70Flight Magazine (Dallas: Air Review Publishing
C-188, C-97, and C-54 types of craft. The Logair fleet is composed of C-46's and C-54's. It may be seen, then, that the feeder system does not operate a single plane which is considered to be suitable for the performance of the services required by the MATS and Logair.

One of the difficulties involved in the use of the commercial types of craft that are even outwardly similar to military types is that the former are not capable of handling "outsized" cargo, which will not pass through the entrances of the commercial aircraft. The magnitude of these types of movements is particularly great during emergency periods, and the requirement is for aircraft of the C-124 or C-133 types. Another objection related to the use of common carriers is their practice of imposing limitations on the weight of the shipments that they will accept for movement in one day. In the past, it was found that when large amounts were offered for shipment, the shipments were often split and forwarded over periods of from


72 Military Air Transportation, Report, op. cit., p. 27.

73 Military Air Transportation, Hearings, op. cit., p. 759. Testimony of Brigadier General Albert T. Wilson, Jr., Deputy Chief of Staff, Operations, Headquarters, Military Air Transportation Service.
four to five days.\textsuperscript{74} Practices such as these obviously destroy much of the speed advantage which is otherwise derivable from air transport movements. The use of common carrier craft may also be objectionable because of the increase in tare weight which might be required, especially if the common-carrier movements would have to be made by combined air-surface arrangements. In this respect, the performance of an air-surface movement would probably necessitate the use of additional packaging and crating with a resultant increase in weight and space, all of which will tend to increase the amounts of time and money which must be expended for any given transportation movement that is conducted under these conditions.\textsuperscript{75}

Not only do the feeder craft presently manifest serious shortcomings insofar as the meeting of national defense requirements is concerned, but it is quite unlikely that these deficiencies will be removed in the future, such corrections being dependent upon either the modification of existing aircraft or the development and utilization of new types of planes which will more nearly possess the attributes required by the military. With respect to modification, it is felt that it is "uneconomical to do it in

\textsuperscript{74}Air Materiel Command Analysis of the Conair Project Report, op. cit., p. IV-3.

\textsuperscript{75}Ibid., p. IV-4.
peacetime and impractical in wartime," as there would not
be time to perform the necessary changes in the latter
case.76 This statement was made in relation to the CRAF,
but it seems to have greater applicability to the feeder
fleet, since there is less likelihood that the latter fleet
will be used in the event of emergency than there is that
the CRAF will be mobilized. The major modifications re­
quired would include the increasing of the size of the en­
trances and the strengthening of the floor loading, both
of which, assuming that they could be done successfully,
would increase the weight of the aircraft by a consider­
able amount and would, at the same time, reduce the poten­
tial payload.77 In view of the current usage and probable
future requirements of the military on the feeders, it
seems highly unlikely that the management of the feeder
carriers will be incurring the expense of making modifica­
tions and risking the possible loss of revenues on the
"gamble" that such modifications will result in either cur­
rent or future utilization of their craft by the military.
It seems just as implausible that the managers of the
feeder airlines would purchase new craft which would meet
the needs of the military, especially in view of the lack

76 Military Air Transportation, Hearings, op. cit.,

77 Ibid.
of assurance that they will have the opportunity, especially in peacetime, to haul military passengers and cargo.

Finally, it should be indicated that the feeder carriers suffer a possible handicap in those cases in which the military shipments are distributed on the basis of open bidding, as are all shipments distributed which are transported for the military. The military is committed, until otherwise instructed, to conduct its procurement program on the basis of a bidding system. The problem of the feeder carriers is that they must quote the rates which at the time appear in their tariffs. These rates might not be the lowest that the feeders would be willing to quote, especially on relatively large shipments, but to quote any lower rates would necessitate the filing of amended tariffs, but no amendments in tariffs may be made "except after thirty days' notice of the proposed change [is] filed, posted, and published...."78 However, the Civil Aeronautics Board may

...in the public interest, by regulation or otherwise, allow such change upon notice less than that herein specified, or modify the requirements of this section with respect to filing and posting of tariffs, either in particular instances or by general orders applicable to special or peculiar circumstances or conditions.79

78 Federal Aviation Act of 1958, 72 Stat. 731, Section 403(c).
79 Ibid.
Thus, the feeder carriers could not bid on a shipment which required the quotation of a bid within thirty days or less except on the basis of the rates appearing in the tariff at that particular period of time, unless the Civil Aeronautics Board waived the aforementioned statutory requirement. To this writer's knowledge, no waiving of this requirement has been made to enable the feeders to quote rates and fares other than those prevailing in their tariffs at that particular period of time. Nor has there been any data to indicate that the feeder carriers have requested any special treatment to permit them to change their rates in thirty days or less. The Air Materiel Command states that the common carriers do not have the "inclination" to seek the military traffic, and they buttress their argument by pointing to the fact that "not a single major scheduled carrier has ever evidenced any interest in bidding on the Logair operation." On the other hand, if the feeder rate quotations were not required until after a long enough period of time had elapsed to permit them to file amended tariffs, they would be in a better position to design rates for the transportation of a specific type and amount of cargo, but it would still be necessary for them to receive the approval of the Civil Aeronautics Board of these rates.

Chapter Summary

This chapter was designed to indicate the nature and the magnitude of the national defense airlift requirements of the economy during periods of both peacetime and wartime and to relate to these requirements the capability of the feeder system for the purpose of determining the current and probable future contributions of the feeder system to national defense. In addition, some attention was devoted to the specific advantages and disadvantages of the feeder system insofar as national defense is concerned.

As was indicated in Chapter V, the current use of the feeder system by the military is negligible. As long as there is a continuation of the conditions which now lead to non-utilization of the feeders, it seems that the actual usage value of the system will depend upon the magnitude of the demands which future emergencies are likely to impose on the system. With this consideration in mind, an analysis was made of the usage of the trunk carriers during the Second World War and of the feeder carriers during the emergencies subsequent to World War II, after which war the feeders began operations. During the Second World War, it was found that the trunk carriers sold nearly one-half of their fleets outright to the military and that near-capacity utilization was made of the remaining planes. In addition, the trunks contributed other services to the
war effort, such as training of personnel and repair and overhauling of aircraft. It seems probable that considerable use would have been made of the feeder carriers during this conflict, especially if their operations had not been confined to a set route pattern.

During the Korean War, the augmentation of the Military Air Transportation Service fleet in the performance of the Pacific airlift operations was supplied by contract commercial carriers. To this supplemental fleet, the feeders contributed no aircraft. Domestically, the available data do not indicate that the Korean emergency required a significant, if any, increase in the utilization of available feeder facilities. During the Berlin airlift emergency, available data likewise do not indicate that any utilization was made of the feeder craft to supplement the military airlift.

The nature of the programs designed to meet the future emergency airlift needs was considered to determine the probable significance of the feeder carriers insofar as contributions to the airlift requirements during such periods is concerned. It was found that the development of wartime airlift requirements is based upon a total requirement developed from war plans prepared by the Joint Chiefs of Staff and from logistics requirements considered necessary by the three military departments to perform
their wartime tasks. The airlift portions of total require-
ments are then given to the Air Force, and the MATS trans-
lates these requirements into airlift capabilities. Any
overseas airlift requirements which the MATS fleet can not
handle are to be assigned to the Civil Reserve Air Fleet,
which is composed of specifically designated civil planes.
The civil carrier capability which remains after the
deduction of the planes comprising the CRAF is to be used
in the manner considered to be necessary by the Civil Aero-
nautics Board for the satisfaction of essential wartime
needs in the domestic sector.

It was indicated that the Air Force has its own
overseas airlift facility in the form of the Military Air
Transportation Service. The size of the MATS fleet is as-
sociated with military airlift capabilities regarded as
"irreducible and irreplaceable," but the MATS does supple-
ment its own transport operations on a contractual basis
from commercial carriers, none of which are feeder carriers.

The most important program designed to perform
domestic cargo transportation service is the Logair opera-
tion. The Air Materiel Command of the Air Force manages
the Logair operations which furnish scheduled service to
some fifty bases and installations. These services are
performed by four commercial carriers on the basis of
negotiated contracts. The facilities of the feeder car-
rriers are not used in the performance of any of the Logair
operations, it being maintained by the Air Materiel Command that the common-carrier facilities are not "responsive" generally to military requirements.

An analysis of the composition of the Civil Reserve Air Fleet revealed that it is composed of four-engine aircraft which are owned by commercial carriers and which are assigned to a mobilization fleet that is to be used in the event of the declaration of a national emergency, primarily to furnish the airlift which is considered to be necessary to supplement the MATS. The assignments of aircraft to the CRAF are made by the Defense Air Transportation Administration in the Department of Commerce. Of the 309 aircraft assigned to the CRAF in fiscal year 1959, there were no planes contributed by the feeder carriers.

The final program considered was that of the War Air Service Pattern, which is a plan for the mobilization of the commercial fleet for the performance of domestic transportation services, again only in the event of the declaration of a national emergency. The WASP fleet is composed of the planes which remain after the craft required for the CRAF are deducted from the total commercial airlift capability. In essence, the operational plan for the WASP is the plan of operations which is pursued currently by the scheduled carriers in the performance of their operations. In the event, then, of a national-emergency declaration, the contributions which the feeders
would make would be through the WASP, and the degree of such utilization would depend upon the seriousness of the emergency. It is conceivable that the demands upon the feeder system could range from zero utilization to capacity utilization.

Besides the current and potential national defense value of the feeder system from the standpoint of direct usage, it is possible that the feeder system makes an indirect non-usage contribution through its contribution to the deterrence strength of the nation. This chapter evaluated the significance of the feeder system insofar as its value as a deterrent is concerned.

The difficulty of defining the deterrence concept was pointed out, and it was noted that the conceptualization problem is complicated by the impossibility of determining either the goals of a potential aggressor or the lengths to which it would go in its attempt to attain such objectives. A "useable" conceptualization of deterrence has been elaborated by Henry Kissinger who defined it as "the attempt to keep an opponent from adopting a certain course of action by posing risks which will seem to him out of proportion to any gain to be achieved."81 It was indicated that the frequent appearances of terms such as "long-range striking force" and "adequate retaliatory force" seem to indicate

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81 Refer to footnote 43 on page 226.
the essence of a deterrence program. In turn, the strength of such striking power is often measured largely in terms of the possession of and willingness to use such instruments of destruction as ballistic missiles, thermonuclear bombs, and nuclear weapons.

For the purpose of determining the deterrence value of the feeder system, two possible types of emergency conditions were delineated - those of limited and all-out war. Under any conditions, it appears likely that the contribution of the feeder carriers to any future war effort will be confined to the transportation of persons and cargo. As far as the performance of airlift is concerned, the feeder system could perform any amount of transportation service until it reached the physical limitations imposed by the number and the capacity of its facilities.

Based upon a consideration of the criteria both of the historical non-utilization of the feeder system during periods of emergency and of the current failure of the military to plan for the utilization of the feeder craft in any situations short of those of a national-emergency character, it was determined that the feeder system would not likely be used in a limited war, particularly if it were assumed that any limited war would not reach national-emergency proportions. Thus, it was indicated that an awareness on the part of a potential aggressor of our actual non-utilization of the feeder carriers in the past and of
our planned utilization of them in the future for military purposes would probably lead to such aggressor's discounting the significance of the feeder system as a deterrent to limited war.

It was concluded that the significance of the feeder system as a deterrent to all-out war would depend upon the manner in which the potential enemy conceptualized the deterrent. If the deterrent were conceived of in terms such as strategic striking power, then it is unlikely that the feeder system would constitute any deterrence threat to foreign aggression. On the other hand, if the deterrent were defined by such aggressor in terms of the strategic striking force, as well as its military and civil complement, some deterrence value might be assigned to the feeder system, such value increasing as there was a decrease in the magnitude of destruction which the potential attacker expected to inflict and as there was an increase in the anticipated duration of the conflict. Even under these conditions, however, it seems that the value assigned to the feeder system will be relatively insignificant in view of the limitations confronted by the feeders in the meeting of military requirements, unless the emergency demanded the use of all commercial aircraft.

In the last section of this chapter, the salient national defense advantages and disadvantages of the feeder system were considered, with particular reference to the
requirements of the Air Materiel Command insofar as the peacetime procurement of domestic airlift is concerned. Initially, it was pointed out that the national defense advantages of the feeder system are the advantages of commercial air transportation in general, but that the national defense disadvantages of the feeder system are peculiar to the operations of the feeder system and account in large part for the failure of the military to utilize the system.

The specific advantages of the feeder system seem to lie in its speed, readiness, operational flexibility, and relatively high degree of unutilized capacity. It was indicated that these advantages would not make it any more valuable a national defense asset than would be any other mode of transportation in a situation in which all available transportation facilities had to be utilized. In periods of emergency not so critical as that just described, it was indicated that the only significant differential advantages of a departing feeder carrier with unutilized capacity over a departing surface carrier with unutilized capacity would take the form of speed and operational flexibility, assuming an abandonment of the fixed-route requirements of the feeders.

To make the consideration of the feeder advantages and disadvantages more meaningful, an analysis was made of the domestic airlift requirements of the military. Consideration was given to the rationale behind the organization
of the Logair operations by the Air Materiel Command. Through the operation of a centrally managed system, the AMC maintains that it is able to achieve the desired instant reaction to meet any type of situation which might arise. The essence of the AMC philosophy is the substitution of high-speed reaction for inventory, with a resultant reduction in procurements and the aggregation of stocks. In the light of the requirements of the military for domestic airlift, an analysis was made of the shortcomings of the feeder system insofar as the meeting of these requirements is concerned.

It was found that the major shortcomings of the feeder system, and ones which are difficult to overcome under present regulatory conditions, are those related to the route configuration and schedule patterns of the feeder carriers. With respect to the former, the feeders generally do not provide service direct to the points to which military airlift is destined. It was concluded that the greater the distance which separates the airport from the military user, the greater the increase in total delivery time and the greater the possibility of security leaks. Returning to the deficiencies of the schedule pattern, it was found that the necessity of strict adherence to published schedules would make it possible for the feeders to transport military airlift only at the times prescribed by
their schedules. Thus, these carriers might not be able to perform their flights at the times required by the military, especially on emergency shipments.

Another major objection to the use of the feeder system is the inadequacy of the feeder equipment. Most of the feeder planes are obsolescent when compared with the equipment being used in the MATS and Logair operations. Not only is the total airlift capacity of many of these craft inadequate for many military movements, but also the craft often are not suitable for the transportation of "outsized" cargo. In addition, it has been the practice of some common carriers in the past to split shipments and to transport them over a period of several days, thus largely nullifying the speed advantages of air transportation. Finally, it was determined that the feeder carriers may be at a disadvantage when competing for military airlift with carriers which are not regulated as to rates. The potential disadvantage of the feeder carriers stems from the fact that they must adhere to published rates in the performance of transportation operations.

In view of the Air Materiel Command philosophy which guides the procurement of domestic military airlift, it was concluded that the shortcomings of the feeder system are great enough both to outweigh its advantages and to account for its non-utilization by the military in the performance of domestic airlift operations.
CHAPTER VII

ALLOCATION OF TOTAL COSTS OF OPERATION
OF FEEDER SYSTEM

Introduction

In Chapters IV, V, and VI, the objectives were those of determining the contributions being made by the feeder carriers to the postal service, to commerce, and to national defense. For the postal service and commerce, the analyses proceeded largely upon the basis of investigation of usage data, convertible into both ton-miles of utilization and dollar values of operating revenues. The development of similar types of data for "national defense" was not nearly so simple a matter, largely because there is no current military usage of the feeder facilities. A further complicating factor related to the impossibility of determining national defense value exclusively upon the basis of a consideration of statistical indicators of usage even under conditions in which there had been actual utilization. In this respect, it was necessary to consider the national defense stand-by values of the total and of the unutilized capabilities of the feeder system and to determine whether the system could be said to be making any
contribution to the deterrence strength of the nation. It was indicated in those chapters that the contributions to the economy of the feeder system might be of an indirect [non-user] nature, as well as of a direct [user] type. As far as this study is concerned, the major problem presented by the possible provision of both direct and indirect benefits by the feeder system is one of measuring the indirect benefits, especially insofar as the placing of a monetary value on them is concerned. As an aid to the final resolution of the problem, reliance will be placed in Chapter VIII on the principles of welfare economics.

This chapter will consider the costs of feeder service. As was indicated in Chapter II, the relevant costs for this chapter will be the actual dollar costs of providing feeder service. Eliminated from consideration herein will be the "costs" to society of such imponderables as the noise, hazards, and other nuisance values associated with the existence of the feeder system. These intangibles will be accounted for, however, in Chapter VIII, where the total costs of the operations of the feeder system will be related to the total benefits derived from the system for the purpose of ascertaining the overall significance of the feeder system to the economy. Not only will this chapter be concerned with an analysis of the total monetary costs associated with the operation of the feeder system, but also with a separation of these costs so that they may be
assigned to the postal service, to commerce, and to national defense. This separation and allocation will be made primarily for the purpose of developing dollar-cost figures which will be necessary for the conduct of a costs-benefits comparison for each of the above-mentioned beneficiaries of feeder service. The separation and allocation of costs to each of the three beneficiary groups and the comparison of these allocated costs with the benefits obtained by the postal service, commerce, and national defense will also provide information essential for a consideration of which of these three classes of beneficiaries are receiving subsidy, of the amounts of such subsidy being received by each group, and of the implications thereof from the standpoint of the formulation of public policy.

The conduct of the analyses of this chapter will be made more difficult because of two complicating conditions under which feeder service is conducted. Initially, feeder operations are performed under conditions which make it impossible to separate incontestably all of the costs of operation and to attribute them on the basis of their distinct separability to the appropriate users of the feeder service. Another large problem is created because there is no national defense direct usage of the feeder system. Since there is no direct utilization, there is no basis for allocating a portion of the costs of the feeder operations to national defense. The gravity of the first
problem is reduced somewhat, though, by the very non-existence of actual national defense utilization. Thus, the absence of military usage creates a condition under which it is necessary to allocate costs among only two classes of users - the postal and the commercial. As was pointed out in Chapter II, this study will adhere to the principle that the only groups to which costs should be allocated are users. Other groups, such as taxpayers, may be required to contribute to the support of the system, but such contributions should be made on some basis other than a direct-user one. The most important criterion to be considered in this study as a possible basis for the apportioning of some of the burden of supporting the feeder system to groups other than users will be the receipt by these non-user groups of indirect benefits in the form of national defense protection. As a result, then, of the absence of military utilization, the monetary costs of the feeder system must be allocated only among the postal and commercial users, such allocation being facilitated, as will be seen, by the acceptance of the mail service rate as being one which is just sufficient to compensate the carriers for the transportation of mail and to provide them with a return on their investment. Thus, after the service rate costs of the postal service have been deducted from the total monetary costs of the feeder operations,
the remainder will represent the cost of the "commercial" phase of feeder operations.

To revert to a consideration of the problems created by the absence of military utilization of the feeder system, it should be pointed out that a statement to the effect that no allocation of costs will be made to national defense inasmuch as there is no military usage of the facilities of the feeder carriers does not resolve all the important issues appertaining thereto. If it is assumed that the feeder system does contribute benefits of an indirect [non-user] nature to the economy, as through national-defense protection, then the additional problems arise of measuring these indirect benefits and of developing from them bases for the apportionment to non-users of a portion of the burden of supporting the feeder system. Methods have been developed in this study to measure in monetary terms both the total and the stand-by values of the type of service currently being performed by the feeder carriers. When, however, the deterrence significance of the feeder system is being considered, it is impossible to state such value in monetary units since there is initially no way to determine conclusively, as was indicated in Chapter VI, whether a potential enemy conceives of the feeder system as a deterrent to acts of aggression and there is secondly no method to measure the
real value to our nation arising from the possession of such a deterrent. Again, the tools of welfare economics will be utilized to incorporate intangible national defense values into this costs-benefits study.

Nature and Magnitude of the Costs of Operation of the Feeder System

As a first step in the consideration of the costs of the feeder system, a description of the types and magnitudes of these costs will be presented. The statistics collected in Table 18 on page 267 will be indicative of both the types and the amounts of the costs incurred in selected years in the performance of the operations of the feeder system.

Although it is not essential to the conduct of this study, a brief description of each of these categories of costs will follow. The "flying operations" category includes the direct costs of plane operations, such costs being largely accounted for by flight-crew salaries, fuels, and lubricants. As the term connotes, "maintenance" encompasses both direct maintenance of flight equipment and ground and indirect maintenance. The "passenger service" costs are largely attributable to the salaries of stewards and stewardesses, to meals served in flight, and to passenger liability. "Aircraft and traffic servicing" costs reflect the expenses involved in the performance of many of the
### TABLE 18

**FEEDER AIRLINES OPERATING COSTS FOR SELECTED YEARS**

(In Thousands of Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Flying Operations</th>
<th>Maintenance</th>
<th>General Services and Administration</th>
<th>Aircraft &amp; Traffic Servicing</th>
<th>Promotion &amp; Sales</th>
<th>Administrative</th>
<th>Total G.S.&amp;A.</th>
<th>Depreciation and Amortization</th>
<th>Total Operating Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>6,336</td>
<td>4,537</td>
<td>825</td>
<td>3,743</td>
<td>2,405</td>
<td>1,792</td>
<td>8,765</td>
<td>2,233</td>
<td>21,871</td>
</tr>
<tr>
<td>1955</td>
<td>18,080</td>
<td>10,384</td>
<td>2,687</td>
<td>9,553</td>
<td>9,287</td>
<td>4,485</td>
<td>26,022</td>
<td>2,278</td>
<td>56,764</td>
</tr>
<tr>
<td>1956</td>
<td>21,616</td>
<td>12,610</td>
<td>3,385</td>
<td>11,187</td>
<td>11,399</td>
<td>5,382</td>
<td>31,353</td>
<td>2,714</td>
<td>68,293</td>
</tr>
<tr>
<td>1957</td>
<td>26,509</td>
<td>16,418</td>
<td>4,028</td>
<td>21,160</td>
<td>6,089</td>
<td>4,938</td>
<td>36,215</td>
<td>3,758</td>
<td>82,900</td>
</tr>
<tr>
<td>1958</td>
<td>29,265</td>
<td>18,686</td>
<td>4,527</td>
<td>24,023</td>
<td>6,998</td>
<td>5,530</td>
<td>41,078</td>
<td>4,274</td>
<td>93,303</td>
</tr>
</tbody>
</table>

ground operations. Examples of such costs include those incurred in the payment of salaries of personnel such as dispatchers, radio operators, and station managers. Obviously enough, "promotion and sales" costs include those associated with sales, such as the salaries of the sales managers, with advertising activities, and with publicity programs. The "administrative" category encompasses, among other things, the salaries of the general officers, legal expenses, and general taxes. Finally, "depreciation and amortization" includes the depreciation of both flight and ground equipment.1 For 1958, the total operating costs of all feeder carriers were $93,303,000, nearly 80 per cent of which took the form of the costs of flying operations, of maintenance, and of aircraft and traffic servicing.

According to the statistics for 1958, these total operating costs of $93,303,000 provided services which returned total operating revenues of $94,654,000, the difference between these two figures being one of $1,351,000, which represented the net operating income for 1958.2


Again, though, it is very important to indicate that the total operating revenues figure of $94,654,000 included $32,523,000 of public service revenue [subsidy]. Thus, subsidy accounted for nearly 35 per cent of the total operating revenues of the feeders and made it possible for them to obtain a small net operating income instead of a considerable net operating loss.

Allocation of Feeder Costs of Operation to the Postal Service

It will be the purpose of this section to allocate to the postal service its share of the total costs of operation of the feeder system. This allocation procedure will be simplified somewhat by virtue of the possibility of using a method formulated and currently being used by the Post Office Department for the assignment of costs to postal operations.

The Post Office Department bases its payments to the feeder carriers upon what it terms a "service rate," which rate is designed, according to the Post Office Department, just to cover the costs of provision of the mail service, including the costs of capital, incurred by each carrier. As was pointed out in Chapter II, it will not be the purpose of this study to examine the allocation

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3Ibid., p. 17.
procedure followed by the Post Office Department to determine its "correctness." Thus, there will be no consideration of such thorny problems as those of distinguishing between common and separable costs, of "properly" allocating to the postal operations its share of the common costs, and of determining the "right" cost of capital to be included in the total postal-cost figure. Inasmuch as it is designed merely to compensate the carriers for the necessary costs incurred in the transportation of mail, it is maintained by the Post Office Department that the service rate itself contains no element of subsidy. There are those who maintain, however, that the service rates are more than sufficient to compensate the carriers and that, as a result, they do provide "disguised" subsidy to such carriers. The figure for 1958 of $1,370,000 will be used in this study to indicate the magnitude of the costs incurred by the feeders in the performance of the postal operations.

It may be seen from a comparison of this total-cost figure of $1,370,000 with the total-benefits figure of $1,370,000, which was introduced in Chapter IV to indicate the monetary benefits received by the users of the postal service furnished by the feeders in 1958, that the monetary benefits were in equality with the monetary costs.

^Ibid., p. 17.
This identity arose, of course, as a result of the utilization by the Post Office Department of a cost-allocation formula which is designed "just" to reimburse the carriers for the expenses which they incurred in the transportation of mail. These data do not, and can not, reveal the total benefits received by the ultimate users of air mail service who, of course, purchase such service directly from the Post Office Department. While it is not the purpose of this paper to examine the costs-benefits relationships existing between the Post Office Department and the users of air mail service, it might be pointed out that valuable empirical research might be undertaken in this area to provide information relative to whether the Post Office Department is covering its total costs incurred in providing air mail service to the ultimate users of the feeder services. The solution of this problem would depend upon the development of data which would indicate both the amounts of revenues in the form of postage rates being contributed by the users of feeder air mail services and the total costs, including both air-transportation costs [service rate] and non-air transportation costs, incurred by the Post Office Department on behalf of the users of the feeder air mail service. These data are available for the domestic air transportation system, but they are not
separated in such a way that it is possible to make an
application of them to the feeder system.\textsuperscript{5}

If such data were separable, it would be possible
to determine the total costs - total contributions rela-
tionships for the Post Office Department insofar as feeder
air mail service is concerned. Thus, if a separable por-
tion of the total contributions by users in the form of
postage rates did not equal the total costs incurred by
the Post Office Department in the performance of the
feeder phase of its air mail operations, it could be con-
cluded that the users of the feeder air mail service were
not contributing their full share of total costs and were,
therefore, being subsidized from the general tax revenues
received by the federal government. This would not be the
same thing, though, as saying that the feeder carriers were
being subsidized by the federal government as a result of
their performance of the air mail service. If it is re-
called that the Post Office Department pays to the feeder
carriers an amount just sufficient to enable them to cover
the total costs of performing the air mail operations, it
will be clear that the users of the air mail service, not

\textsuperscript{5}United States Post Office Department, United
States Post Office Department Cost Ascertainment Report,
Office, 1959).
the feeder carriers, are being subsidized from federal tax revenues. The feeder carriers, as has been indicated, do receive federal funds, but they are not received in connection with the air mail operations which they perform; in this respect, then, these funds do not constitute a subsidization of their air mail operations.

Allocation of Feeder Costs of Operations to "Commerce"

In the preceding section, it was concluded that an acceptance of the results of the procedure used by the Post Office Department to compensate feeder carriers for the transportation of mail would similarly lead to an acceptance of the affirmation of the Post Office Department that the mail operations per se of the feeder carriers do not receive any subsidy. Proceeding upon the premise that air mail revenues received by the feeder carriers from the Post Office Department are just sufficient to cover the total costs incurred by these carriers in the performance of such air mail service, this section will be devoted to an examination of the costs-revenues relationship with respect to the feeder operations conducted on behalf of the "commerce" of the nation. These "commercial" operations will include all of those services performed for users other than for the users in the postal and military categories. The major objective of this section is to develop data which
will indicate whether the commercial users of the feeder system are receiving subsidy. The information obtained from the analyses of this section will be used in the next section in conjunction with the consideration of the appropriateness of apportioning a part of the feeder subsidy burden to non-users on the basis of their receipt of national defense protection.

Once more, it should be recalled that the only direct users of the feeder service are the Post Office Department and the commercial users, the latter being represented primarily by travelers and shippers of cargo. In the allocation of a portion of total feeder costs to commerce, the total-cost figure of $93,303,000 will be used again, and from it will be deducted the $1,370,000 one representing the total cost to the feeders of performing the air mail service. The difference of $91,933,000, then, is the amount of total costs chargeable to the commercial users of feeder services. It is the figure which must be matched by feeder "commercial" revenues before it can be concluded that the commercial users were not receiving subsidy in 1958.

A consideration of the feeder operating revenues reveals initially that the revenues from all sources other than the Post Office Department and federal subsidy
toted $60,761,000 in 1958. When this figure is compared with the figure of $91,933,000, which represented the costs of all services except those performed for the Post Office Department, it is possible to determine that the costs of commercial operations exceeded the revenues derived therefrom by $31,172,000, which figure, when added to the net operating revenue figure of $1,351,000, gives an amount of $32,523,000, which is equal to the amount of public service revenue [subsidy] appropriated to the feeder operations by the federal government in 1958. In summary, it is evident that feeder total operating revenues, exclusive of subsidy, were less than feeder total operating costs by $31,172,000 in 1958.

If it is granted, as has been done in this study, that air mail revenues fully compensated the feeder carriers for all air mail costs which were incurred in 1958, then it may be concluded that the commercial users did not make large enough user contributions to permit the continuation of the types and magnitudes of service of which they were recipients, without governmental support. Tentatively,

6Air Transport Facts and Figures, op. cit., p. 17.

7Inasmuch as the critics of the present procedure used by the Post Office Department in the determination of service mail rates aver that the service-rate payments to the airlines are too "generous," it would follow logically that such critics would maintain that the figure of $31,172,000 which has been developed in this section understated the amount of subsidy received by commercial users.
then, it may be concluded that the commercial users of the feeder service are the main beneficiaries of federal subsidy. It should be mentioned that, as yet, there has been no consideration of the possibility of assigning some of the subsidy burden to those groups in the economy which are beneficiaries of the national defense protection, if any, afforded by the feeder system.

Determination of the Monetary National Defense Value of the Service Capabilities of the Feeder System and the Theoretical Apportionment of the Feeder Subsidy Burden to the Indirect Beneficiaries of the Feeder System

In view of the absence of military utilization of the feeder system, no allocation of the total costs of operating the system will be assigned to national defense. This is an application of the principle to be adhered to in this study that a scientific cost-allocation method distributes costs only to the users of the service in question. From the equity standpoint, however, it is still possible to apportion a part of the federal burden of supporting the feeder system to groups other than users, particularly to national defense beneficiaries, but this type of burden distribution to non-users is quite different from the allocation of costs to users. In Chapters V and VI, the analyses were directed primarily towards a determination of the contributions being made by the feeder system to national
defense. In this section of this chapter, the objective will be one of assigning a monetary value to the total and to the unutilized capacities of the feeder system on the premise that such capacity is a national defense asset. In Chapter VIII, the findings of these three chapters will be integrated for the purpose of ascertaining the overall national defense significance of the feeder system. Also in Chapter VIII, the data developed herein relative to the total costs of the feeder system will be combined within a welfare economics framework with those data pertaining to the total contributions being made by the feeder system for the purpose of determining the overall significance of the feeder system to the economy.

In the assigning of a monetary value to the feeder system, the main concern will be that of attaching such value to the total and to the stand-by, or unutilized, capacities of the feeders. This latter type of capacity represents approximately the maximum amount of available service which could be devoted to military transportation without seriously disturbing the commercial operations of the feeder carriers. In this sense, then, this figure will represent a lump-sum valuation placed upon the stand-by capacity of the feeder airline system. It should be pointed out that the total value of the feeder system to national defense will probably rise as the seriousness of a hypothetical national emergency increases.
Two approaches will be used to arrive at the total and stand-by values of the feeder system. The first method will be one of determining what it would cost to purchase both the total capacity and the stand-by capacity of the feeder carriers at the minimum rates which have been approved by the Civil Aeronautics Board for the carriage of cargo. This cost to the military would represent, then, the values of the total and of the stand-by capacities of the feeder system at the minimum rates which could have been charged legally by the feeder carriers themselves in 1958. No valuation will be placed upon the equipment used by the feeders, but only upon the services which they are enabled to perform as a result of their possession of this equipment. The reason for treating equipment in this manner is the fact that the military, in its purchase of capacity from the Logair contractors, does not purchase the equipment; instead, such equipment is supplied by the Logair contractors themselves. Thus, in the procurement of services from the type of operations that it considers to be most "responsive" to meet military airlift demands under present conditions, the military does not purchase directly any equipment. The second method will involve an alternative-cost type of determination based upon the cost that would be incurred by the Logair operators in the performance of service of a magnitude equivalent to that which could be performed with the total capacity and
the stand-by capacity of the feeder system. These figures will represent, then, the costs of obtaining the service which could be performed by the feeders at the rates which would be charged by the operators considered by the military to offer the most "responsive" type of airlift service.

The relevant statistics to be used in determining the total and stand-by capacities of the feeder carriers include those for available ton-miles flown and for revenue ton-miles flown. The first term measures the total ton-mile availability of feeder air service. By multiplying this figure by one which would indicate the relevant "charge" for the obtaining of this amount of service, it is possible to determine the value of the feeder service which could be performed with full-capacity operation of the feeder system under the present operational and rate conditions imposed by the Civil Aeronautics Board. The second figure, revenue ton-miles flown, represents the number of available ton-miles which were "sold" during a given period. The difference, then, between available ton-miles flown and revenue ton-miles flown is the amount of unutilized capacity possessed by the feeder carriers under a given pattern of operations. By multiplying the amount of unutilized capacity by a figure which would indicate the relevant "charge" associated with the provision of this amount of service, it is possible to determine the service value of the stand-by [unutilized] capacity of the feeder
system under present operational conditions. For 1957, the available ton-miles flown by all feeder carriers totaled 170,700,000, the revenue ton-miles flown amounted to 78,500,000, and the difference was 92,200,000 ton-miles, this latter figure representing total unutilized ton-mile capacity. For 1958, 185,400,000 available ton-miles were flown, 86,600,000 of the available ton-miles were sold, and 98,800,000 ton-miles were not utilized. Thus, for 1957, the total stand-by capacity of the feeder system amounted to 92,200,000 ton-miles, while the figure for 1958 was 98,800,000 ton-miles.

The first, and most obvious, method of calculating the value of the total and of the stand-by service which could have been performed by the feeder carriers under 1958 operating conditions is to determine the costs of these amounts of service at the rates which would have been chargeable in 1958 by the feeder carriers themselves. As has been pointed out earlier, the rates chargeable by the feeder carriers are their published rates, and these rates may not be changed except after thirty days' notice. Because of the impossibility of determining the rates which would have been charged by the feeder carriers under hypothetical conditions in which they performed transportation services of an unspecified nature for the military, it will be assumed in the following calculations that the feeders
charged the legal minimum rates set by the Civil Aeronautics Board. There is no assurance that the feeder carriers would have charged these minimum rates in the performance of service for the military, but it is likely that they would have been charging rates quite close to the minimum, especially if they had been performing these flights in equipment designed specifically for cargo movements and under conditions in which the right to perform the movements was based on the current competitive-bidding procedures established by the Department of Defense. Competition also tends to force rates to the legal minimum. As Frederick states, "it is a truism that a regulated minimum rate in most cases becomes a maximum rate where route competition exists."  

Under 1958 regulations of the Civil Aeronautics Board, the minimum air freight rates for all carriers subject to the economic rate regulations of the Board were $.20 per ton-mile for the first 1,000 ton-miles of any one shipment and $.1625 per ton-mile for all ton-miles in excess of 1,000 of any one shipment.  

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Jesse F. Stallings, President of Capitol Airways, Inc., one of the four air carriers which are performing air service under the Logair contracts, that the average length of the Logair haul is "substantially less" than 1,000 miles. Statistics of the Air Materiel Command indicate that the average length of the Logair haul was 952 miles for the period of July 1, 1957, through November 30, 1957. Under the legal minimum rate and with an average length of haul of less than 1,000 miles, the applicable rate for the transportation of cargo would be $.20 per ton-mile. Under these conditions, the value of the total service capability of the feeder carriers at the performance level of 1958 of $37,080,000 would be arrived at by determining the product of 185,400,000, the number of available ton-miles flown, and $.20, the legal minimum rate per ton-mile. For a determination of the value of the stand-by service capability of the feeder carriers in 1958, it is necessary to multiply 98,800,000, the unutilized ton-miles flown by the feeders in 1958, by $.20, again the legal minimum rate per ton-mile. The result of this calculation is the development of a figure of $19,760,000.

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10 Ibid.

The second, or alternative-cost, method of determining the value of the total and of the stand-by capacities of the feeder system will involve the ascertainment of the costs which would have been incurred by the military in its procurement from Logair contractors of the amounts of service which could have been furnished by the feeder carriers in 1958 under conditions of their having provided for the military their total capacity and their unutilized capacity. In the Logair operations, the contractors furnish all personnel, equipment, materials, and supplies necessary for the performance of the military airlift requirements. At the same time, the government furnishes such things as communications facilities along the routes flown, gasoline and oil at cost, emergency maintenance at cost, and, most importantly, all cargo loading and unloading at the Air Force bases and installations serviced by Logair. It is somewhat difficult to assign a cost figure to these services, inasmuch as the communications facilities and the loading and unloading personnel and facilities are utilized in the performance of other activities besides those which they execute for the Logair contractors. The Air Materiel Command has

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13Ibid., Tab. A, p. 2.
stated that a recent analysis of indirect costs incurred in the Logair operations revealed that these costs amounted to two cents per ton-mile.\textsuperscript{14} This figure is the one which will be used in this study.

With respect to the determination of the costs incurred by the Logair contractors in the performance of the transportation phase of their source-to-user operations, the essential data is readily available. For the period of July 1, 1957, through November 30, 1957, the average ton-mile cost of all of the Logair contractors amounted to $\textdollar$.139.\textsuperscript{15} For the 1957 fiscal year, the cost figure was $\textdollar$.137 per ton-mile. Comparable data are not available for 1958, but the estimated figure for the 1959 fiscal year was $\textdollar$.139.\textsuperscript{16} For the purposes of the computations to be made in this study, the figure of $\textdollar$.139 will be utilized, but it will be rounded to $\textdollar$.14, to indicate the ton-mile rate paid by the military to the Logair contractors. The addition of this $\textdollar$.14 figure to the $\textdollar$.02 per ton-mile one for indirect costs will result in the development of a $\textdollar$.16 per ton-mile figure which will be used as the one to indicate

\textsuperscript{14}\textit{Ibid.}, pp. V-5 and V-6.
\textsuperscript{15}\textit{Ibid.}, Tab. A, p. 3.
\textsuperscript{16}\textit{Ibid.}, Tab. A., p. 5.
the total ton-mile cost for Logair operations in 1958. To arrive at a dollar value of the total and of the stand-by service capabilities of the feeder system under these conditions, this $ .16 per ton-mile cost figure will be multiplied both by the available ton-miles flown and by the unutilized ton-miles flown by the feeder carriers in 1958. These calculations provide a figure of $29,664,000 [185,400,000 X $.16] for the dollar value of the total capacity and one of $15,808,000 [98,800,000 X $.16] for the dollar value of the stand-by capacity of the feeder system in 1958. This is to say that it would have cost the military $29,664,000 to purchase through its most "satisfactory" current medium the amount of air transportation service which could have been performed by the feeder carriers in 1958 if these carriers had been operating at full capacity. The figure of $15,808,000 represents the stand-by value of the feeder system at Logair rates under the assumption that the military would have purchased the 1958 unutilized capacity of the feeder carriers. No valuation will be placed on the feeder equipment, since the military purchases service and not equipment under its Logair contracts.

It should be indicated again that these dollar values signify nothing about the real actual usage value of the feeder system, since the nature of future emergency conditions might not even necessitate the utilization of
such facilities. These data should be considered within the framework of the findings of Chapters V and VI, in which manner they will be considered in Chapter VIII.

The calculation of these two sets of values of both the total and the stand-by service capabilities of the feeder system reveal yet another reason for the utilization of the Logair system by the military - it is less costly, at least insofar as it is possible to determine from a comparison of the available data. It may be recalled that the main objective behind the analyses of these data was to develop information which might be used in the apportionment of at least a part of the subsidy burden of supporting the feeder system to the recipients of the benefits of national defense protection, such analyses being conducted under the assumption that the feeder system does furnish national defense benefits. Of the two methods considered in this study for the purpose of placing a monetary value on the total and the stand-by service capabilities of the feeder system, it was indicated that the alternative of procurement of such amounts of service from the Logair contractors would have been the less costly one in 1958. Of all presently available methods of securing similar transportation services, the Logair type of operation is certainly the most "responsive" to military needs and is very probably the least costly.
As was indicated earlier, the value of the total service capability of the feeder system during 1958 at Logair rates was $29,664,000, whereas the stand-by service capability was $15,808,000. While the military does not currently utilize any of the feeder facilities, it might use them in the case of an emergency, the degree of such usage depending upon the nature of the emergency. It might be restated, then, that the national defense usage value of the feeder system under emergency conditions in which its total 1958 airlift capability was utilized at current Logair rates would be $29,664,000. Under the same conditions, the stand-by usage value of the feeder system to national defense would be $15,808,000. Of course, under conditions of absence of military utilization of the feeder system in the future, its national defense usage value would be zero. As was seen in Chapter VI, and as will be indicated again in Chapter VIII, the national defense deterrence value of the feeder system depends upon the strength of its threat as a deterrent, as such deterrent strength is measured by a potential aggressor, and upon the value which the citizens of the United States collectively place upon a transportation system which provides this impediment, if any, to a possible enemy attack.

Some tentative conclusions may be drawn briefly at this point in relation to the possibilities for and to the implications thereof of the assignment of a national
defense value to the service capabilities of the feeder system. In this connection, it will again be necessary to utilize the figure of $31,172,000, which represented the amount by which the 1958 operating costs of all of the carriers of the feeder system exceeded their operating revenues, exclusive of subsidy, after the revenues and the costs associated with the transportation of air mail had been accounted for by stating that the revenues were just sufficient to cover the total costs of the air mail operations. This figure of $31,172,000, then, represented the amount of costs allocated at an earlier point in this chapter to "commerce," the national defense value of the system having been explicitly ignored. Now that three figures have been developed to indicate the potential national defense usage value of the feeder system, these figures will be related to the $31,172,000 one for the purpose of theoretically apportioning some of this burden to the indirect beneficiaries of the feeder system. If it is concluded that the feeder system has no future national defense usage value, then the entire $31,172,000 is chargeable to the "commercial" operations and is the amount of public revenues being received by the feeder carriers to enable them to cover the operating costs associated with this phase of their operations. As such, it is the amount of subsidy being granted by the government to the users of the commercial services of the feeders.
On the other extreme, under conditions in which it is assumed that the potential national defense usage demands on the feeder system would require its total service capability, it might be said that $29,664,000 of the $31,172,000 could be borne by the taxpaying citizenry in the support of a feeder system which furnishes potential national defense usage value to them. Again, this is not to say that $29,664,000 of the total costs of the feeder system are being allocated to national defense. It is to say, however, that from the equity standpoint, the general public might be expected to help support a system which is furnishing potential national defense usage value. Finally, if it is assumed that only the stand-by capacity of the feeder system has national defense value, then it may be said that $15,808,000 is the part of the $31,172,000 which might be apportioned to the taxpaying public because such taxpayers are the potential beneficiaries of the national defense usage value of the feeder system.

Chapter Summary

This chapter was primarily concerned with a consideration of the monetary costs incurred in the operation of the feeder system. Not only were the total monetary costs analyzed for the purpose of relating them to the total monetary benefits arising from the feeder system, but
these total costs were allocated to the postal service, to "commerce," and to national defense to make it possible to compare the costs incurred by each one of these divisions with the revenues generated by each one. These data were then used to indicate the extent of subsidy, if any, being received by each one of these three categories of beneficiaries of feeder service. Another major objective of this chapter was the assignment of monetary values to the total and to the stand-by usage capacities of the feeder system, such assignments being based upon the premise that such capacities would be useable for national defense purposes.

A brief description of the Civil Aeronautics Board's classification of the types of costs incurred in the performance of feeder service was made, it then being indicated that for 1958 all of these costs totaled $93,303,000. On the revenues side, it was found that the total operating revenues of the feeder system in 1958 amounted to $94,654,000, with the difference between total costs and total revenues of $1,351,000 constituting net operating income. Of the total operating revenues, though, it was pointed out that public service revenues [subsidy] accounted for $32,523,000, such subsidy converting what otherwise would have been a considerable operating loss to a small operating profit.

In the allocation of a portion of the total costs of operation of the feeder system to the postal service,
the basis for such allocation was the "service rate" formulated and used by the Post Office Department to compensate the air carriers for the transportation of mail. It is maintained by the Post Office Department that these service-rate payments are just sufficient to cover the total costs incurred by the feeder carriers in the performance of their air mail transportation operations. In 1958, the payments by the Post Office Department to all of the carriers of the feeder system amounted to $1,370,000. Inasmuch as this figure was identical with the one introduced in Chapter IV to indicate the magnitude of the monetary benefits received by the users of the postal service in 1958, it was evident that the feeder operating costs incurred in the performance of the transportation of air mail were just offset by the operating revenues received from the Post Office Department and that, on this basis, no subsidy was received by the users of air mail service, at least insofar as the actual air-movement phase of the service was concerned.

Costs were then allocated to the "commercial" segment of the feeder operations. "Commercial" operations were defined as those providing direct service to all but air mail and military users of the feeder system. As a result of the absence of current military utilization of the feeder system, it was concluded that the amount of the total costs of $93,303,000 remaining after the costs of $1,370,000 attributable to the operations of the postal
service had been deducted, or $91,933,000, was the sum chargeable to the commercial users of the feeder service. After deducting from total operating revenues the operating revenues received by the feeders from the Post Office Department and from the federal government through subsidy payments, it was found that the remainder of $60,761,000 represented the portion of total operating revenues which had been generated by the commercial operations of the feeder system. This figure of $60,761,000, representing operating revenues from commercial operations, when compared to the $91,933,000 of operating costs attributable to these commercial operations, revealed a difference of $31,172,000, the amount by which the 1958 total operating costs of the feeder carriers exceeded their total operating revenues, exclusive of subsidy, and, likewise, the amount of subsidy being provided by the federal government to the users of the commercial services of the feeder carriers.

Inasmuch as the military did not directly utilize the facilities of the feeder carriers during 1958, it was concluded that none of the costs of their operations should be allocated to national defense. It was indicated, though, that the absence of military utilization did not preclude the possibility of apportioning a part of the burden of supporting the feeder system to the taxpaying public on the basis of the receipt by such taxpayers of indirect benefits in the form of either deterrence value or potential
usage capacity, the two not being mutually exclusive in all cases.

The first method utilized in the assigning of values to the total and stand-by capacities of the feeder system was one of determining how much would have been charged by the feeder carriers themselves in the performance of service at the levels of both their total and stand-by ton-mileage capabilities and at the minimum ton-mile rate of twenty cents chargeable by these carriers under 1958 Civil Aeronautics Board regulations for the movement of freight for the first 1,000 ton-miles of any one shipment. Under these conditions, the monetary value placed on the total usage capability of the feeder system in 1958 was $37,080,000, whereas it was determined that the stand-by service capacity would have been valued at $19,760,000.

An alternative-cost method was also utilized for the purpose of establishing similar values. This formula involved the utilization of the same ton-mile figures as those used in the above calculations, but the relevant rate was that which would have been charged by the Logair contractors in the performance of these same magnitudes of service. It was pointed out that although this method bore an alternative-cost label, the Logair operators are probably the most "responsive" and the least costly of all media available to the military to meet its airlift requirements. In the conduct of the Logair flights, it was
indicated that the contractors themselves furnish all personnel, equipment, materials, and supplies, while the government provides communication facilities along the routes flown, gasoline and oil at cost, emergency maintenance at cost, and all cargo loading and unloading at the Air Force bases and installations serviced by Logair. The ton-mile rate of sixteen cents was used in this method in the calculation of the values of the total and the stand-by feeder capacities. It was based on a combination of the ton-mile figure of two cents to cover indirect costs, primarily the expenses of the loading and unloading operations performed by the Air Force, and the one of fourteen cents per ton-mile to compensate the Logair contractors for their transportation services. With these data, it was determined that the value of the total capability of the feeder system was $29,664,000, whereas the value of the stand-by capacity was $15,808,000.

At this juncture, some tentative conclusions were drawn. Utilizing the figure of $31,172,000, which represented the amount by which the 1958 total operating costs of all of the feeder carriers exceeded their total operating revenues, exclusive of subsidy, for the same year, it was determined initially that under conditions in which it was assumed that the future national defense usage value of the system would be zero, the entire $31,172,000
was allocable to the "commercial" operations, such amount indicating the magnitude of subsidy being received by the users of the commercial services of the feeder carriers. On the other extreme, under conditions in which it was assumed that the potential national defense usage demands on the feeder system would require its entire service capability, it was concluded that $29,664,000 of the $31,172,000 might be apportioned as a burden to be borne by the tax-paying citizenry to support a transportation system which offered potential national defense usage value. Finally, under conditions in which it was assumed that only the stand-by capacity of the feeder system would have future national defense usage value, it was concluded that $15,808,000 of the $31,172,000 might be apportioned to the taxpaying public on the basis of the potential receipt by such public of national defense usage value of the feeder system.
CHAPTER VIII

APPLICATION OF ANALYTICAL FRAMEWORK IN THE
DETERMINATION OF THE SIGNIFICANCE OF THE
FEEDER SYSTEM TO THE ECONOMY

One of the major objectives of this study was to develop the types of data which would permit the making of a costs-benefits analysis of the feeder air transportation system to determine the overall significance of the industry to the economy. The results of this analysis were then to be used for the purpose of formulating public policy to guide the future conduct of feeder operations.

As was pointed out in Chapter II, the conduct of a costs-benefits study in this sector of the economy can not be made on the basis of an evaluation of market values alone, particularly with relation to the benefits segment. Granted, it is possible to measure through the market medium the user benefits, since the monetary figures reflecting utilization provide a major indicator of the user benefits. Similarly, the dollar costs, which include subsidy, reveal the monetary costs of the feeder system which are occasioned by its operation.

Yet the monetary user benefits and the monetary user costs incurred on behalf of these users might not be
indicative of either the total benefits or the total costs which are attributable to the operation of the system. This statement has particular relevance when applied to benefits, inasmuch as the feeder system might provide benefits of an indirect nature to both the users and the non-users of its services. In this study, particular attention is given to a consideration of whether or not the feeder system provides indirect benefits of a national defense nature to the economy. On the cost side, it is likewise possible that the operation of the feeder system results in the development of costs other than those reflected in the accounting statements of the feeder airlines. In this sense, "social costs," such as decreases in land values adjacent to the site of feeder operations, hazards to health and safety due to the mere performance of feeder flights, and noise nuisance associated with feeder operations, should also be considered for the purpose of obtaining a comprehensive picture of the total costs of the feeder system.

The difficulty presented by the existence of the types of benefits and costs which are not reflected in a consideration of market values could be circumvented if it were possible to assign monetary values to them. This paper makes an attempt to place such values on the total usage and stand-by usage capacities of the feeder system at its 1958 operating levels. These values attached to the
national defense service capabilities of the feeder system would be meaningless, though, unless it could be concluded that the feeder system would be utilized in the event of the outbreak of a national emergency. Available data indicated that present military plans do not anticipate the usage of the feeder system except through the War Air Service Pattern and then only in the event of the existence of a national emergency which would be serious enough to warrant such usage. Thus, the impossibility of predicting the seriousness of a future national emergency, assuming initially the outbreak of one, prevents even the drawing of a conclusion that the feeder system will be utilized, to say nothing of the probable extent of such utilization. An even greater problem is encountered when an attempt is made to assess the deterrence value of the feeder system. Deterrence depends, as conceptualized in this study, on the impediment, if any, to enemy aggression resulting from the existence of the feeder system, as such impediment is reckoned by the aggressor and as a value is placed upon the availability of such an impediment by our citizens. Even assuming that the feeder system presents some deterrence to enemy aggression, it is impossible to convert such an intangible into a monetary value.

To provide for a consideration of both market-measurable and market-immeasurable benefits and costs, it
was indicated in Chapter II that recourse would be had in this paper to the "tools" of welfare economics. Through the use of some of the welfare concepts, it is possible to develop conditions which must be met before it can be said that the feeder system is at an optimum and, therefore, making its maximum contribution to the economy. The relationships between total benefits and total costs will be considered, but it should be mentioned that equality between the two does not necessarily indicate that the feeder system is at an optimum position in a welfare sense, inasmuch as such a point of equality does not reveal whether or not an economic reorganization would make at least one person better off to the extent that his [their] gain[s] would exceed the loss[es] of the loser[s]. Whenever a reorganization within the feeder system could accomplish the foregoing result, it can be said that the system is not at an optimum. If it is not, public-policy measures might be recommended which would have as their objective the directing of the feeder industry to an optimal position.

It will be the purpose of this chapter to utilize the analytical framework which was developed in Chapter II to compare the total benefits and total costs associated with the operation of the feeder system for the purpose of determining the significance of the system to the economy. In Chapter II, five cases were developed into one or all of which it was said, at that time, that the feeder system
might be placed. In this chapter, using the data developed in the chapters intervening between Chapter II and this one, the case[s] describing the nature of the conditions under which feeder operations are conducted will be selected, and a determination will be made of whether it can be concluded that the feeder system satisfies the tests, appropriate to this [these] case[s], which must be met before it can be said that it is at an optimum. As may be inferred, this chapter is designed to draw together the data developed from the descriptions and analyses of the preceding chapters for the purpose of formulating some of the major conclusions of this study. The findings of this chapter will provide a considerable amount of the information which will be used in Chapter XI in the making of recommendations relative to the conduct of future operations of the feeder system.

Initially, it might be well to indicate the method which will be used in this chapter for the treatment of total benefits and total costs. The benefits accruing to the users of the feeder system are measurable, as has been indicated previously, through the analysis of ton-mile and dollar-value statistics which reflect the actual utilization of the feeder system. The two main categories of users include those in the postal and commercial classes. The latter division of users includes all utilizers of
the feeder system except those in the postal and military groups, it being composed primarily of travelers and shippers of freight and express.

Complicating the making of this costs-benefits study, however, is the possibility that the feeder system makes contributions to the economy on other than a direct-usage basis. The number of alleged contributions of this type is considerable, particularly if they are being enumerated by a proponent of more extensive feeder services. Such an advocate might emphasize the impetus given to the growth of a city which possesses feeder service and stress the stimulus provided for the attraction of industry to an area which offers feeder services, to mention only two. The most frequently used, yet possibly the least frequently analyzed, non-commercial justification of the existence of the feeder system is, of course, the national defense contribution which this segment of our air transportation network reputedly makes to the economy.

Inasmuch as there are possible beneficiaries of the feeder system other than direct users and inasmuch, also, as it is impossible to place a monetary value on these indirect benefits, it is likewise impossible to total all benefits through the utilization of a homogeneous measuring device, such as ton-mile utilization or dollar value of operating revenues. It is possible, however, to utilize some of the principles of welfare economics in such
a way that conclusions may be drawn about the total contributions being made by the feeder system to the economy and about the position of the system relative to optimum.

The same types of methodological problems are encountered in relation to the costs associated with the operation of the feeder system. The direct money costs, including subsidy, incurred by the feeder carriers are easily calculable. Yet it is possible that there are other costs attributable to the conduct of feeder operations, these taking the form of such things as decrements in the value of land which is in close proximity to the site of feeder operations and hazards to health and life created by the making of feeder flights. Again, although it is impossible to attach a monetary tag to costs of this nature, it is still possible, within a welfare economics framework, to compare the total costs, including those of the types just discussed, of the feeder system with the total benefits for the purpose of determining whether the system is making its maximum contribution to the welfare of the economy.

As will be indicated in greater detail in subsequent paragraphs, one of the techniques to be pursued in this chapter for the purpose of determining whether or not the feeder system is at an optimum is to conclude that if the relationship between total benefits and total costs is
such that total benefits, including consumers' surplus and indirect benefits, such as those with a national defense label, would not exceed total costs, including non-user costs, especially subsidy, as a result of an economic reorganization, then the feeder system is at an optimum, and it is making the maximum possible net contribution to the economy. It should be pointed out again that the mere equality of total feeder benefits and of total feeder costs does not indicate whether the feeder system is at an optimum, since gains great enough to exceed losses might be registered as a result of some type of economic reorganization in the feeder industry.

This methodological technique of postulating the making of an economic reorganization, of determining the total gains and the total losses from such a hypothetical reorganization, and of thus concluding from an analysis of the net results whether or not the feeder system was at an optimum position prior to the making of the reorganization furnishes a way of drawing conclusions, at least to those who subscribe to the possibility of drawing meaningful conclusions from welfare analysis, pertinent to the relation between total benefits and total costs and to the significance of the feeder system. At the same time, the utilization of this technique obviates the necessity of having to sum different types of data which are not convertible into homogeneous units for measurement purposes.
As was indicated in Chapter II, it is to be assumed that the desideratum for the conduct of the operations of the feeder system is the attainment of an allocative optimum. This optimum was defined as "a state of affairs starting from which it is not possible to make any single individual better off while leaving other individuals as well off as before." Summarily, then, it may be said that optimum has been reached when no allocative reorganization would increase welfare, but that as long as it has not been attained, it follows that the pursuit of certain maximizing courses of action would enhance total welfare. An analytical framework was constructed in Chapter II, it being designed to provide for a means of considering all of the factors necessary for the determination of the position of the feeder system relative to optimum. An integral part of this framework was the elaboration of five cases. When these cases were constructed, it was indicated that the characteristics surrounding the operations and regulation of the feeder system would determine the case[s] into which the feeder system should be placed, that an analysis of the factors necessary to determine the exact placement would be made in Chapters III through VII, and, finally, that an application of this analytical framework would be made in this particular chapter.

\(^1\)Refer to footnote 52 in Chapter II.
Even though the characteristics surrounding the operations and regulation of the feeder system preclude its conforming to the characteristics necessary for the satisfaction of every one of these five cases, the nature of each will be outlined again so that it may be indicated why the feeder system does or does not conform to each one. In the consideration of these cases, it will be concluded, whenever relevant, that the feeder system does provide some indirect benefits, however small. The findings of Chapter VI provide a justification for the formulation of this conclusion, it having been pointed out therein that if our nation were confronted with a grave national emergency, it would be likely that some military demands would be made on the feeder system for the transportation of persons and/or cargo.

In Case A, it was assumed that the operations of the feeder system were characterized by the absence of external economies of consumption, likewise by the absence of government programs designed either partially or wholly for the satisfaction of collective wants, and by the presence of perfectly divisible factors of production. It was pointed out that if these criteria were satisfied within a framework of perfect competition, the operation of the market alone would assure the satisfaction of the conditions necessary for the attainment of an allocative
Inasmuch, though, as it has been concluded that the feeder system does provide some indirect benefits, it may likewise be concluded that the feeder system does not qualify for placement into Case A. In addition, the operation of the feeder system is characterized by the presence of factor indivisibility. Often it is impossible to employ just the correct quantity of factors needed to produce one additional unit of service, as is exemplified by a hypothetical situation in which a new flight [an additional plane] must be added to accommodate the marginal passenger.

For Case B, it was assumed that there are no external economies of consumption and no programs for the satisfaction of collective wants, but that there are factor indivisibilities. Since it has been concluded earlier that the feeder system does provide external economies of consumption [indirect benefits], then it is obvious that the feeder system does not meet the conditions of this case, although its operations are characterized by the presence of factor indivisibilities. It may be indicated at this point, however, that such factor indivisibility may lead to the development of external economies of consumption, depending on the nature of such external economies. Thus, if it were concluded, as has been done,

\[2\text{Refer to footnote 54 in Chapter II.}\]
that the unutilized capacity of the feeder system is an asset of potential national defense usage value, then it might similarly be concluded that a part, at least, of this value is an external economy attributable to factor indivisibility, since the latter is responsible for the existence of at least some of the unutilized capacity. On the other hand, though, if the indirect benefits were attributable to the deterrence value, if any, of the feeder system, then it could be maintained that the feeder system constituted a national defense asset, regardless of whether there was unutilized capacity, although the asset value of the feeder system for this purpose would probably be greater if there were unutilized capacity.

As to Case C, it was assumed that there are external economies of consumption and that user revenues equal user costs, under which conditions there would be no necessity for the feeder carriers to receive subsidy to continue their current level of operations. As has been indicated frequently in this study, the feeder carriers are the recipients of government support [subsidy]. On this basis, it may be concluded that Case C does not describe the types of conditions under which the feeder carriers conduct their operations.

Relative to Case D, it was assumed, as it was for Case C also, that there are external economies of consumption, but that service is conducted under conditions in
which user revenues are less than user costs, necessitating the receipt of governmental support by the airlines of the feeder system. As it has been concluded that the feeder system does provide external economies of consumption [indirect benefits] and since the feeders in reality do receive governmental support [subsidy], it may be concluded that the feeder system meets the criteria for inclusion into Case D. It should be mentioned again that the existence of indivisible factors may be partly responsible for the provision of the indirect benefits to both the users and the non-users of the feeder system. Inasmuch as the market alone fails to satisfy the conditions necessary for the attainment of optimum when there are external economies of consumption and subsidy payments, utilization will be made in succeeding paragraphs of the methodological tools of analysis of welfare economics for the purpose of indicating the conditions which must be met before it can be said that feeder operations conducted under Case-D conditions satisfy the requirements of an allocative optimum.

In connection with Case E, it was assumed that the feeder operations are conducted either partially or wholly under conditions in which the primary objective is one of satisfying collective wants, as for national defense protection. Inasmuch as the feeder system is primarily, if not exclusively, market-oriented in its provision of service for users, it can not be reasonably maintained
that it is designed totally for the satisfaction of collective wants, as such wants were defined in Chapter II. Available data do not indicate either that the feeder system is *specifically designed*, even in part, to provide for the satisfaction of collective wants. This is not to say that collective-want satisfaction, as through national defense protection, does not occur as a result of the performance of service by the feeder carriers, but it is to say that if wants are collectively satisfied, it is a result of the existence of external economies of consumption and not of a specific design on the part of the framers of policy for the conduct of feeder operations. In this sense, collective-want satisfaction would be a *by-product* of the market-oriented operations of the feeder system. Inasmuch as research has not produced any evidence to indicate that the policy governing the abandonment, continuance, and extension of feeder routes and schedules is not primarily market directed, it will be concluded that Case E has only limited applicability, if any, to the feeder system. It is correct to state that the framers of the policy which guides the operations of the system must consider the needs of the postal service, commerce, and national defense, without explicit reference to either market or non-market considerations, but this is by no means tantamount to declaring that the route and schedule
patterns of the feeder carriers are specifically planned for the purpose of satisfying collective wants.

It has been concluded, then, that Case D has the greatest applicability in describing the conditions under which feeder operations are conducted. To summarize, it was stated that this case was characterized by the presence of indirect benefits in the form of external economies of consumption, such as national defense protection, and by the receipt on the part of the feeder carriers of federal funds [subsidy] which permitted them to equate total operating revenues with total operating costs. It was indicated in Chapter II that the prevalence of this case would necessitate the utilization of the principles of welfare economics to aid in a determination of whether or not the feeder system is at an optimum position.

As was also pointed out in Chapter II, the determination of the position of the feeder system relative to optimum is to be based upon the utilization of two approaches, both of these depending either on the use of interpersonal comparisons of utility, a cardinalist measure, or on the use of the compensation principle, an ordinalist measure. Both of these approaches, which were explained in detail in Chapter II, will be based upon the making of a hypothetical economic reorganization the results of which will be analyzed to determine whether the system is at an
optimum. Thus, by assuming the possibility of either making interpersonal comparisons of utility or of applying the compensation principle, or both, and by using either one of these, or both, in an analysis of the findings developed in Chapters III through VII, it will be maintained that it can be determined whether or not the feeder system is at optimum. In this respect, if it can be concluded that an economic reorganization would make nobody better off, it may be said that the feeder system is at an optimum. If, on the other hand, at least one person could be made better off by an economic reorganization and if his [their] gain[s] would be greater than the loss[es] of the loser[s], it may then be concluded that the feeder system is not at an optimum. In this situation, the gainer[s] could compensate the loser[s], and welfare would be enhanced by the reorganization.

In the second approach, the results of the analyses of Chapters III through VII will be utilized to indicate the relationship between the changes in total benefits and in total costs associated with a hypothetical economic reorganization. In this respect, if it can be said as a result of an economic reorganization that total benefits, including consumers' surplus and indirect benefits, would not exceed total costs, including subsidy, then it may be concluded that the feeder system is at an optimum position.
On the other hand, under conditions in which the total benefits, including consumers' surplus and indirect benefits, derivable from an economic reorganization would exceed the total costs, including subsidy, associated with the same economic reorganization, it may be concluded that the system is not at an optimum. In this case, if the magnitudes of consumers' surplus and indirect benefits developed from an economic reorganization were greater than the subsidy cost incurred by virtue of the making of the reorganization, it could be concluded that a reorganization would lead to an increase in total welfare.

It should be pointed out that a reorganization could take the form of an increase in the amount of funds invested in the feeder system. As long as the increased investment met the welfare conditions outlined above, it could be maintained that welfare would be increased. Still assuming that the feeder system is not at an optimum, the reorganization necessary for its attainment might be one of decreasing the amount of investment in the feeder system. In this respect, the "gainers" would be those persons who are now supporting the feeder system by providing the tax funds from which the subsidy payments are distributed, whereas the "losers" would be the present recipients of consumers' surplus and of the indirect benefits developed from the operations of the feeder system.
Conceivably, a pricing schema based upon other than the current average-cost arrangement would lead to an enhancement of welfare. In this respect, possibly a marginal-cost pricing formula would meet the conditions necessary for the attainment of optimum. These matters involving the possible approaches to the attainment of optimum will be considered again in Chapter XI.

Using the aforementioned assumptions and approaches to provide a framework for the determination of the position of the feeder system relative to optimum and analyzing the findings of Chapters III through VII within such a framework, it is concluded that the feeder system is not at an optimum position. This is to say nothing about the possibility that the feeder carriers may attain an optimum position in the future, particularly through a reduction or elimination of its subsidy requirements. The subsidy-reduction prospects of the feeder carriers will be considered in detail in Chapters IX and X. It is to say, however, that the system is not at an optimum currently, inasmuch as it may be reasoned that an economic reorganization could be made in such a manner that somebody would be made better off or, synonymously, that this reorganization could be made in such a way that the total benefits received therefrom would exceed the total costs incurred in its making. It is this writer's conclusion that the "gains"
accruing in the form of consumers' surplus and indirect benefits, with special emphasis on the latter, from the operation of the feeder system are less than sufficient to offset the "losses" incurred by the persons who pay the taxes from which the federal funds are derived to provide the subsidy support for the operations of the feeder system.

There is no "tool" available which will permit the development of satisfactory data relative to the magnitude of consumers' surplus, if any, which is created through the provision of service by the feeder airlines. The development of this type of information would require the possession of data which would indicate the willingness of the users of the feeder airlines to purchase their services at rates higher than those currently in effect. In the absence of such information, it will be assumed, using as a basis the available data indicative of the relatively elastic demand for air transportation services, that there would be a considerable amount of reluctance to purchase at higher rates and, thus, that there is not a large amount of consumers' surplus, if any.

Frederick states that although there are no data on the exact elasticity of demand for airline services, there is reason to believe that the elasticity is "relatively high," largely because of the availability of substitute media of transportation. John H. Frederick, Commercial Air Transportation, Fourth Edition [Homewood: Richard D. Irwin, Inc., 1955], p. 167.
The distinguishable indirect benefits from feeder service take the form of external economies of consumption, reflected primarily in national defense contributions, largely of the deterrence and potential-usage types. As was indicated in Chapters V and VI, there are no direct benefits from usage being derived presently by the military from the feeder system. The only current contribution, if any, of the feeder system to national defense is its asset value as a deterrent to enemy aggression. As was indicated in Chapter VI, it does not seem plausible to conclude that an enlightened aggressor would impute any value to the feeder system as a deterrent to limited war. It was also concluded, though not as conclusively, that the deterrence significance of the feeder system insofar as all-out war is concerned would probably be small, especially in view of the manner in which total warfare is likely to be conducted under modern conditions. It was also concluded in Chapter VI that some national defense value, however small, would have to be attributed to the feeder system because of its potential usage capability in the event of the outbreak of a national emergency, particularly of a serious nature. To make this point, the existence of an emergency of a critical enough nature to require the utilization of all available transportation facilities could be assumed, under which conditions the existence of the feeder system would be an asset,
although of unpredictable value. It should be pointed out that the gainers of tomorrow from such potential usage value might not be the same persons as the losers of today, the latter being the persons who are providing the funds for the subsidization of the feeder system.

Still in relation to benefits, it seems unreasonable to conclude that the other alleged indirect benefits associated with the provision of feeder services, such as community gains attributable to the attraction of industry, are real net benefits to the economy as a whole, since, as in this example, one area may have gained at the expense of another, while the welfare of the economy as a whole might not have been enhanced. In addition, community losses, such as decrements in land values adjacent to feeder facilities, may occur and offset the alleged community gains associated with the provision of feeder service.

While it is difficult to identify the non-users who are gainers from the conduct of feeder operations, it is not nearly so difficult to identify the non-user losers, as a group at least, since they, in large part, are the persons who contribute the tax revenues used to help support the feeder operations. If it were assumed that because of the non-existence of the feeder system, the total of federal taxes would be smaller by at least the amount
of the direct subsidy payments, then it could be concluded that the satisfaction foregone because of the making of such tax payments could have been enjoyed through a utilization of such funds for purposes other than the making of such tax payments. It is concluded that the satisfaction foregone because of tax payments was greater than the sum of the satisfaction derived from the accumulated consumers' surplus and from the indirect benefits supplied by the feeder system and that, as a result, the feeder system is not at an optimum.

Having concluded that the feeder system is not at an optimum, it will also be the purpose of this paper to make recommendations which it is believed would lead to an attainment of optimum. These recommendations will take the form of suggested changes in the policy governing the conduct of feeder operations. Although these recommendations will be made in Chapter XI, it may be pointed out at this point that the analytical methods which were used herein to indicate the position of the feeder system relative to optimum might also be utilized to determine whether a given recommendation, especially with relation to changes in investment, would lead to an enhancement of welfare. In this respect, if it could be concluded that somebody would be made better off as a result of the changes or, synonymously, that the total benefits
derivable from such a reorganization would exceed the total costs incurred as a result of the same reorganization, then it could likewise be concluded that the recommended policy change would be in the public interest from the standpoint of its effect on the welfare of the economy.
CHAPTER IX

ANALYSIS OF PROSPECTS OF FEEDER CARRIERS
FOR IMPROVEMENT OF REVENUES

Introduction

Whereas the first eight chapters of this study presented a rather static analysis of the significance of the feeder system to the economy, Chapters IX and X will be more dynamic in nature in that either they will be evaluating the significance for the future of the feeder system of changes which are currently taking place, as in regulation, in the parameters which were assumed to be stationary in the previous chapters or they will be postulating changes in these parameters for the purposes of assessing their probable effects upon the future conduct of feeder operations and of developing data which will be of value in the formulation of public policy. Chapter IX will be concerned with an analysis of the prospects of the feeder carriers for the reduction of their subsidy requirements through the improvement of their revenues. Chapter X will also consider the subsidy-reduction prospects of the feeder carriers, but therein they will be analyzed from the standpoint of the likelihood that they will be effected through cost reductions. It should be pointed out
that a comprehensive coverage of all of the data suggested by the titles of Chapters IX and X can not be undertaken in a study whose primary purpose is other than a consideration of subsidy-reduction prospects. In combination with the data derived from the first eight chapters, that developed in these two chapters will provide a more comprehensive analysis of the most important factors which must be considered both in evaluating the current and probable future significance of the feeder system to the economy and in formulating the types of public policy for this industry which are consistent with a goal of optimum allocation of the nation's resources.

To obtain a perspective of the trends in feeder operating revenues since 1955, it will be advantageous to consider Table 19 on page 321. This table reveals that the passenger revenues, subsidy revenues, total feeder operating revenues, and total feeder operating revenues exclusive of subsidy all increased between 1955 and 1958. The most violent fluctuations occurred in subsidy revenues, as they increased by 10.94 per cent between 1955 and 1956, jumped upward by 27.75 per cent between 1956 and 1957, and then rose by 9.69 per cent between 1957 and 1958. While this table will reveal the general movements in these revenue categories, it should be pointed out that projection of these data is not very meaningful, largely
### DOLLAR AND PERCENTAGE CHANGES FOR THE FIFTH YEAR

<table>
<thead>
<tr>
<th>Year</th>
<th>Passenger Revenues [000]</th>
<th>Public Service Revenues [Subsidy] [000]</th>
<th>Total Feeder Operating Revenues [000]</th>
<th>Total Feeder Operating Revenues Exclusive of Subsidy [000]</th>
</tr>
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<tr>
<td>1955</td>
<td>32,840</td>
<td>20,923</td>
<td>57,450</td>
<td>36,527</td>
</tr>
<tr>
<td>1956</td>
<td>40,166</td>
<td>23,211</td>
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<td>44,501</td>
</tr>
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<td>1957</td>
<td>47,464</td>
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<td>82,139</td>
<td>52,488</td>
</tr>
<tr>
<td>1958</td>
<td>56,421</td>
<td>32,523</td>
<td>94,654</td>
<td>62,131</td>
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</table>

Source: *Air Transport Facts and Figures, 20th Edition*
<table>
<thead>
<tr>
<th>Yearly Change in Passenger Revenues [%]</th>
<th>Yearly Change in Public Service Revenues [Subsidy] [%]</th>
<th>Yearly Changes in Total Feeder Operating Revenues [%]</th>
<th>Yearly Changes in Total Feeder Operating Revenues Exclusive of Subsidy [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>----</td>
<td>----</td>
<td>----</td>
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<tr>
<td>22.31</td>
<td>10.94</td>
<td>17.86</td>
<td>21.83</td>
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<tr>
<td>18.17</td>
<td>27.75</td>
<td>21.31</td>
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<tr>
<td>18.87</td>
<td>9.69</td>
<td>15.24</td>
<td>18.37</td>
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because of the role played by subsidy. In this respect, while passenger revenues and all other revenues exclusive of subsidy increased at fairly stable rates, projection of these rates of growth would not necessarily be indicative of the probable future success of the feeder carriers, inasmuch as there is a large number of variables to be considered, the effects of changes in which are reflected in the subsidy figure. Examples of these variables include changes in the route structure of the feeders and the undertaking of re-equipment programs, to mention the two which have been most significant in recent years. Changes in these variables could have accounted for the situation which developed between 1956 and 1957, during which period passenger revenues increased by 18.17 per cent and total feeder operating revenues exclusive of subsidy rose by 17.95 per cent, while, at the same time, subsidy requirements jumped by 27.75 per cent.

In presenting his budget requests for the 1961 fiscal year, President Eisenhower pointed out that the subsidy payments requested by the Civil Aeronautics Board for fiscal year 1961 represented an 80 per cent increase over the payments granted in 1958. Since these are the total figures for subsidy, they include payments to the helicopter operations and to the Alaskan carriers, as well as to the feeder carriers. A breakdown of the
estimated subsidy payments for fiscal year 1961 reveals that $57,400,000 will go to thirteen feeders, as compared with expected payments of $53,400,000 for fiscal year 1960, an increase of 7.49 per cent; the three helicopter carriers will collect $4,700,000; and the seven Alaskan carriers will receive $9,300,000. The President advised Congress that it may be necessary to consider proposals to make feeder carriers, including helicopter and Alaskan carriers, less dependent upon government aid. At about the same time that the President submitted his budget proposals, the Bureau of the Budget asked the Civil Aeronautics Board to draft legislation designed to exercise greater control over annual subsidy appropriations.

While the data in Table 19 indicate that the absolute amounts of subsidy necessary for the operation of the feeder system increased, they do not indicate anything about the effects of increased service availability on such subsidy requirements. Table 20 on page 324 is designed to reveal in terms of available ton-miles flown what the changes were between 1955 and 1958 in public service revenues [subsidy], in total feeder operating revenues, in total feeder operating revenues exclusive of subsidy, and

1^Aviation Week, January 25, 1960, p. 38.
2^Aviation Week, February 1, 1960, p. 28.
<table>
<thead>
<tr>
<th>Year</th>
<th>Public Service Revenues [Subsidy] [000]</th>
<th>Total Feeder Operating Revenues [000]</th>
<th>Total Feeder Operating Revenues Exclusive of Subsidy [000]</th>
<th>Total Feeder Operating Costs [000]</th>
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<tr>
<td>1955</td>
<td>20,923</td>
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<td>32,523</td>
<td>94,654</td>
<td>62,131</td>
<td>93,303</td>
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</table>

<table>
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<tr>
<th>Public Service Revenues per Available Ton-Mile Flown</th>
<th>Total Feeder Operating Revenues per Available Ton-Mile Flown</th>
<th>Total Feeder Operating Revenues Exclusive of Subsidy per Available Ton-Mile Flown</th>
<th>Total Feeder Operating Costs per Available Ton-Mile Flown</th>
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<tbody>
<tr>
<td>$ .172</td>
<td>$ .471</td>
<td>$ .300</td>
<td>$ .466</td>
</tr>
<tr>
<td>.159</td>
<td>.465</td>
<td>.306</td>
<td>.469</td>
</tr>
<tr>
<td>.174</td>
<td>.481</td>
<td>.307</td>
<td>.486</td>
</tr>
<tr>
<td>.176</td>
<td>.513</td>
<td>.337</td>
<td>.506</td>
</tr>
</tbody>
</table>

*hington: Air Transport Association of America, 1959,*
in total feeder operating costs. The measure of available ton-miles flown refers to the ton-miles made available, whether or not sold, during a given period.

Columns (5) through (8) in Table 20 reveal the relationship between the indicated revenue categories and total operating costs, on the one hand, and the available ton-miles flown, on the other. As such, they measure in monetary figures the revenues generated and the costs incurred per available ton-mile flown, not utilized, in each of these years. Thus, in 1958, $.176 of public service revenues [subsidy] was provided by the government for each ton-mile flown by the feeder carriers. It may be seen that the per ton-mile rates for each one of these categories remained relatively constant over the four-year period, although the rates increased slightly for columns (6) through (8) between 1957 and 1958. One of the most significant conclusions that can be drawn from these data is that the governmental subsidy burden of supporting the feeder system per available ton-mile flown remained almost constant as the amount of services increased. Thus, in 1955 with 121,900,000 available ton-miles flown, the subsidy rate per available ton-mile flown was $.172, while in 1958, when the available ton-miles flown had increased to 184,400,000, the subsidy rate per available ton-mile flown was $.176. If these rates are indicative of the
probable subsidy burden per available ton-mile flown for the future, it may be concluded that changes in the total subsidy requirements will bear a direct and constant relationship to the changes in the available ton-miles flown by the feeder carriers. Thus, for every increase in available ton-miles flown as a result of such things as route expansion or increased flight frequencies, it might be expected that the subsidy cost of supporting the feeder carriers will increase by slightly more than seventeen cents per available ton-mile flown. In view of the considerable expansion in the route structure of the feeders as a result of the recent "area" cases, it might be anticipated that the total subsidy requirements of the feeders will increase considerably. It should be pointed out, however, that the proponents of expanded route coverage for the feeders, especially the carriers themselves, maintain that a solution to the feeder "problem" depends very heavily on the receipt by the feeders from the Civil Aeronautics Board of permission to expand their route mileages.

Table 20 also indicates, as would be expected from a consideration of the column of public service revenues per available ton-mile flown, that there is a relatively stable relationship between total feeder revenues exclusive of subsidy per available ton-mile flown, on the one hand, and total feeder operating costs per available
Thus, while the former increased by $.037 between 1955 and 1958, the latter increased by $.040 over the same period. The most obvious generalization that may be drawn from the data presented in this table is that increases in total feeder operating revenues exclusive of subsidy per available ton-mile flown were accompanied by increases in total feeder operating costs per available ton-mile flown of almost identical amounts and that, as a result, the subsidy burden per available ton-mile flown remained relatively constant, but that the total subsidy burden increased at a relatively constant amount, approximately seventeen cents, per available ton-mile flown. Whether or not these types of movements will continue into the future in view of the considerable route expansion and re-equipment programs now underway will be revealed only when sufficient time has elapsed to permit concrete operating results to be obtained.

Most of the remainder of this chapter will be concerned with analyses of the nature of the primary factors which affect the revenue-earning capabilities of the feeders, of the ways in which these factors affect revenues, and of the probable effects which current changes in these factors will have on the operations of the feeder carriers.
Magnitude of the Feeder Market

No doubt the most important single factor affecting the revenues of the feeder carriers, or of any mode of transportation, is the magnitude of the market in terms of the number of passengers and the ton-miles of cargo to be carried. Though the actual size of the total transportation market for any one past year can be measured fairly accurately, especially for common carriers, the potential for any future year is a dynamic factor, depending on changes both external to the industry, such as population growth, and internal to the industry, such as changes in pricing policy and in promotional activity. Table 21 on page 329 presents the total number of intercity passenger miles for all modes of transportation in the United States for selected years. It indicates, for example, that the airline share of total common carrier passenger traffic was 43.3 per cent in 1958, but that it was only 3.6 per cent of total common carrier and automobile intercity passenger miles for the same year. Of course, these percentage figures reveal the total airline share, which is to say that they encompass the statistics for both trunk and feeder carriers. Of the 25,255,900,000 total revenue passenger-miles flown by both the trunks and the feeders in 1958, the feeder carriers accounted for only 820,200,000 revenue passenger-miles, or for 3.25 per
TABLE 21
DOMESTIC INTERCITY PASSENGER MILES

<table>
<thead>
<tr>
<th></th>
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<td></td>
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<td>First Class</td>
<td>7,527</td>
<td>9,349</td>
<td>6,440</td>
<td>6,275</td>
<td>5,185</td>
<td>4,249</td>
</tr>
<tr>
<td>Coach</td>
<td>11,180</td>
<td>20,310</td>
<td>17,329</td>
<td>17,105</td>
<td>16,365</td>
<td>14,3005</td>
</tr>
<tr>
<td>Air Travel:²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>654</td>
<td>6,454</td>
<td>13,025</td>
<td>14,202</td>
<td>15,736</td>
<td>15,180</td>
</tr>
<tr>
<td>Coach</td>
<td>--</td>
<td>251</td>
<td>6,716</td>
<td>8,074</td>
<td>9,510</td>
<td>10,076</td>
</tr>
<tr>
<td>Motor Bus Travel³</td>
<td>9,100</td>
<td>22,411</td>
<td>16,562</td>
<td>16,409</td>
<td>14,886</td>
<td>14,585</td>
</tr>
<tr>
<td>Total Common Carriers</td>
<td>28,461</td>
<td>58,775</td>
<td>60,072</td>
<td>62,065</td>
<td>61,682</td>
<td>58,393</td>
</tr>
<tr>
<td>Airline Share of Total</td>
<td>2.3</td>
<td>11.4</td>
<td>32.9</td>
<td>35.9</td>
<td>40.9</td>
<td>43.3</td>
</tr>
<tr>
<td>Private Automobile, Intercity⁴</td>
<td>234,700</td>
<td>376,313</td>
<td>585,800</td>
<td>617,700</td>
<td>637,800</td>
<td>650,000⁵</td>
</tr>
<tr>
<td>Total Common Carrier and Auto</td>
<td>263,161</td>
<td>435,088</td>
<td>645,872</td>
<td>679,765</td>
<td>699,482</td>
<td>708,393</td>
</tr>
<tr>
<td>Airline Share of Total Intercity Travel</td>
<td>0.2</td>
<td>1.5</td>
<td>3.1</td>
<td>3.3</td>
<td>3.6</td>
<td>3.6</td>
</tr>
</tbody>
</table>

⁵Estimated.

Thus, the feeder share of both total common carrier passenger-miles and of total common carrier and automobile passenger-miles was very small. It should be recalled that passenger revenues in 1958 accounted for 90.81 per cent of total feeder operating revenues exclusive of subsidy. Since passenger revenues are so important to the feeder carriers, much of the data presented in this chapter will be concentrated on the passenger operations of these carriers.

The following statistics indicate the percentage distribution of intercity freight traffic among the different modes of transportation in the United States for 1952.

<table>
<thead>
<tr>
<th>Mode of Transportation</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam railroads</td>
<td>55.6%</td>
</tr>
<tr>
<td>Motor trucks</td>
<td>16.5%</td>
</tr>
<tr>
<td>Great Lakes carriers</td>
<td>8.0%</td>
</tr>
<tr>
<td>River and canal carriers</td>
<td>5.7%</td>
</tr>
<tr>
<td>Oil pipe lines</td>
<td>14.1%</td>
</tr>
<tr>
<td>Electric railroads</td>
<td>0.1%</td>
</tr>
<tr>
<td>Air carriers</td>
<td>Less than 0.1% of 1%</td>
</tr>
</tbody>
</table>

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4Ibid., p. 17.

These data illuminate the historical fact that the air carriers do not participate very heavily in the intercity movement of freight traffic, another reason for devoting the major part of this chapter to analyses of passenger operations.

A consideration of Table 22 on page 332 indicates for 1953 the share of the total common carrier intercity revenue passengers captured by railroad, motor bus, and airline carriers in various mileage categories. The significance of this table is its revelation that air carriers transported only 0.03 per cent of the revenue passengers in the 0-50 miles distance category, 0.32 per cent in the 51-100 miles distance range, and 11.27 per cent in the 101-250 miles distance bracket. No indication of the manner in which these percentages were shared by the feeders and trunks was given. When it is considered, though, that the average journey of the passengers originated by the feeders in 1958 was 195 miles and of those enplaned in the same year was 184 miles, it may be concluded that the feeders are performing their services in the distance categories which are heavily dominated by railroad and motor bus carriers, not to mention the private

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### PATTERN OF INTERCITY COMMON

<table>
<thead>
<tr>
<th>Distance in Miles</th>
<th>Railroad Revenue Passengers [Millions]</th>
<th>Ratio of Railroad Revenue Passengers to Total Revenue Passengers [%]</th>
<th>Motor Bus Revenue Passengers [Millions]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>65.3</td>
<td>22.04</td>
<td>230.9</td>
</tr>
<tr>
<td>51-100</td>
<td>55.7</td>
<td>60.48</td>
<td>36.1</td>
</tr>
<tr>
<td>101-250</td>
<td>47.0</td>
<td>59.49</td>
<td>23.1</td>
</tr>
<tr>
<td>251-500</td>
<td>16.0</td>
<td>46.11</td>
<td>9.0</td>
</tr>
<tr>
<td>501-1000</td>
<td>5.6</td>
<td>40.87</td>
<td>3.0</td>
</tr>
<tr>
<td>1001-1500</td>
<td>0.4</td>
<td>8.70</td>
<td>1.0</td>
</tr>
<tr>
<td>Over 1500</td>
<td>0.2</td>
<td>8.00</td>
<td>0.4</td>
</tr>
<tr>
<td>Total</td>
<td>190.2</td>
<td>36.37</td>
<td>303.5</td>
</tr>
</tbody>
</table>

Source: John H. Frederick, Commercial Air Transportation, p. 393. These data were developed by Graham H. A Potential, read in 1954.
### TABLE 22
CARRIER PASSENGER MOVEMENT IN 1953

<table>
<thead>
<tr>
<th>Ratio of Motor Bus Revenue Passengers to Total Revenue Passengers [%]</th>
<th>Airline Revenue Passengers [Millions]</th>
<th>Ratio of Airline Revenue Passengers to Total Revenue Passengers [%]</th>
<th>Total Revenue Passengers [Millions]</th>
</tr>
</thead>
<tbody>
<tr>
<td>77.93</td>
<td>0.1</td>
<td>0.03</td>
<td>296.3</td>
</tr>
<tr>
<td>39.20</td>
<td>0.3</td>
<td>0.32</td>
<td>92.1</td>
</tr>
<tr>
<td>29.24</td>
<td>8.9</td>
<td>11.27</td>
<td>79.0</td>
</tr>
<tr>
<td>25.94</td>
<td>9.7</td>
<td>27.95</td>
<td>34.7</td>
</tr>
<tr>
<td>21.90</td>
<td>5.1</td>
<td>37.23</td>
<td>13.7</td>
</tr>
<tr>
<td>21.74</td>
<td>3.2</td>
<td>69.56</td>
<td>4.6</td>
</tr>
<tr>
<td>16.00</td>
<td>1.9</td>
<td>76.00</td>
<td>2.5</td>
</tr>
<tr>
<td>58.04</td>
<td>29.2</td>
<td>5.59</td>
<td>522.9</td>
</tr>
</tbody>
</table>

automobile. Thus, of just the common carrier intercity passenger traffic movements in 1953, exclusive of transportation by private auto, air carriers, including both trunks and feeders, transported only 1.99 per cent of the total passengers in the three combined mileage categories from 0-250 miles. Though these data are not too current, there is little reason to believe that they have changed significantly enough to overshadow the fact that the feeder carriers are competing in a short-haul market which is controlled by the private automobile, as well as by the railroad and motor bus carriers. Though the members of the Civil Aeronautics Board who endorsed the feeder "experiment" anticipated that the feeders would be competing in a market where speed, the greatest competitive weapon of the air carrier, would be only a slight advantage, it may be wondered if these framers of public policy for air transportation realized the full extent of such a handicap.

Route Configuration

Probably the most significant factor influencing the magnitude of the market of any feeder carrier is its route configuration. The major reason for the ability of the trunks to operate without subsidy while the feeders require it is the difference in the route structures of these two types of carriers. Similarly, it is
also one of the most important reasons why individual carriers within each of these two broad categories obtain differential operating results measured in operating profits, or lack of them.

It has been concluded by Koontz that the "real difference among carriers...is the character of the market facing them." His study was based upon an analysis of the operations of the trunk lines, as was that of Gill and Bates, who concluded that the principal problem involved in achieving airline self-sufficiency is the degree of competition between carriers. Koontz avers, though, that the differentiating factor is not competition, but that it is the "size and density" of the traffic-generating routes which the carriers serve, these being a matter of route structure which, in turn, is dependent upon government policy, as determined by the Civil Aeronautics Board.

Although the size of the market in terms of total volume of traffic offered is important to a carrier, Koontz

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9Koontz, op. cit., p. 121.
maintains that the volume of traffic available between pairs of stations on the routes is of "greater strategic importance in determining the economic strength of the route."¹⁰ The presence of high-density pairs of cities makes it possible to achieve high load factors on non-stop flights in larger and more efficient equipment, these factors having favorable effects on both revenues and costs. A consideration of Table 23 on page 336 will reveal the significance of changes in the load factor on operating income. It may be seen that a decline of only 1 per cent, for example, of the load factor in 1953 would have lead to a decrease of almost $12,000,000 in net income. Thus, though the terrain covered by the feeders is a limiting factor from the cost standpoint, the route structure imposes more important limitations in the form of the number of important cities, and, more significantly, the number of important city pairs that it encompasses. Obviously, it is more difficult to generate large amounts of traffic between Concord and Manchester, New Hampshire, than it is between San Francisco and Los Angeles, regardless of the extent of the promotional activities undertaken between each of those two city pairs.

¹⁰Ibid., p. 118.
### TABLE 23

EFFECT OF PASSENGER LOAD FACTOR ON AIRLINE OPERATING PROFIT, 1946-1953

<table>
<thead>
<tr>
<th>Year</th>
<th>Operating Profit (000)</th>
<th>Passenger Load Factor</th>
<th>Effect of 1 Per Cent Change in Load Factor on Operating Profit (000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Actual</td>
<td>Breakeven</td>
</tr>
<tr>
<td>1946</td>
<td>$5,288*</td>
<td>78.81</td>
<td>80.32</td>
</tr>
<tr>
<td>1947</td>
<td>$20,900*</td>
<td>65.67</td>
<td>70.20</td>
</tr>
<tr>
<td>1948</td>
<td>2,075</td>
<td>58.34</td>
<td>57.99</td>
</tr>
<tr>
<td>1949</td>
<td>24,525</td>
<td>59.10</td>
<td>55.24</td>
</tr>
<tr>
<td>1950</td>
<td>62,571</td>
<td>62.70</td>
<td>53.58</td>
</tr>
<tr>
<td>1951</td>
<td>105,940</td>
<td>69.59</td>
<td>56.68</td>
</tr>
<tr>
<td>1952</td>
<td>95,537</td>
<td>67.08</td>
<td>57.54</td>
</tr>
<tr>
<td>1953</td>
<td>87,377</td>
<td>64.85</td>
<td>57.33</td>
</tr>
</tbody>
</table>

*Indicates a negative figure.

One of the studies prepared by the Civil Aeronautics Administration is of considerable import in providing data on the significance to a carrier of its route structure. This study has classified cities, on the basis of enplaned airline passengers, which indicator the CAA considers to be one of the "best common denominators for community air traffic volume," into "hub" cities, as follows:

a. A large hub is one which enplanes over 440,175 passengers.

b. A medium hub enplanes between 110,044 and 440,174 passengers.

c. A small hub enplanes between 22,009 and 110,043 passengers.

d. A non-hub enplanes under 22,008 passengers.11

It is pertinent to note that 85.4 per cent of the passengers and 91.6 per cent of the tons of cargo transported in 1957 were enplaned in the large and medium hubs, but that these two types of hubs accounted for only 11.4 per cent of the total number of communities included in the survey.

In 1957, the average number of feeder carriers serving the 22 large hubs was 1.8, while the average number serving the 40 medium hubs was 1.3. In the former category,

only two feeders were serving New York City, only one operated at such metropolises as San Francisco, Philadelphia, and Boston, while no feeders serviced Miami. In the category of medium hubs, cities such as Baltimore, Richmond, Syracuse, and Jacksonville received service from only one feeder carrier, while Tampa, as an example, was without feeder service. The obvious conclusion that may be drawn from these data is that, on the average, each of the feeder carriers has only a limited opportunity to serve those hubs wherein the predominant number of passengers and tons of cargo originate. Obviously, such an impediment poses a handicap insofar as the revenue-generating abilities of the feeders are concerned.

Of even greater significance than the absolute number of cities served is the number of city pairs with high traffic density which are provided service by the feeder carriers, as has been mentioned earlier in this section. Even though most of the feeders serve some of the important city pairs, it is important to indicate that any one feeder may serve only a few, and usually a very few, if any, of the most important of these pairs. In addition, it may be indicated that no feeders serve some of the most important, if not the most important, city pairs, such as

\[12\] Ibid., p. 4 and Flight Magazine, op. cit., pp. 60, 61.
New York and Los Angeles, New York and San Francisco, New York and Miami, New York and Chicago, Chicago and Los Angeles, and Chicago and San Francisco, to mention the most salient omissions. When it is considered again that by far the greatest amount of total passenger traffic is developed in the large and medium hubs, that the majority of this traffic moves from one large hub to another, or from one large hub to a medium one, or from one medium hub to another medium one, and that the feeders are not nearly as fortunate as are the trunks in terms of receipt of operating rights to serve the large and medium hubs, especially the large-and medium-hub pairs, it is relatively easy to understand in large part why the feeders require subsidy whereas the trunks do not find it necessary to receive these government payments.\(^{13}\)

Thus, logical reasoning based upon the examination of available data seems to indicate that the key to an improvement in the capability of the feeder carriers to generate additional revenues, and possibly eliminate subsidy, lies in an increase in the load factor, any such increase depending either upon the elicitation of greater traffic from the existing route configuration or upon an alteration in the route structure itself. In this respect,

\(^{13}\text{Ibid.} \)
the comments of Joseph O. Fitzgerald, executive vice president and general manager of the feeder carrier, Ozark Airlines, and former Director of the Bureau of Air Operations of the Civil Aeronautics Board, are enlightening. Even with its current route expansion and re-equipment programs, Fitzgerald maintains that Ozark must rely on federal subsidy for future growth. As a matter of fact, Ozark has keyed its expansion plan to the continued availability of subsidy. As viewed by Fitzgerald, the basic character of the route structure of his company is not self-supporting. To accomplish self-sufficiency, he states that it would be necessary for Ozark to obtain non-stop and long-haul routes in the high-density markets. A change in the pattern of services of this scope, however, would place the feeders in direct competition with the trunks in a type of competition for which Fitzgerald feels the feeders were not designed.14 Thus, according to this type of reasoning, as long as the feeders remain "feeders," the prospects for self-sufficiency are not good.

In the recent past, there seems to have been a pattern developing which has resulted in the relinquishing by the trunks of some of the points which they formerly served to the feeder carriers, a practice which, according to Harmar Denny, a member of the Civil Aeronautics Board,

14*Aviation Week*, August 10, 1959, p. 38.
constitutes the salvation of the feeder carriers. As an example, just recently operating rights at sixteen communities were turned over to the feeder carriers by trunks in keeping with a policy of separating trunk operations from subsidized feeder operations. Whether or not a pronounced trend in this direction has developed and whether or not such a trend would aid the feeder carriers significantly can be determined only as time transpires. It is likely, however, that any tendency towards trunk withdrawal from the short-haul market will be strengthened by the continued introduction by the trunks of long-range turbo-prop and turbo-jet equipment.

Besides these types of route alterations, the Civil Aeronautics Board embarked just prior to 1958 upon a new program to expand the feeder network. The program consisted -- as it still does -- of a number of "area" cases conducted by the Board for every region in the nation. As an example of the extent of the route changes taking place as a result of these area cases, the expansion of route systems and the lifting of restrictions in the Seven

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15Ibid., April 6, 1959, p. 38.
16Ibid., April 20, 1959, p. 49.
17James R. Durfee, Chairman of the Civil Aeronautics Board, in an address to the Lake Central Airlines Resident Managers Conference held at Indianapolis on March 17-19, 1959.
States Area case alone added 33 per cent to the nation's feeder mileage. Because of the recency of these cases approving the expansion of feeder routes, it is too soon to gather data which would indicate the probable results of these expansionary programs. If the past results of expanded geographical service and the estimated subsidy requirements of the feeders for 1960 and 1961 provide any sorts of indicators, it would appear that the expanded route mileages will lead to increased total subsidy requirements, though not necessarily to increases per available ton-miles flown.

Although his opinion may not ever be translated into policy resulting in changes in the feeder route system, Chairman Durfee of the Civil Aeronautics Board, in a recent regional meeting of the Air Line Transport Association in Fairbanks, Alaska, expressed belief that the feeder carriers should be granted route awards based upon traffic-flow area as a means of attaining greater management independence. Such a plan would be different from that currently pursued by the Board of basing route awards upon distinct geographical areas served by the airlines. According to Durfee's plan, a route standards program would be developed by which an area would be permanently marked out for a carrier by traffic flow. Within this area, the

18 *Aviation Week*, March 9, 1959, p. 150.
carrier would be given a monopoly, "for the time being," with the freedom to provide all needed local services, decide which cities could support this service within the allotted subsidy, and determine routings and schedules, as well as make other similar management decisions. Under this plan, the Board would still have to hold route hearings to adjust boundaries between carriers and to re-define the relative tasks of the feeder and the trunk airlines, but, in Durfee's opinion, such a program would still constitute the best chance for the exercise of management control and initiative under subsidy regulations.

Marketing Mix

In the following paragraphs, it will be assumed that the geographical operations of the feeder carriers are confined to their present route configurations. Any improvements in revenues, then, would be most likely to arise either from changes in the number and/or quality of alternative modes of transportation or from alterations in the internal policies of airline management which deal with the product itself, or in the "marketing mix" or merchandising program of the carriers." The "marketing mix" is comprised of prices [rates and fares], equipment,

19Aviation Week, August 10, 1959, p. 40.
schedules, in-flight and on-the-ground services, and selling and promotional activity. In referring to the basic determinants of the "quality of service" which a given trunk airline produces in a particular market, Gill and Bates cite competition, passenger-traffic potential, operational factors, such as the location of a carrier's maintenance bases, and the route structure, including franchise limitations. Since the feeders are not competitive in many areas, this would suggest that the most important determinants to them of the "quality of service" from the revenue side are the passenger-traffic potential and the route structure.

Pricing

As is the case with much of the data developed in relation to the operations of the air common carriers, that which is available pertaining to pricing related mostly to the pricing practices and problems of the trunk carriers. The applicability to feeder operations of the generalized data developed from analyses of trunk operations is sometimes questionable, since the two types of operations are quite different in many respects, particularly with regard

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to the geographical areas served and to the degree of competition encountered in these areas. As has been mentioned previously, the feeders serve relatively sparsely populated, low-density areas in the main and do not meet with any sizable amount of competition in many of the areas which they serve. Thus, while it is quite true that more carriers than one serve Atlanta, as an example, it is also correct to state that no other feeder carriers and often no other trunks serve most of the city pairs that are served by Southern Air Lines, the feeder carrier in that area. As examples, no feeders other than Southern fly between Atlanta and Greenwood, South Carolina, or Atlanta and Gadsden, Alabama, or Atlanta and Moultrie, Georgia. Of course, this monopoly position does not carry with it monopoly pricing power due to the control exercised by the Civil Aeronautics Board.

With respect to the changes in pricing policy which have taken place in the recent past, at the initiation of either the Board or the carriers, usually the latter, it will be advantageous to consider these movements as they have developed in the trunkline sector before considering their relationship to the feeder system. In his treatment of airline price policy, Cherington divides the majority

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of pricing policies into four categories, including pricing for "small market segments," pricing for "major market segments," pricing designed for competitive selling and pricing designed to increase unit revenues.

In the first division of prices designed for small market segments, Cherlington considers fares which are "beamed at a specific market segment such as a specific type of potential rider or [at] riders traveling between specific points [or both]." These pricing actions may include such things as promotional or excursion fares and fares aimed at specific groups, such as convention delegates. It should be pointed out that the impact of these types of fares is "typically slight, in terms of the carriers' over-all traffic and revenue." Another drawback to the use of these promotional fares is the disfavor with which they are viewed by the Civil Aeronautics Board. Only in cases where these fares are aimed at "extremely broad" groups does the Board fail to seriously question their discriminatory aspects. Thus, the Board often looks with a jaundiced eye upon fares too closely tailored to a particular market.

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23Cherlington, op. cit., p. 148.
24Ibid., p. 161.
25Ibid., p. 159.
In the division of pricing policy designed for major market segments, Cherington concentrates on coach fares, stating that "undoubtedly the most important development in airline pricing in the last decade has been the inauguration and gradual expansion of air coach service at reduced fares." Another fairly significant type of plan directed at large markets is the family-fare type of pricing. At the time the coach service was begun, the objective was the attraction of a different type of passenger than the one who used the first-class service so that a minimum amount of traffic would be diverted from the first-class service to that of the coach type. That the coach service succeeded in opening up new markets is attested to by the fact that such service grew from nothing in 1948 to almost ten billion passenger miles in 1957, while over the same period of time there was a doubling of first-class traffic.

Thirdly, there will be a consideration of prices designed for competitive selling. In contrast to the other two types of policies which were directed at attracting a new market segment, either large or small, these actions have competitive pricing and selling as their main motive and seek to give the carrier "as good a chance as

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26 Ibid., p. 186.
27 Ibid., p. 224.
possible of attracting a share of existing traffic." Included in this category are such things as round-trip discounts, common fares [cities which are close together or which are served in different sequence by different carriers often have the same fare from a third city, as could be illustrated by an identical fare to both Baltimore and Washington from Chicago], and the trading of services for fare concessions as was practiced in 1949 by Western Air Lines, as an example, when it discontinued all in-flight meals and set fares at 5 per cent below their previous level. It has been concluded that fare actions of this type when standing alone are not "particularly spectacular," but that

ye they constitute a significant proportion of total pricing actions and in aggregate, both standing alone and in conjunction with competitive actions in other areas, tend to establish the framework within which airline price policy is developed.

Finally, Cherington considers pricing actions designed to increase unit revenues, the objective of those actions being, of course, the increasing of revenues per unit, as contrasted to most of the actions previously described which were aimed at increasing volume by lowering unit revenues. For purposes of analysis, the pricing

28 Ibid., p. 331.
29 Ibid., p. 341.
30 Ibid., pp. 343, 344.
actions considered in this section may be divided into two broad categories, namely those concerned with the efforts of individual carriers to improve unit revenues on their own airlines alone and those concerned with the attempt of the industry as a whole, or at least a major portion of it, to improve unit revenues by changes either in the fare level or alternatively in the structure of fares. The former types of actions engaged in individually by the carriers are generally confined to situations where there is no competition and little threat of competition. Under conditions such as these, the pricing actions take the form of increasing fares over their own lines, usually on certain routes only. The efforts directed at improvement of unit revenues by multi-carrier actions encompass both flat, across-the-board fare increases, as in the 10 percent fare increases which took place in 1947-48, and shifts in the structure of fares, as in the case of the one dollar a ticket increase in 1952, or as in the adoption and almost immediate abandonment of the charge levied against "no-show" passengers in 1957-58. Most of the actions taken to increase unit revenues have been made on the flat,

31 Ibid., p. 374.
32 Ibid., p. 379.
33 Ibid., pp. 409, 410.
across-the-board, percentage basis. Cherington concludes this section by pointing out that the growth of coach service and the added complexity of the price structure raise the question of whether or not flat increases alone are any longer appropriate or if it is not time to devote primary attention to changes in the structure of fares.\footnote{Ibid., p. 416.}

With respect to a description of the types of pricing policies pursued by the feeder carriers, it may be indicated that the operations of the feeders are characterized by the utilization of many of the pricing policies followed by the trunks. Of the greatest importance, of course, are the first-class and coach fares which together dominate the fare structure of the feeders.

Feeders also use other pricing schemes besides the first-class and coach fares. Thus, they formulate prices for small market segments, as through the construction of excursion fares. Bonanza Airlines, for example, has inaugurated excursion fares over most of its system on an experimental basis, primarily as a device to increase the diversion from the automobile to air travel. Bonanza management even prefers these types of fares to the coach fares for the purpose of peak-period travel control, since the excursion fares can be designed for the special purpose
of encouraging travel in slack periods. In the category of pricing designed for competitive selling, feeders have experimented with certain types of schemes. For example, Mohawk Airlines offered fare reductions for round-trips completed within twenty-four hours. It concluded from these experiments that such fares did not attract a substantial number of new passengers and that time and convenience are more important to the passenger than dollar savings.

As may be inferred from a consideration of the nature of these pricing policies other than the first-class fare, a major problem confronting the carriers is how to develop "promotional" fares in such a manner that they will provide a maximum stimulation of new traffic with a minimum diversion of passengers from the collective "group" which has been flying at the first-class rates. The acuteness of this problem may be even greater for the feeder carriers than it is for the trunks, if the assumption is correct that the potential of the feeders for stimulating new traffic in the majority of the markets which they serve is less than is the new-traffic potential of the trunks in the markets for which they provide service.

36Ibid., p. 75.
Speaking with reference to trunk carriers, Cherington points out that another continuing problem confronting these carriers is pricing for their short-haul markets. Although the short-haul market is, under today's operating procedures, less attractive than long-haul traffic and although air travel does not enjoy the same comparative advantages over surface travel at short hauls as at long hauls, there is general agreement that a "substantial volume" of untapped traffic exists in the short-haul markets. The trunk carriers argue, however, that it would be impossible to price short-haul service at fully allocated costs since such pricing would drive the traffic to surface transportation. The same writer points out with respect to this problem that there have been informal discussions within the managements of several of the trunk carriers as to the possibilities of developing a new type of service for high-density, short-haul markets, the features of such new service most prominently being mentioned including high-seating density aircraft, frequent schedules, elimination of reservations, and streamlining of ticketing and ground-handling procedures.\textsuperscript{37}

Although the trunks have not developed any concrete proposals embodying all of these features, the feeder

\textsuperscript{37}Cherington, \textit{op. cit.}, p. 442.
carriers have been doing something in this direction through the development of their commuter services and commuter fares. A commuter passenger is generally defined as one who makes a round-trip flight over the same airline in the same day. In commenting on his philosophy for reaching short-haul traffic, which he defines as that under three-hundred to four-hundred miles, Leslie O. Barnes, president of Allegheny Airlines, stressed the importance of "eliminating all unnecessary, costly, and inconvenient ground functions" and of "pricing our product in a range competitive with the automobile." The commuter fare of Allegheny results from a by-passing of a minimum of six ground-operations steps required to make reservations and ticket passengers under the conventional methods. The aim of Barnes is to cut so deeply into ground services costs that the "passenger will cost us nothing except the cost of the airplane seat he occupies." 38

As an example of the commuter type of flights, North Central Airlines flew fifty-five flights a day between Milwaukee and Chicago in 1958. Whereas North Central derived 45 per cent of its business from commuter traffic in 1958, Ozark Airlines obtained in the same year only 25 per cent of its traffic from local operations, within

38 *Aviation Week*, September 14, 1959, p. 48.
which the commuter traffic would fall. The other 75 per cent was interline traffic developed in conjunction with at least one other carrier, usually a trunk. The large amount of feeder interline traffic flown by Ozark Airlines no doubt strengthens the feeling of the management of this carrier that it was primarily certificated as a feeder carrier to provide the interline connection between the smaller intermediate-type cities and the major traffic centers.39

Although this commuter type of service has been inaugurated too recently to permit the drawing of any important conclusions as to its effects on the revenues of the feeder carriers, it is believed by some persons both in the industry and in regulatory circles that it, or something similar to it, will become a significant type of service. Thus, John W. Dregge, Chief of the Routes Division of the Bureau of Air Operations of the Civil Aeronautics Board, stated in February, 1959, that

...we have three layers in our air transportation system - all at different stages of maturity. These are the trunkline system, the local service system, and the third layer - now served in a limited manner by helicopters in suburban services....As the local service carriers expand their efforts into more of the smaller trunkline markets and concentrate their efforts on this type of operation, I believe the third layer...will be expanded in the next 10 years when more efficient and economical craft become available for taxi and commuter type of service in the markets immediately surrounding our major traffic generation.40

39Flight Magazine, op. cit., p. 75.
40Ibid., p. 79.
Of course, this is only one person's opinion and does not necessarily reflect the thinking of the Civil Aeronautics Board. Even if future developments confirm the expectations of the most optimistic believers in this type of service, it is not now apparent whether its success would materially improve the positions of the feeder carriers, inasmuch as it is entirely possible that this type of service would be performed by some types of carriers other than those in the "feeder" industry.

Although not pricing actions designed specifically to increase the unit revenues of feeder carriers, recent actions taken by the Civil Aeronautics Board with respect to the rate of return will have the effect of increasing both the average and the total revenues of the feeder carriers, probably through the subsidy medium. These increases will follow the steps taken by the Board which increased the rate of return on the investment of the feeders from 8 per cent to 9.5 per cent. Even more recently in the Rate of Return Local Service Carriers Case, William J. Madden, the Civil Aeronautics Board examiner in this case, recommended an even higher rate of return on investment for the feeder carriers.

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41Aviation Week, March 9, 1959, p. 151.
42Aviation Week, July 20, 1959, p. 36.
Another revenue problem of which the feeder carriers complain - and one whose solution would increase their unit revenues - is that they have not been able to collect the proper share of interline fares to reflect the costs incurred by them in originating a passenger. Under present interline agreements, each airline receives a portion of the fare which is based on mileage for the segment of its route system used by a passenger, regardless of which airline originates his flight. According to the feeder carriers, a more equitable way of handling the interline distribution would be first to refund the originating carrier a sum sufficient to cover the sales, reservations, ticketing, and baggage costs for the passenger and then pro rate the remaining share of the ticket in a way which would reflect the portion of each airline system used. It has been estimated by most carriers that "a" solution of this problem would reduce subsidy requirements by more than $3,000,000 annually.\(^{43}\)

Unfortunately, there is little conclusive data which would indicate very much about the degree of price elasticity of demand which characterizes the operations of the feeder carriers. Although it is maintained by Frederick and others that the demand for air transportation

\(^{43}\)Aviation Week, February 1, 1960, p. 29.
services is relatively elastic, it is wondered whether the applicability of this statement is very great when it is applied to the pricing of the feeder carriers for much of their operations.

Although his generalizations are based upon a study of the trunkline system, Cherington concludes that there is substantial evidence to indicate that, as far as many carriers are concerned, "pricing action is often kept as a 'last resort' solution to a difficult problem." He further charges that today both the carriers and the Board tend to think of price in terms of "level rather than of structure, as though the market which the carriers served was largely homogeneous." As to price elasticity, he concludes that there is little evidence for believing that within a particular class of service, small price changes (either increases or decreases) lead to an appreciable change in the volume of traffic. In short, it appears that the demand for airline service, at least within a specified class of service, is inelastic in that a fare at a certain level will create more revenue than a fare which is, say, 10% less.45

On the other hand, he holds that the substantial growth of coach traffic indicates that under differential pricing (multiple classes of service or levels of fares), the total demand of all markets may be elastic in that markets can be added and total revenues increased with comparatively little diversion or trading down of higher yield traffic.

44Cherington, op. cit., p. 457.
On the basis of a consideration of these types of data, Cherington recommends that in the future the management of carriers and the members of the Civil Aeronautics Board better identify both existing and new markets, better define their distinguishing characteristics, and then develop appropriate prices and products for them.  

It is difficult to measure the effects of past innovations in feeder pricing on the revenues of the feeder carriers, since changes in pricing are only partially responsible for changes in revenues. When, however, the magnitude of subsidy requirements, especially for the last few years, is considered, it seems that the pricing policies either pursued by the feeders alone or used by them in conjunction with other components of the marketing mix have not been sufficient to prevent increases in total subsidy requirements. It remains to be seen whether new developments in feeder pricing policy, such as the commuter services and fares, will be more successful in this respect.

**Equipment**

Although the equipment problem will be considered in greater detail from the cost standpoint in Chapter X, it should be pointed out here that the selection of the

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proper type of equipment is important to both trunk carriers and feeder carriers, especially where there is competition between at least two carriers. Although modern equipment at least as good as that of the competitor is an essential component of a good marketing program of any air carrier, it is probably of less significance to many feeder carriers than to most of the trunks, since the passengers in many of the cities served by the feeders have no other air service and are thus not in a position to compare and select their carriers on the basis of equipment differentials. Even so, it might be found that the addition of more modern equipment by some of the feeder carriers would provide a stimulus to the development of new traffic. 47

At this point, it might be stated that it seems that improvements in equipment are not likely to reduce materially the subsidy requirements of the feeders, at least from the revenue standpoint. As in other types of product differentiation, it is often the innovator who reaps the earliest and possibly the largest gains. The feeder carriers are usually imitators. Thus, changes in equipment will probably be more important in aiding the

47 It might be pointed out that Gill and Bates, op. cit., pages 59 through 92, provide a good source of information on the influence of competition on equipment.
feeders maintain their relative positions, especially on competitive routes, than they will be in enabling them to outdistance their rivals.

Scheduling

The "proper" timing and the "correct" frequency of flights are also of considerable importance as competitive weapons, especially where the traveler has the opportunity to select from the service offerings of more carriers than one. In this respect, arrival and departure times ideally should be arranged for the convenience of the greatest number of potential passengers and for the achievement of the maximum possible smoothness in making connections with other carriers. Frequency of scheduling is quite important, inasmuch as the carriers with the more frequent schedules will be in better positions to satisfy a larger number of persons than will carriers with infrequent schedules. It should be indicated that the feeder carriers often operate at a disadvantage in relation to both the timing and the frequency of flights, some of them having only one flight a day from a given city and, thus, only one arrival time and one departure time during the same twenty-four hour period. Although poor scheduling might not result in the loss of any traffic to other air carriers, particularly when cities are served by only one feeder, it might be the cause of diversion of traffic from the air carrier to a surface mode
of transportation, especially in view of the fact that the average journey of the feeder passenger is less than two-hundred miles, with some journeys, of course, being of even shorter length than the average figure.

In keeping with the increasing Administration pressure for tighter subsidy controls, the Board has adopted scheduling standards for feeder subsidy purposes. Having become effective on February 1, 1960, these standards are tailored to the concept of subsidy being paid for the first six daily round-trip flights between any two points, with a built-in provision that each flight must earn its direct costs, with indirect costs being covered under a schedule ranging from 35 per cent to 100 per cent. Any loss on flights made beyond this number [six] will not be covered by subsidy payments. As might be anticipated, the carriers are concerned about the development and application of these standards. In addition to complaints about infringement upon the so-called "management prerogatives," the members of the Association of Local Transport Airlines have remarked that adoption of these standards will lead to a severe crippling of feeder operations, forcing the airlines to make drastic scheduling cutbacks which will lead to a "severe deterioration" of the industry's growth and benefit to the traveling public.48

48*Aviation Week*, February 1, 1960, pp. 28, 29.
Though it is doubtful that the results of the utilization of these schedule standards will be as disastrous as the feeder carriers predict, it will be enlightening to gauge the effects of the imposition of these controls after sufficient time has elapsed for a consideration of their actual results. It seems unreasonable to conclude, however, that any types of changes in the timing and frequency of feeder flights will be significant enough alone to cause much movement, either upward or downward, in the subsidy needs of the feeder carriers.

**In-flight and On-the-Ground Services**

Competitive pressures are also exerted in relation to in-flight and ground services. The former services cater to the creature comforts of the passengers while they are in flight, whereas the latter are concerned with the development of a product which will favorably impress the passengers while they are on the ground. The latter encompass areas such as reservations, ticketing procedures, and baggage handling, among others. A considerable number of changes is currently taking place in relation to the provision of these ground services, especially with respect to reservations and ticketing procedures. As is true of the other components of the marketing mix, the degree of refinement found in the furnishing of these services will tend to increase as one moves from cities
served by feeder carriers alone to those which have the benefits of services provided by two or more carriers. Thus, a feeder serving New York City will need more elaborate in-flight and ground services to compete with the trunks than will a feeder which is only carrier servicing Tupelo, Mississippi, as an example.

Some of the current ground services changes taking place in the feeder industry were considered in connection with the description of the commuter type of service. In Chapter X an analysis will be made from the cost standpoint of the actual and probable effect of changes in in-flight and ground services on the subsidy requirements of the feeders. It seems reasonable to conclude with respect to these types of changes that they will not produce noticeable results in terms of increases in gross revenues, although they may permit cost reductions which could be translated into a diminution of subsidy requirements.

**Selling and Promotional Activity**

To complete the consideration of the most important factors which influence the revenue-generating abilities of the feeder carriers, attention will be directed to their promotional and selling activities. As might be expected, the activities of the feeders which are devoted to promotion and selling are, in general, the same as those used by companies in most other types of industries,
although the reliance placed on specific media may be different. It has been concluded by Cherington that "perhaps the most important [and costly] element of the typical sales program has been advertising and promotion." Dollar-wise, the largest amounts of advertising expenditures are made for newspaper and magazine space, with the former being the more important of these two media. Representing much smaller expenditures are those devoted to radio, television, billboards, car cards, counter cards, window displays, and direct mail. While the bulk of airline advertising is specific in that it is designed to advertise a particular service and the advantages of that service, a considerable portion of it is identification advertising bordering on the institutional.

With relation to direct and indirect selling, it might be stated generally that the domestic airlines place considerable emphasis on personal selling. While there are still traffic solicitors, much utilization is made of indirect selling by reservations clerks, counter agents, and the like, whose primary job is to sell, or to sell more, to a prospective passenger already in the market. Also of considerable importance are the activities of travel agents who usually account for from 15 per cent to

49Cherington, op. cit., pp. 16, 17.
20 per cent of total sales in domestic travel, although they are responsible for around 50 per cent of total sales in the international field. Since so many present air passengers are repeat customers, it appears fairly obvious that the stimulation of new traffic depends on the development of services, fare levels, and selling and promotional techniques which will attract the traveler who is not currently utilizing air transportation as a means of conveyance.

A new approach has been taken by the Civil Aeronautics Board in relation to promotional activities. As elaborated by the Board in the recent Seven States Case, the Board has adopted a "use-it-or-lose-it" program with respect to feeder operations. This program is designed to place the responsibility for securing continued service on the cities being served, as well as on the carriers which are servicing them. Under this concept, the center of attention is focused on the marginal traffic stations, which are those handling only a "handful of passengers." In order to qualify for continued service under this plan, a "community" must board an average of 150 passengers a

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50 Ibid., pp. 19, 20.

51 James R. Durfee, Chairman of the Civil Aeronautics Board, in an address to Lake Central Airlines Resident Managers Conference held in Indianapolis, Indiana, March 17-19, 1959.
month. Although the use-it-or-lose-it program has been put into operation only recently, it is not a new idea. Writing in 1953, Joseph P. Adams, a former member of the Civil Aeronautics Board, advanced the thesis that the future of the feeder service depended on state support and recommended that states and localities sponsor these types of campaigns, as well as increase the magnitude of their publicity and public-relations programs designed to encourage travel on feeder airlines.

Currently, several of the feeder carriers are engaged in rather extensive campaigns to promote the aforementioned commuter type of service. In a statement which brought to mind an earlier proclamation of the Chairman of the Civil Aeronautics Board to the effect that there was a need to educate people for the purpose of bringing about a better utilization of feeder service, the management of Bonanza Airlines declared that there is a need for education

52 Flight Magazine, op. cit., p. 53.
of the public with respect to the potential benefits of the commuter service. To accomplish this educational goal, Bonanza coordinates much of its advertising with that of trunk carriers, inasmuch as the latter have greater budgets for educational purposes and for the dissemination of general information.\textsuperscript{55}

All feeder carriers seem to realize that the greatest potential for increasing commuter air traffic is to divert the traveler to air from the automobile. To accomplish this purpose, Frontier Airlines, for example, has engaged in a widespread billboard advertising program. It is also utilizing newspaper, radio, and television advertising, as well as its credit card, to supplement the billboard promotion.\textsuperscript{56} Although Lake Central Airlines relies considerably on advertising to increase commuter travel, the management of this carrier feels that real attraction of this type of traffic depends on its receipt of approval to increase the average length of the journey of its passenger.

In 1958, the average length of journey of the Lake Central passenger was just under seventy miles, the shortest in the feeder industry. According to the management of Lake Central, the means to the accomplishment of this

\textsuperscript{55}Flight Magazine, op. cit., p. 87.
\textsuperscript{56}Ibid., p. 88.
goal of a longer than average length of journey depend on Civil Aeronautics Board sanction of expanded route coverage and of more skip-stop authority. 57

Although there are no data available which would indicate the promotional elasticity of demand for feeder services, there is evidence, some of which has been introduced herein, to support the belief of this writer that concentrated selling and promotional activity, particularly that directed towards the mass of the populace which has never flown, would be of considerable significance in generating additional revenues for the feeder carriers, the magnitude of these increased revenues depending upon the success of the selling and promotional campaigns. Confirmation of this belief depends initially, of course, on the undertaking of these types of activities by the feeder carriers.

Chapter Summary

Chapter IX was concerned, as Chapter X will be, with an investigation of the prospects of the feeder carriers for the reduction of subsidy. This chapter examined these prospects from the revenue-generating standpoint, whereas Chapter X will confront the same problem from the cost side.

57 Ibid.
A presentation and analysis of selected revenue data revealed that revenues from all classes of feeder service, and therefore total revenues, have increased since 1955. At the same time, however, subsidy revenues [needs] have been rising. On an available-ton-miles-flown basis, it was found that subsidy requirements remained almost constant, indicating that, as the feeders flew more miles, they required more subsidy, each additional ton-mile flown having increased total subsidy requirements by about seventeen cents. It was concluded from these data that, if the past is indicative of the future, total subsidy requirements will rise by a constant amount as the number of available ton-miles flown increases.

It was concluded that the most significant factor affecting the success of any type of carrier is its total market. For 1958, it was indicated that air carriers were responsible for 43.3 per cent of all intercity common carrier passenger-miles traveled, but that they accounted for only 3.6 per cent of all intercity passenger-miles traveled in both common carriers and private automobiles. Of the combined total number of revenue passenger-miles flown by both trunks and feeders, the latter were responsible for only 3.25 per cent in 1958. Historically, then, the feeders' share of the total travel market has been very small. One important reason for this small share is the distance limitation imposed upon the operations of the
feeders by the Civil Aeronautics Board. The feeders were designed to function as short-haul carriers; that they have done so is indicated by the fact that the average length of journey of the feeder passenger in 1958 was just under two-hundred miles. It was pointed out that in 1953 both the feeders and the trunks accounted for only 1.99 per cent of the revenue passengers transported, exclusive of those traveling by automobile, in the 0-250 miles distance category.

A 1957 study prepared by the Civil Aeronautics Administration indicates that 85.4 per cent of passenger traffic and 91.6 per cent of cargo tonnage originated in cities which were classified as large and medium "hubs," these large- and medium-sized cities having accounted for only 11.4 per cent of the total number of cities included in the survey. Although nearly all of these large and medium hubs were served by at least one feeder carrier, the average number serving the large ones was only 1.8, while the average number providing flights to the medium ones was only 1.3. Of even greater importance than the absolute number of cities served is the number of city pairs, particularly important city pairs, that is served by the feeders. Again, although nearly all of the feeders serve at least one of the large city pairs, the average feeder does not serve a large number of them, and no feeders serve
the most important ones, especially those which span the United States.

Current policy changes were considered which are expected to expand considerably the route coverage of the feeders, in terms of both cities served and mileage traversed. One of the most important policy measures is that providing for the relinquishing by trunk carriers of the operating rights at certain cities and for a transfer of these rights to feeder carriers. Even more important is the expansion of the feeder map which is resulting from the "area" cases of the Civil Aeronautics Board. It was mentioned that the effects of these and other changes will be determinable only after sufficient time has elapsed for concrete operating results to be obtained and analyzed.

The remainder of the chapter was devoted to a description of the nature of the composition of the "marketing mix" and to a consideration and analysis of the changes taking place in these components, as well as to the probable effects of such changes upon the revenue [and subsidy] position of the feeder industry. Included under the heading of marketing mix were pricing, equipment, schedules, in-flight and on-the-ground services, and selling and promotional activity. Within a given route configuration, these are the media through which feeder carriers compete, either with other air carriers or with surface modes, or with both.
A description was made of the types of pricing policies pursued by the trunks and, similarly, in most cases, by the feeders. For convenience in the making of descriptions and analyses, the pricing policies were divided into four categories, including those for small market segments, for major market segments, for competitive selling, and for increasing unit revenues. Examples of each of these types of pricing policies were considered, as were some of the more important current changes now taking place in the pricing of feeder services. It was indicated that past developments in feeder pricing had not significantly improved the subsidy positions of the feeders and that a consideration of the probable results of current developments would have to await the accumulation of data before even tentative conclusions could be drawn.

With respect to the prospects for the reduction of subsidy through improvements in equipment, it was indicated that this matter would be considered in greater detail in Chapter X from the cost side. From the revenues standpoint, however, it was pointed out that foreseeable improvements in equipment are unlikely to increase very greatly, if any, the revenues of the feeder carriers. The feeders are non-competitive on many of their routes; on those routes over which they engage in competition, they generally are imitators, and often with a lag, in the adoption of equipment. As a result, it was concluded that
most of the equipment changes which they make, while possibly attracting some new customers, particularly through diversion from surface modes, often only enable them to maintain the status quo insofar as their share of the total air market is concerned.

As far as scheduling is concerned, it was indicated that the timing and the frequency of flights are of considerable importance to air carriers, especially if they are competitive with other air carriers. It was pointed out that recent changes in Civil Aeronautics Board policy will have the effect of eliminating subsidy payments as compensation for losses incurred by the feeders on their round-trip flights numbering in excess of six between any two points within a twenty-four hour period. Although the feeder carriers profess great concern over this new policy, it seems improbable that any foreseeable type of scheduling changes will materially reduce total subsidy requirements.

Another component of the marketing mix of the feeder carriers was considered under the heading of inflight and ground services. In-flight services, such as meals, are designed for the comfort and convenience of the passenger while he is in flight, whereas the ground services are furnished in connection with all movements of the passenger while he is not in flight and include such items as
reservations, ticketing, and baggage handling. As was believed to be the case with equipment, it seems that changes in these types of services may stimulate some additional traffic, but that they often do little more from the revenue-generation standpoint than enable the feeder carriers to maintain their relative standings in terms of sharing in the total passenger market. If these types of changes affect subsidy requirements materially, it is believed that they will do so more from the cost than from the revenue standpoint.

Finally, the promotional and selling activities of the feeder carriers were considered. Monetarily, the greatest expenditures are made for promotion and advertising, with the largest amounts being expended for newspaper and magazine space. It was found that other types of advertising include radio, television, direct mail, and the like. With respect to direct and indirect selling, it was pointed out that the airlines place considerable emphasis on personal selling, a great deal of it being devoted to selling, or to selling more, to a prospective passenger already in the market.

It was found that currently a considerable amount of advertising and promotional activity has been directed towards the development of the commuter type of traffic, the primary aim of this promotion being pointed towards diverting travelers from the automobile to the airplane.
On the regulatory front, one of the latest developments in this area is the adoption of the "use-it-or-lose-it" type of program by the Civil Aeronautics Board, under which it is necessary for a feeder-served community to board an average of 150 passengers a month in order to qualify for continued service.

It was concluded that the undertaking of more extensive and intensive promotional and selling efforts seems to offer among all the elements of the marketing mix, except possibly for the pricing one, the best opportunity to the feeder carriers for increasing their total revenues and for possibly, at the same time, reducing their subsidy needs. This conclusion seems to be especially applicable with relation to the directing of such promotional and selling activities to the very great majority of the population which has never traveled by air.
CHAPTER X

ANALYSIS OF PROSPECTS OF FEEDER CARRIERS FOR DIMINUTION OF SUBSIDY REQUIREMENTS THROUGH COST REDUCTIONS

Introduction

Whereas Chapter IX considered the prospects of the feeder carriers for the reduction of their subsidy requirements through the improvement of revenues, Chapter X will confront these prospects from the standpoint of the possibility of making cost reductions. The procedure to be followed herein will be to consider briefly the nature of feeder costs, especially the ones with the greatest magnitudes. The purpose of this consideration will be to determine the factors which are most significant in influencing changes in these costs and to analyze the nature and probable magnitude of foreseeable changes in these controlling factors for the purpose of determining whether such changes seem to be conducive to future reductions in feeder costs, especially on an available-ton-miles-flown basis.

The primary objective of the chapter, as may be inferred, will be to draw conclusions relative to the likelihood that cost reductions can be effected in the
future which will improve the positions of the feeder carriers and reduce, or eliminate, their reliance on subsidy revenues. When coupled with the information obtained from Chapter IX, these data will give a comprehensive indication of the prospects of the feeders for subsidy reduction as a result of both improvements in revenues and reductions in costs. Together with the information developed in Chapters II through VIII, that arising from Chapters IX and X will provide the basis for the conclusions which will be drawn and for the recommendations which will be made in Chapter XI.

Table 24 on page 378 will give an indication of the nature and magnitude of the types of costs incurred in selected years in the performance of the feeder service. Inasmuch as the composition of each of these types of costs was indicated in Chapter VII, the effort will not be duplicated at this point. In 1958, the three cost categories of flying operations, maintenance, and aircraft and traffic servicing accounted for 77.14 per cent of the total operating costs of the feeder carriers. The four remaining cost divisions of passenger service, promotion and sales, administrative, and depreciation and amortization were responsible, of course, for the other 22.86 per cent of total operating costs, no one of these four categories being much more significant than another. It is significant to
## TABLE

### FEEDER INDUSTRY OPERATING

[In Thousand]

<table>
<thead>
<tr>
<th>Year</th>
<th>Flying Operations</th>
<th>Maintenance</th>
<th>Passenger Service</th>
<th>Aircraft &amp; Traffic Servicing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>6,336</td>
<td>4,537</td>
<td>825</td>
<td>3,743</td>
</tr>
<tr>
<td>1955</td>
<td>18,080</td>
<td>10,384</td>
<td>2,687</td>
<td>9,563</td>
</tr>
<tr>
<td>1956</td>
<td>21,616</td>
<td>12,610</td>
<td>3,385</td>
<td>11,187</td>
</tr>
<tr>
<td>1957</td>
<td>26,509</td>
<td>16,418</td>
<td>4,028</td>
<td>21,160</td>
</tr>
<tr>
<td>1958</td>
<td>29,265</td>
<td>18,686</td>
<td>4,527</td>
<td>24,023</td>
</tr>
</tbody>
</table>

Source: *Air Transport Facts and Figures*, 20th Edition (Was
### Costs for Selected Years

[In thousands of Dollars]

<table>
<thead>
<tr>
<th>Promotion &amp; Sales</th>
<th>Administrative</th>
<th>Total G.S. &amp; A.</th>
<th>Depreciation and Amortization</th>
<th>Total Operating Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,405</td>
<td>1,792</td>
<td>8,765</td>
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<td>4,485</td>
<td>26,022</td>
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</tr>
<tr>
<td>11,399</td>
<td>5,382</td>
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</tr>
<tr>
<td>6,089</td>
<td>4,938</td>
<td>36,215</td>
<td>3,758</td>
<td>82,900</td>
</tr>
<tr>
<td>6,998</td>
<td>5,530</td>
<td>41,078</td>
<td>4,274</td>
<td>93,303</td>
</tr>
</tbody>
</table>

note that a considerable portion of total operating costs can be attributed to the operation, maintenance, and financing of feeder flight equipment. It may be concluded that reductions in any, or in all, of those types of costs directly or indirectly related to flight equipment would offer the most significant opportunities for reductions in total costs and in subsidy requirements.

From a consideration of Table 25 on page 380, it may be seen that although total operating costs increased for each year between 1955 and 1958, they increased at a decreasing rate between 1957 and 1958. Total operating costs increased by 12.55 per cent between 1957 and 1958. The reasons for these movements may be explained largely by a consideration of the factors responsible for fluctuations in the three major costs divisions of flying operations, maintenance, and aircraft and traffic servicing.

As Cherington points out, there have been in the past, usually in route and mail rate cases, "innumerable attempts" to explain the wide cost differences between groups of carriers or between various individual carriers. The following is a list of the principal causal elements which have frequently been cited to explain such differences and the principal issue involved in each element:

1. **Size** -- Is there an inherent and inexorable advantage in size *per se*?
### TABLE

RATE OF CHANGE IN FEEDER OPERATIONS

[Percentages]

<table>
<thead>
<tr>
<th>Year</th>
<th>Flying Operations (1)</th>
<th>Maintenance (2)</th>
<th>Passenger Service (3)</th>
<th>Aircraft &amp; Traffic Servicing (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>-</td>
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</tr>
<tr>
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</table>

Source: Derived from the data presented in Table 24.
<table>
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<th>Promotion &amp; Sales (5)</th>
<th>Administrative (6)</th>
<th>Total General Services and Administrative (7)</th>
<th>Depreciation and Amortization (8)</th>
<th>Total Operating Costs (9)</th>
</tr>
</thead>
<tbody>
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<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
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<td>11.99</td>
<td>13.43</td>
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<td>12.55</td>
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</table>
2. **Route turnover** (the number of plane miles per route mile flown daily) -- Is there a marked advantage in having a high route turnover?

3. **Length of haul** -- Does a high average length of haul materially reduce unit costs?

4. **Length of hop** -- Does a high average length of hop materially reduce unit costs?

5. **Station strength** -- Is a high average number of flights, boarded passengers, or revenues per station a determinant of unit costs?

6. **Volume of coach operations** -- Does a high volume of coach operations reduce unit costs?\(^1\)

While the nature of feeder coach operations was considered in Chapter IX, it may be pointed out that the majority of the trunk carriers take the position in the current Civil Aeronautics Board New York Coach Investigation that coach service in short-haul markets is unprofitable and will not attract new traffic because of the slight differential in fares between coach and first-class fares. Eastern Airlines maintained that short-haul coach service must be a part of a long-haul operation if it is to be operated at a break-even level. Trans-World Airlines similarly held that coach service provided on a fully

allocated cost basis in short-haul markets will operate at a loss.\(^2\)

Although the more important of these six factors will be considered again briefly in this chapter, it is not the desire of this writer to dwell upon a description of the statistical analyses conducted by Cherington and thus to become duplicative of his work; instead, only his conclusions with respect to the significance of these cost elements will be presented herein. It should be pointed out that the research of Cherington was conducted on the basis of an examination of the trunk carriers alone. Correlations between unit costs and each of these six factors were developed. Summarily, it was found that the highest correlations were between unit cost and length of haul, unit cost and proportion of coach traffic, and unit cost and length of hop. The correlation between size and unit cost indicated that while there was some relationship between low costs and large size, this relationship was far from perfect. A comparatively low coefficient was also obtained between unit costs and route turnover.\(^3\) From a consideration of the foregoing data, it was concluded that the "principal determinant of airline costs appears to be

\(^2\)Aviation Week, March 14, 1960, pp, 38, 39.

\(^3\)Cherington, op. cit., p. 50.
length of haul coupled with sufficient volume of traffic to permit a relatively long average length of hop." As has been indicated in Chapter IX and as will be pointed out subsequently in this chapter, the feeder carriers have historically been at a considerable disadvantage with respect to both length of haul and volume of traffic.

**Significant Factors Affecting Feeder Costs**

**Substantial Degree of Constant Costs**

A "substantial portion of airline costs are constant costs in the sense that they do not vary in proportion to changes in the volume of business handled." As examples, many of the station expenses are not adaptable to the volume of traffic; similarly, many of the supervisory, administrative, and clerical costs are not closely related to output. In addition, plane operating costs, such as fuel, wages, and maintenance, with a given number of flights, are almost completely independent of the volume of traffic handled. Since about the only direct variable costs are those associated with the selling of additional tickets, serving of more meals, and the use of

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4Ibid., p. 62.
5Frederick, op. cit., p. 162.
some additional fuel, the marginal costs of handling additional units of business are extremely small. As a result, the costs per additional passenger or per additional ton-mile decline up to the point at which additional flights are required. A consideration of the data presented in this section will emphasize the importance to the feeder carriers of a higher load factor, the achieving of which depends in large part, especially insofar as the Civil Aeronautics Board is concerned, upon expanded route mileage and more skip-stop authority. As has been indicated elsewhere, however, the granting of such expanded route coverage and skip-stop authorizations seems unlikely, in isolation, to be a solution to the feeder subsidy problem, although more definite conclusions can be drawn only after data have become available which will indicate the probable results of current Board policy changes in these matters.

Ground and Indirect Expenses

Although costs of the feeder carriers are not segregated by the Civil Aeronautics Board into a "ground and indirect" category, it is convenient for the purpose of this section to make such a breakdown and to include therein the three cost categories of aircraft and traffic servicing, promotion and sales, and administrative expenses which accounted in 1958 for $24,023,000, $6,998,000, and
$5,553,000, respectively, of the total feeder costs of $93,303,000, or for a combined total of $36,551,000, which represented 39.17 per cent of total feeder operating costs. As was indicated in the previous section, a considerable number of these costs are constant costs. Since this is the case, it is to the advantage of the carriers, from the standpoint of achieving declining unit costs, to increase the number of passengers and the ton-miles of traffic carried, at least up to the point of maximum utilization of the existing complement of facilities. Inasmuch, however, as these costs are constant costs, they are often difficult to eliminate. Thus, it is necessary to have at least one reservations clerk regardless of whether he books one or one-hundred trips. Assuming, however, that he can efficiently book one-hundred trips, it is to the advantage of the carrier to generate as close to one-hundred trips as possible, since the marginal cost of each additional trip, at least as far as reservations costs are concerned, is very small.

Air carriers, particularly those operating in competition with other air carriers, have taken several steps in the recent past to improve their ground-handling procedures and to reduce in total, at least, their ground and indirect expenses. Many of these changes have been made for the purpose of making it possible for the carriers to
perform their operations more rapidly, particularly with respect to reservations.

Unfortunately, there are no data available which will indicate the success, if any, the feeder carriers have had in reducing specific categories of ground and indirect expenses. In total, however, these expenses have continued to rise over the last few years.

Certain carriers, particularly Allegheny, have begun types of operations, described in Chapter IX, designed to provide lower fares as a result of the elimination, on those particular types of operations, of certain types of ground-handling activities. These are the commuter types of services. Since the leader in this area was Allegheny Airlines, consideration will be given to the manner in which it has attempted to circumvent the incurrence of certain of the ground and indirect expenses. In relation to proposed service between Philadelphia and Pittsburgh, Allegheny would give purchasers of a ten-trip booklet of tickets a 15 per cent reduction in the one-way fare and establish a lower commuter fare for passengers who boarded without reservations. Inasmuch as all passengers would receive the same in-flight services, the economies would be realized on ground-handling savings effected through purchases of booklets and elimination of
reservations. In another type of plan for other flights, there would be an elimination of the making of reservations for passengers who wished to do so, but not through the use of booklets. Instead, passengers without reservations would purchase their tickets at the loading gate where an automatic ticketer would be located.

The president of Allegheny Airlines, Leslie O. Barnes, feels that passengers may actually seek to escape the inconvenience of making reservations. In this respect, he states that

...reconfirmation, early ticket pickup, cancellation of space because of a change in planes, standing in line at ticket counters, [and] waiting for checked baggage are burdens many passengers want to avoid.

**Equipment**

Although not mentioned specifically by Cherington, one of the most significant factors, and probably the most important single factor, affecting airline costs is the equipment utilized by the carrier. Thus, from the cost standpoint, according to the Planning Research Corporation in an extensive study conducted for the Association of Local Transport Airlines, the most significant factor in

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6 *Aviation Week*, October 5, 1959, p. 42.
7 *Aviation Week*, September 14, 1959, pp, 38, 39.
8 *Ibid*. 
which improvements would result in a reduction in feeder subsidy would be the utilization of more efficient equipment.\(^9\) Not only are the direct-flying operational costs of the equipment of considerable magnitude, especially fuel, but the maintenance and depreciation of equipment occasion the making of sizeable expenditures. Much of the interest charges paid by air carriers, especially by feeders, arises from the payment of interest on fixed indebtedness incurred in the purchase of flight equipment. It is not difficult to understand why there has been a great deal of concern on the part of carrier managements and governmental regulators as to ways of controlling the costs of such a pervasive item as equipment.

As to some specific examples of the ways in which equipment costs affect the total feeder operating costs, the following may be considered. It should be mentioned that these factors are also determinants of the quality of service which an airline produces. Thus, the equipment used determines the time which elapses in a given flight between any two cities. In this respect, a fast plane is of greater value to a carrier than a slow one, since it will require less fuel, consume less man-hours of flying time, and give better utilization of capacity. Of course,\(^9\)

\(^9\)Aviation Week, February 29, 1960, p. 40.
the elapsed time is also a function of the route structure, especially for the feeders, inasmuch as they have route authorizations whose total number of miles are relatively short and which are interrupted frequently because of the necessity of stopping at several cities along the way from the point of origin of a given flight to its point of termination.

The size and design of the plane determine the amount of space which can be offered to the public on any given flight. Whereas trunk carriers, especially on many of their transcontinental jet flights of today, do not have enough seating capacity, the feeders are faced in several instances with a different sort of problem in that the craft which they are utilizing are often too large for the types of operations which they are conducting and result in the accumulation of unutilized capacity. It should be indicated that a low load factor results from a combination of two factors, namely, equipment which is not suited for a given route configuration and an inability of a given route structure to generate enough traffic to support a given type of equipment, a problem which was considered in Chapter IX.

Although it was concluded in Chapter IX that potential traffic exists on the feeder routes which can be obtained by the feeders if they pursue the "correct" types of pricing and promotional activities, it seems that
considerable opportunity for the conduct of more efficient feeder operations resides in the ability of the feeders and the aircraft manufacturing industry to develop the types of craft which are tailored to the needs of the feeders in their specific operations. The reasons for the failure of these new craft to be developed are not at all mysterious. Generally, they revolve around the critical shortage of capital confronting the feeders, especially that of the equity type, and around the unwillingness of the manufacturers of aircraft to assume both the cost of attempting to develop a suitable type of craft for the feeder operations and the risk that the market for these craft would be a rather limited one. As the trunk carriers concentrate more and more on long-haul traffic, the market for short-haul craft becomes increasingly confined to the feeder carriers. Thus, a craft designed exclusively for feeder operations would be likely to have a rather "thin" market.

The type of equipment is also important from other standpoints. One of these features is the load capacity of a plane. Thus, the greater the load capacity of a plane the greater the number of passengers that can be carried and the smaller is the share of the total costs of operating a given flight that must be borne by each passenger. Of course, it is likely in many cases that the
total operating costs of a large-capacity craft will be
greater than those for a small-capacity craft; under such
conditions, the load factors of the two capacities of
crafts on given flights will be the determinant of the
one which offers to the carriers the lowest unit [per
passenger] cost. While a large-capacity aircraft with a
heavy load factor would generally provide a lower unit
cost than a small-capacity aircraft with a heavy load
factor, the fact that many of the flights of feeders are
conducted with low load factors would make the utilization
of large equipment quite undesirable, at least from the
cost standpoint. As Frederick points out, larger and
newer equipment has higher costs per airplane-mile but
lower costs per seat-mile.\(^1\) Thus, smaller-capacity craft
often provide the lowest cost per unit when the load factors
are low. Much of the equipment dilemma of the feeders can
be traced to this type of situation in which much of the
presently utilized modern equipment is too large in terms
of capacity to meet the needs of the feeder carriers.

The range of aircraft is of considerable import,
although it is more significant in most cases to the trunk
carriers than to the feeders. One of the major contribu-
tions made by long-range craft is their greater fuel-
carrying capacity. Whenever planes can carry considerable

\(^{10}\text{Frederick, op. cit., p. 13.}\)
amounts of fuel, they may confine their refueling operations to major terminals and avoid the delays incident to such stops, thus eliminating passenger objections to frequent landings and take-offs, and, more importantly from the cost standpoint, they can obviate the added costs which are incurred as a result of these landings and take-offs. The necessity for frequent refueling leaves little choice to a feeder carrier with relation to the specific airports at which it will refuel; as a result, carriers are often required to purchase fuel at ports where local taxes are high and a lack of bulk-storage facilities increases per gallon costs.

Of considerable import are the conclusions reached by Gill and Bates in 1949 in their study of airline competition. Researching the operations of the trunk carriers only, they concluded that the most important single factor influencing the purchase of airline equipment, especially in the post-World War II period, was the degree of competition. Of particular relevance is their conclusion that competition in 1949 is of such extent and intensity that the equipment purchase program

\[\text{11It should be indicated that delays are usually more burdensome to a feeder carrier than to a trunk, since the latter is in a better position to make up a twenty-minute delay on a relatively long flight than is a feeder on a thirty-minute flight.}\]
of the Big Four is practically dictated by their competitors and this, in turn, sets the pace for most of the other carriers.\textsuperscript{12}

The results of this competition were such that even though carriers might have found it possible to serve routes economically and efficiently with previous equipment in many cases, these same carriers were likely to have purchased post-war equipment in order to hold a competitive share of the market when their competitors were utilizing post-war equipment. Though this study was completed several years ago, there is little reason to believe that the conditions have changed materially, if any; as a matter of fact, it might be that competitive pressures both in terms of equipment and service play a more significant role today than they did in 1949. If such is the case, it could very well be maintained that the cost considerations are outweighed by competitive ones in the selection of flight equipment. Frederick concludes that "what might be termed 'luxury' equipment has been introduced under conditions that virtually eliminate a conclusion that economic considerations, other than competitive ones, warranted or prompted the action."\textsuperscript{13}


As far as the trunk carriers are concerned, there seems to be no reason to conclude, however, that the effects of competition are such that they result in the utilization of equipment which is much less efficient than that which would be flown in the absence of competition. It is likely, though, that one of the results of this competition is the more rapid obsolescence of equipment. On the other hand, the efficiency of the feeders may be adversely affected by these competitive conditions, especially on those routes on which they compete with the trunk carriers. In this respect, it may be that the utilization of relatively small craft would give more efficient performance than larger craft for the feeder operations but that the utilization of the former type of equipment would jeopardize the ability of the feeders to attract passengers away from the trunk carriers. Evidence indicates that even on those feeder routes which are not competitive with the trunks in terms of the provision of service to identical points, the mere availability of more modern and comfortable equipment is sufficient to arouse demands for the utilization of similar types of equipment by the feeders. Thus, a feeder operating into and out of a large city, such as New York, would probably find it expedient, if not necessary, to purchase equipment somewhat similar, if not identical, to that being flown by its competitors. This factor, coupled with the seeming unwillingness of aircraft
manufacturers to design a plane exclusively suited for the short-haul operations of the feeders, could in large measure explain the basic cause for the absence of a satisfactory "feeder" aircraft.

Data relative to the effects on costs of the new equipment which has been adopted by several of the feeder airlines are scarce, since many of these craft have not been in operation long enough to permit the accumulation of operating results that would be indicative of the probable future efficiency of such equipment. Some cost data are available, however, which will give some inconclusive indications of performance, such results being inconclusive since they, in most cases, do not span even a year's period of time.

An interesting study of the experience of West Coast Airlines in the acquisition of equipment revolves around their purchase and introduction in 1958 of turbo-prop Fairchild F-27's. As was reported in the spring of 1959, the management of West Coast felt that the cost per seat-mile with exclusive utilization of F-27's would be so favorable that West Coast would no longer need subsidy after three years.\(^1\) Although West Coast does not yet operate exclusively with F-27's, the Civil Aeronautics Board

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\(^1\)_{Aviation Week, March 2, 1959, p. 28.}
in the fall of 1959 had before it an order proposing the grant of an additional $5,000,000 in subsidy for the meeting of both recent past and future needs of West Coast Airlines. Approximately $1,000,000 of this amount was approved for the purpose of helping West Coast overcome past operating difficulties, while the remaining $4,000,000 was to be used to meet the estimated future requirements of this carrier. It was pointed out by the Board that for the year ended August 31, 1959, West Coast had requested $1,500,000 more subsidy than for the same period in the previous year. Since this request coincided with the introduction of the new F-27's, the Board termed the coincidence a "cause of great concern," adding that

...we do not yet have sufficient operating experience to determine whether the new equipment has been phased into the carrier's operations efficiently and economically. Pending such determination, we reaffirm our previous statement as to the heavy responsibility of management to guard against unduly burdening a carrier's subsidy requirements when converting to new equipment.15

It should be indicated that some of the increased subsidy requirements were to result from the increased route coverage that had been approved for West Coast Airlines. During the spring of 1959, West Coast reported an average length of haul of 68 miles, while it was stated that the ideal length of haul for an F-27 is about 125 miles.16

15Aviation Week, November 23, 1959, p. 43.
16Aviation Week, March 2, 1959, p. 28.
To obtain a longer average length of haul, it would be necessary for West Coast to receive permission from the Board to expand its route structure or to obtain skip-stop authority, or both.

More concrete operating data are available from Allegheny Airlines relative to its experience with the leased Convair 540's powered with turboprop engines. Unfortunately, these operating statistics cover only the third quarter of 1959. In terms of available ton-mile costs, the figure for the Convair was $0.1259, as compared with a feeder average of $0.2214 for all types of craft. More specifically, the former figure compares with an average ton-mile cost of $0.2070 for the Fairchild F-27, of $0.2196 for the DC-3, and of $0.1954 for the piston-powered Martins and Convairs. These costs include those for flying operations and direct maintenance, but they exclude both depreciation and rental payments on the leased aircraft. As far as the costs of flying operations alone are concerned, on a revenue plane-mile basis the Convair showed a cost of $0.4998, which was lower than the $0.5058 figure for the piston Convairs and Martins but higher than the $0.4387 cost for the F-27's and the $0.3747 for the DC-3's. The gaps in these costs arose largely from the higher fuel, oil tax, and insurance costs associated with the use of the Convairs.17

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17Aviation Week, December 21, 1959, p. 33.
Generally, it has been stated that the turbine-powered Fairchild F-27 is a "fine local service airplane," capable of being adapted to a large portion of the local route structure. Of importance also is the fact that the trunks are releasing numerous Convairs and Martins at reasonable prices and that the feeders are adding them to their fleets. "It is quite clear...," though, that the F-27, the Convair, and the Martin are not going to answer the total equipment problem of any feeder carrier on all its routes, as there are many segments where eight to ten passengers will constitute the load and this kind of volume will not justify the use of any plane larger than the old DC-3. To many feeder-service proponents who believe that such operations constitute "true" feeder service -- not the high density, terminal-to-terminal business at peak travel hours -- the need for a smaller aircraft than the F-27 is greater today than ever before.18 Apropos at this point is the statement by Cherington that there is some danger that jet aircraft will make it impossible for some of the smaller trunklines to compete in an effective manner.19 This statement has even greater applicability


19Aviation Week, April 20, 1959, p. 40, reprinted from an address by Paul W. Cherington at the First World Congress of Flight held at Las Vegas, Nevada, April, 1959.
to feeder carriers inasmuch as they are frequently handi-
capped more than are the trunk carriers by the inadequacy of airports and airport facilities for the accommodation of jet equipment.

On the basis of a consideration of such operating data as are available, it is difficult to conclude at this point how likely it is that the newer equipment now being used by the feeders will be effective in reducing the total operational costs of the feeder carriers. The nature of the problem with respect to feeder equipment, though, seems to be more readily apparent. Basically, the feeders suffer from low load factors, a revenue problem. As a consequence of low load factors, the feeders on many of their routes do not have a need for the large equipment which tends to be more efficient in terms of cost per unit [passenger], especially with relatively high load factors. In Chapter IX, it was found that higher load factors are dependent upon a combination of expanded route authorizations by the Civil Aeronautics Board and the utilization of more "effective" pricing and promotional policies on the part of the feeder carriers themselves. Assuming a favorable conjunction of these factors, the feeders might be in a position to justify the use of larger, more modern equipment which utilization could possibly result in lower costs, especially unit ones, although
the absence of actual utilization of these types of equipment on feeder routes precludes the drawing of concrete conclusions based on actual operating data.

In the absence of higher load factors and the utilization of more efficient equipment, the feeders must either continue the use of their present equipment, some of which is modern but unproven on feeder routes, or await the development of satisfactory flight equipment for their types of operations, the prospects for the latter type of development seeming rather dim in view of the relatively "thin" market for feeder equipment. Although it is too early to draw meaningful conclusions relative to operating results based upon the expanded route authorizations and utilization of new equipment types, a sweeping generalization made at this point would be to the effect that the prospects for the reduction of feeder subsidy from equipment improvements do not seem to be too encouraging.

**Number of Stations**

A very important factor affecting the costs of airlines is the number and strength of stations served by a given carrier. The number of stations is especially significant insofar as feeder airlines are concerned since the nature of their operating authority requires them to serve a relatively large number of stations, especially on
a given route. In contrast, a trunk carrier may, over a
given route, operate only at New York and Los Angeles, as
an example. Inasmuch as certain of the station expenses
remain substantially the same regardless of the amount of
traffic handled, the total station cost is primarily
dependent upon the number of stations in operation. In
addition, it may be pointed out that the greater the number
of stations for a given route length, the greater will be
the total flight time and, thus, the total costs for that
route.

In a study published in 1954, an analysis was made
of the variables which affect airline costs. Among these
variables, three were mentioned, including the length of
the flight, the average speed of the planes, and the number
of hours per day planes are utilized, each of these fac­
tors possibly either directly or indirectly being affected
by the number of stations. It might be pointed out that
for 1959 the average length of hop for feeder carriers
was 85 miles, whereas that for the trunks was 307 miles. Of

course, the greater the number of stations the shorter
the average length of hop. The number of stations also

\[20\] Jesse W. Proctor and Julius S. Duncan, "A
Regression Analysis of Airline Costs," Journal of Air Law

\[21\] Aviation Week, February 29, 1960, p. 40.
influences the passenger trip length. In 1959, for example, the average length of trip for the feeder carriers was 193 miles, while it was 626 miles for the trunk carriers. Of course, a large part of the difficulty of the feeder carriers with respect to the average length of haul and length of passenger trip revolves around the nature of the operating rights bestowed upon these carriers by the Civil Aeronautics Board. In this respect, a relatively short average length of haul may result in large part from the circumscribed route configuration under which the feeders often perform their operations. The average speed of planes, *per se*, is a technical matter, depending upon the performance capabilities of a given craft. On the other hand, the average speed with which a given trip is completed is dependent not only upon the capabilities of the plane but upon the number of stations which must be served. Thus, the greater the number of stations that must be served on a given flight, the less rapid will be the completion of that flight.

As a consequence of this large number of stations and lesser speed per flight, flight equipment spends more time on the ground and is accordingly utilized a smaller number of hours per day in flight. Shorter individual flights result in a larger percentage of ground time being

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22 Ibid.
spent in taxiing and warming-up and a smaller percentage of in-flight utilization of the fleet of a carrier. In addition, a larger number of take-offs and landings is necessary, resulting in a higher operating expense than would be incurred by a carrier having a smaller proportion of ground time and fewer take-offs and landings. One of the most direct effects of these operating characteristics is the higher maintenance expenses occasioned by the wear and tear upon the aircraft, especially the frame and engine. The larger number of stations results in a lower average block-to-block speed. As a consequence, the covering of a certain number of revenue-miles of operation requires more flight time, with correspondingly higher direct expense both in terms of flying expense and maintenance, on the one hand, and depreciation of flight equipment, on the other.

All of the aforementioned factors account for higher indirect expenses, as well as for greater direct expenses. With respect to ground operations, involving such factors as dispatching and communications, the load on communications personnel and equipment will increase with any increase in the number of hours required to cover a given number of miles of operation. As far as traffic and sales expenses are concerned, the shorter the average trip of the passengers, the larger the number of tickets which must be sold for a given number of passenger-miles carried by
the system for any given period of time. For the most part, the costs incurred in the issuance of a ticket are independent of the length of trip of the passenger. Although only a few examples have been mentioned, it might be pointed out that these same indirect costs are responsible for the incurring of additional indirect costs. In this respect, a larger sales force requires more office space, with the correspondingly higher rental charges and other associated expenses. Then, greater expenses are involved in the general and administrative category, if for no other reason than because an increase in the total complement of personnel and equipment often occasions the development of more burdensome supervisory costs.\(^{23}\)

Although it has been mentioned in considerable detail in Chapter IX with respect to the number and significance of the cities and the city-pairs on the routes of feeder carriers, it might be stressed again that the strength of stations is an important cost, as well as revenue, factor. In this respect, the greater the average number of flights and amounts of traffic originated, the more efficient, at least up to a point, will be the utilization

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\(^{23}\text{This material is largely based upon a similar treatment by Frederick, op. cit., pp. 159-161. It has applicability with certain qualifications to other aspects of feeder operations besides the number of stations.}\)
made of ground, and also of flight, facilities with resultant lower unit costs. Since, as has been indicated earlier, a considerable portion of the costs of feeders is constant, it is to the advantage of these carriers from a cost standpoint to operate as close to full utilization as possible. As just another indicator of the relative weakness of the feeders from the standpoint of station strength, it might be pointed out that for 1959 the traffic density at feeder stations was 615 ton-miles per station per day, while at the trunk stations the density was 23,624 ton-miles per station per day.24

Airline Financing

Another significant factor which affects the costs of feeder carriers is that associated with the cost of financing the airlines, especially their equipment purchases. As of September 30, 1958, the flight equipment of the feeder carriers, minus the reserve for depreciation and maintenance, had a value of $18,133,000; for ground property and equipment, the comparable value was $2,955,000. In total, then, $21,088,000 of the total value of all assets of $45,729,000, or 46.12 per cent, was comprised of equipment.25 Table 26 on


<table>
<thead>
<tr>
<th>Account</th>
<th>1949</th>
<th>Ratio of Account to Total Liabilities and Equity</th>
<th>1955</th>
<th>Ratio of Account to Total Liabilities and Equity</th>
<th>1956</th>
</tr>
</thead>
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<tr>
<td>Current Liabilities</td>
<td>$4,449</td>
<td>31.21%</td>
<td>$12,461</td>
<td>43.86%</td>
<td>$17,46</td>
</tr>
<tr>
<td>Long-Term Debt</td>
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<td>11.07%</td>
<td>4,013</td>
<td>14.13%</td>
<td>7,89</td>
</tr>
<tr>
<td>Other Non-Current Liabilities</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Operating Reserves</td>
<td>170</td>
<td>1.19%</td>
<td>783</td>
<td>2.76%</td>
<td>1,1</td>
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<td>Deferred Credits</td>
<td>100</td>
<td>0.70%</td>
<td>21</td>
<td>0.07%</td>
<td>3</td>
</tr>
<tr>
<td>Stockholders Equity-Net of Treasury Stock</td>
<td>7,957</td>
<td>55.83%</td>
<td>11,133</td>
<td>39.18%</td>
<td>11,2</td>
</tr>
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<td>Preferred Stock</td>
<td>226</td>
<td>1.59%</td>
<td>412</td>
<td>1.45%</td>
<td>5,5</td>
</tr>
<tr>
<td>Common Stock</td>
<td>5,191</td>
<td>36.42%</td>
<td>6,345</td>
<td>22.33%</td>
<td>5,5</td>
</tr>
<tr>
<td>Other Paid-In Capital</td>
<td>4,265</td>
<td>29.92%</td>
<td>4,324</td>
<td>15.22%</td>
<td>4,4</td>
</tr>
<tr>
<td>Retained Earnings</td>
<td>(1,725)</td>
<td>(12.10)%</td>
<td>52</td>
<td>0.18%</td>
<td>(</td>
</tr>
<tr>
<td>Total Liabilities and Equity</td>
<td>14,254</td>
<td>100.00%</td>
<td>28,411</td>
<td>100.00%</td>
<td>37,</td>
</tr>
</tbody>
</table>

Source: Developed from statistics presented in Air Transportation Association of America, 1959, p. 24.
## Feeder Carriers for Selected Years

<table>
<thead>
<tr>
<th>Ratio of Account to Total Liabilities and Equity</th>
<th>Account as of</th>
<th>Ratio of Account to Total Liabilities and Equity</th>
<th>September 30, 1958</th>
<th>Ratio of Account to Total Liabilities and Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>131</td>
<td>45.96%</td>
<td>$22,002</td>
<td>53.41%</td>
<td>$23,627</td>
</tr>
<tr>
<td>300</td>
<td>20.57</td>
<td>8,656</td>
<td>21.01</td>
<td>9,733</td>
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<tr>
<td>-</td>
<td>---</td>
<td>205</td>
<td>0.50</td>
<td>349</td>
</tr>
<tr>
<td>138</td>
<td>3.00</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>303</td>
<td>0.80</td>
<td>264</td>
<td>0.64</td>
<td>198</td>
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<tr>
<td>253</td>
<td>29.67</td>
<td>10,063</td>
<td>24.44</td>
<td>11,822</td>
</tr>
<tr>
<td>920</td>
<td>2.42</td>
<td>163</td>
<td>0.40</td>
<td>163</td>
</tr>
<tr>
<td>1,871</td>
<td>15.48</td>
<td>6,776</td>
<td>16.45</td>
<td>7,359</td>
</tr>
<tr>
<td>1,891</td>
<td>12.90</td>
<td>4,863</td>
<td>11.81</td>
<td>5,669</td>
</tr>
<tr>
<td>(429)</td>
<td>(1.13)</td>
<td>(1,739)</td>
<td>(4.22)</td>
<td>(1,369)</td>
</tr>
<tr>
<td>925</td>
<td>100.00</td>
<td>41,190</td>
<td>100.00</td>
<td>45,729</td>
</tr>
</tbody>
</table>

page 406 will indicate the manner in which airline financing has been conducted. Several significant observations may be made on the basis of a consideration of the data presented in this table. It may be noticed that long-term debt as a percentage of total liabilities and equity has nearly doubled between 1949 and 1958, having risen from 11.07 per cent to 21.29 per cent. It may also be seen that the stockholders' equity as a percentage of total liabilities and equity has decreased from 55.83 per cent in 1949 to 25.85 per cent in 1958. Over the same period, the ratio of total preferred and common stock to total liabilities and equity has fallen from 38.01 per cent to 16.44 per cent.

Though the ratios are not presented in this table, long-term debt as a percentage of preferred and common stock has risen from 29.13 per cent in 1945 to 59.39 per cent in 1955 to 114.86 per cent in 1956 to 124.74 per cent in 1957 to 129.39 per cent in 1958. It may be readily concluded from these statistics that the capital structure of the feeder airline system is becoming increasingly dominated by debt capital. In a period of more than a decade, the entire feeder industry has paid only $23,750 in common stock dividends. While such a condition is

\[26\text{Aviation Week, February 29, 1960, p. 40.}\]
considered unhealthy for any type of industry, it is probably of greater concern in the feeder airline industry, since it lessens the ability of these carriers to face economic fluctuations. The most obvious danger would result from the necessity of having to meet relatively heavy fixed charges in the event that a business downturn should occur. For one thing, the operating ratio in air transportation is relatively high. In addition, as has been indicated earlier, there is a large portion of expenses which do not vary directly with the volume of business, such as salaries of flight and ground personnel and depreciation. The airlines, then, may be said to have a high break-even point which is raised even higher by the continued increase in fixed debt and the concomitant rise in fixed expenses. An outcome of this combination of factors is an operating income which fluctuates widely as a result of even small increases or decreases in traffic.

It probably goes without saying that much of this debt capital is acquired in the financing of flight equipment purchases. Besides the purchase of the equipment itself, it is estimated that an amount equal to 20 per cent of the purchase price of an airplane is necessary for the procurement of spare parts to start operations and carry it throughout the first year.\(^{27}\) In addition, it is often

\(^{27}\)Frederick, *op. cit.*, p. 32.
necessary to procure new types of ground equipment for servicing the plane during maintenance stops, as well as for handling passengers and cargo at terminals. This statement, however, does not explain the underlying reasons why the feeder carriers must rely on the use of debt capital instead of equity capital to purchase such equipment. One of the major reasons formerly given for the unwillingness of investors to purchase the equity capital of the feeder carriers was the temporary nature of the operating authority of these carriers. As has been indicated earlier, though, the feeder carriers have had permanent certifications since 1955. Another more pertinent factor explaining the necessity for heavy reliance on the use of debt capital, according to bank and investment house officials reviewing the financial problems of the feeders at a recent quarterly regional meeting of the Association of Local Transport Airlines, is the poor earnings history of the feeder carriers. Thus, poor earnings make the sale of equity capital difficult and the difficulty of the sale of equity capital places the carriers in a poor earnings position. Also mentioned by the aforementioned investment experts as a complicating factor in the sale of equity capital is the existence of government regulations. It was further pointed out that the stock offerings of the
feeders are at their lowest level since 1953 and are threatening the availability of both term and mortgage lending.  

Several avenues are open whose pursuit might result in a mitigation of the feeder problem in this area. Under present regulations, "earnings" could be increased either through an increase in mail rates by the Civil Aeronautics Board or through an increase in subsidy payments, per se. Changes in Board policy, however, are not apparently imminent. Long-term lease of equipment offers a possibility, but it appears that lease contracts would be made under conditions resulting in the necessity of the feeder carriers to make fixed rental payments. Besides, the Board has not recognized straight leases of aircraft as an investment for subsidy and rate-making purposes, although such recognition might take place in the future. Congressional action has been taken to aid the carriers in their equipment financing, although this action will not, at least in one case, result in a reduction of their utilization of borrowed funds for the acquisition of equipment. The two most important steps taken in this respect are the guaranteed-loan program and the capital-gains legislation. The latter of these will permit carriers to retain gains realized from the sale of obsolete flight equipment, with a provision that the money be reinvested in

28*Aviation Week*, November 23, 1959, p. 45.
new equipment or set aside in a special fund for such a future program. In the past, the sums from such sales were deducted from the amounts which had been designated as subsidy payments for the carriers. This practice had in the past virtually wiped out the airlines' greatest source of capital. Since lenders qualify their loans on the basis of both net worth and operating income, feeder airlines found it difficult to obtain financing.²⁹

The study mentioned earlier which was prepared by the Planning Research Corporation found that the availability of greater amounts of capital for equipment modernization would be one of the major factors contributing to substantial reductions in subsidy payments to feeders.³⁰ Although it was enacted before the results of this study were released, the Guaranteed Loan Act was designed to aid feeders in their equipment financing. This act, passed in 1958, authorizes the government to guarantee 90 per cent of the loans sought by airlines to purchase new flight equipment. The ceiling on any such loan is $5,000,000. While this type of legislation makes it easier for the carriers to obtain capital, it is not likely to reduce the reliance of these carriers on the utilization of debt capital as a means of financing. In fact, though approving

²⁹Aviation Week, March 9, 1959, p. 150.
³⁰Aviation Week, February 29, 1960, p. 40.
guarantees on several loan applications from feeders, the Civil Aeronautics Board has consistently warned that the carriers must improve their equity balances. In this respect, the passage of the Guaranteed Loan Act has led to the increases in total interest payments made by feeder carriers, resulting in the accumulation of even greater burdens in this area. As a result of these types of difficulties, the Board decided in 1959 to permit the inclusion of interest charges on long-term debt along with break-even need for computation of temporary mail rates. This decision will result in a financial gain for the feeder carriers, especially if, as the carriers report, they will no longer be forced to borrow funds for interest charges in "today's" tight money market.

It seems that the main effect of current action taken by the Civil Aeronautics Board with respect to equipment financing will have the result of making it easier for carriers to obtain capital; but, at the same time, it also seems likely that such capital will be of the debt type and that its utilization will not reduce -- in fact, it is likely to increase -- the interest burdens of the feeder carriers. The sale of equity capital seems to depend

31 *Aviation Week*, March 7, 1960, p. 159.
largely on the ability of the feeder industry to manifest a satisfactory earnings record, their likelihood for being able to do so having been considered at length in Chapter IX.

**Scheduling**

Although Chapter IX had an analysis of the effect on revenues of the inability of feeder carriers to generate large amounts of passenger traffic on many of their flights, as reflected in low load factors, this factor also has a very significant effect upon costs. Another way of indicating the weakness of the feeder carriers in this respect is to consider the number of passengers which the feeder carriers enplane per actual departure. For calendar year 1958, this average number for the feeder industry was 5.3, which is to say that on the average each of the feeder carriers enplaned only five passengers for each departure.33

The inflexibility in scheduling resulting from the small number of passengers makes it quite difficult for the feeders to schedule their equipment in such a way that very high utilization per day is possible. Low actual utilization will result in higher costs per revenue passenger-mile.

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33**Flight Magazine, op. cit.,** pp. 62, 63.
than would be the case if a higher utilization were obtained. Thus, the salaries of the flight crews and the depreciation of the flight equipment will be higher per passenger when utilization is low. As a result, the fare for each passenger will have to be higher to cover the total cost of performing the air transportation service. In many cases, however, pricing to cover average total costs would produce a fare level so high that at least certain passengers on any given flight would likely find the expenses of traveling by air prohibitive. To avoid developments of this nature, fares are kept low and subsidy is paid to permit carriers to cover their operating costs.

The inflexible scheduling which results from a small number of passengers may also result in higher unit maintenance costs, because of a poor utilization of manpower in maintenance and overhaul. In this respect, the Association of Local Transport Airlines feels that there is a need for consolidated engine overhaul facilities, which will be especially advantageous to meet the growing feeder-service trend towards the use of turbine power plants. The aforementioned principle applies to the utilization of both flight and ground crews in the day-to-day operation of the aircraft, since the highest utilization

34 *Aviation Week*, March 9, 1959, p. 151.
of plant, equipment, and personnel may be prevented by inflexible scheduling.35

Although it is often maintained, especially by proponents of more freedom in scheduling, that a greater number of schedules, at least to a point, would make it more likely that a greater number of passengers would be attracted, because of the greater convenience of the feeder carriers, it is believed by this writer that more freedom for the feeder carriers in scheduling would not, in a large number of cases, result in sufficient attraction of new passengers to warrant such added schedules. In certain cases, it no doubt would reduce the number of enplaned passengers per departure to a still lower level.

Subsidy as "Insurance"

Much as the economist charges that tariffs foster and perpetuate inefficiency in protected industries, he may also maintain that subsidy gives rise to the development and continuation of inefficiency in subsidized industries. In the same manner that it is very difficult to substantiate such a statement with respect to tariff-protected industries without removing the tariff, it is also difficult to prove a similar statement with respect

35Gill and Bates, op. cit., pp. 523, 524.
to subsidized industries unless the subsidies are eliminated. The allegation may be made, then, that the feeder carriers are not as efficient as they might be were they not conducting their operations under conditions in which they are the recipients of subsidy. As long as subsidy continues to be provided to the feeder carriers, conclusions which are drawn relative to the correctness of the statement to the effect that subsidy does foster and perpetuate inefficiency are likely to remain of the speculative variety. As the Civil Aeronautics Board points out, though,

...there is ever present in the process of financially underwriting air transportation...the potentiality that the beneficial force of competition will be nullified by mail payments [subsidy] to individual carriers in amounts inconsistent with maintaining the desired competitive spur to efficiency in the air transport industry.36

Although it is quite possible that the subsidy payments currently being made to the feeders do result in the conduct of operation at a level short of the most efficient one, it is believed that the importance of this type of inefficiency is often exaggerated in the case of the feeders, especially since they have been under increasing recent pressure, particularly from the Administration,

to reduce their reliance on subsidy. As was noted in Chapter IX, proposals have been made which would have the effect of reducing the subsidy payments to the feeder carriers. It will be interesting to observe the actual effects of any such reductions as are actually made. In any case, it is believed that the degree of fostered inefficiency is relatively small and that increases in load factors would be much more likely to improve the overall position of the feeder industry than would cost reductions stimulated by the actual decreasing of subsidy payments. According to the report of the Planning Research Corporation, the load factor for 1959 was 46.1 per cent while the break-even load factor would have been 69.2 per cent. Thus, a disparity of 23.1 per cent existed, whose elimination would have been necessary before the feeders could have even broken even in 1959. It may be concluded, then, that a considerable reduction in costs would be necessary to even permit the feeders to achieve a break-even position.

Chapter Summary

This chapter was designed to analyze the prospects of the feeder carriers for the diminution of subsidy requirements through the medium of cost reductions.

37Aviation Week, February 29, 1960, p. 40.
Methodologically, each of the most important factors affecting costs was considered to determine the likelihood that foreseeable changes in these factors would result in material decreases in the public revenues supplied to the feeder industry.

Initially, there was a statistical presentation of the types [and magnitudes] of costs incurred by the feeder carriers. It was found that of the total cost figure of $93,303,000 for 1958, 77.14 per cent was accounted for by the three cost categories of flying operations, maintenance, and aircraft and traffic servicing. The four remaining cost divisions of passenger service, promotion and sales, administrative, and depreciation and amortization were responsible for the other 22.86 per cent of total operating costs. It was indicated that total feeder operating costs had risen by 12.55 per cent between 1957 and 1958, but that this rate of increase had not been as great as it had been in the three previous years.

The remainder of this chapter was devoted to an analysis of the most important factors affecting feeder airline costs. Paul W. Cherington in his book, *Airline Price Policy*, concluded, on the basis of an analysis of the operations of trunk carriers, that the principal causal elements explaining cost differences between groups of carriers or between individual carriers were size, route
turnover, length of haul, length of hop, station strength, and volume of coach operations. It was found that of these six factors the highest correlations were registered between unit cost and length of haul, unit cost and proportion of coach traffic, and unit cost and length of hop. It was concluded by Cherington that the principal determinant of airline costs appears to be length of haul coupled with a sufficient volume of traffic to permit a relatively long average length of hop.

It was indicated that many of the feeder costs are constant in that they do not vary in proportion to changes in the volume of business handled. Especially is this statement applicable to many of the "ground and indirect" expenses, which encompass the cost categories of aircraft and traffic servicing, promotion and sales, and administrative expenses which, in total, accounted for 39.17 per cent of total feeder operating costs in 1958. Inasmuch as this is the case, the marginal costs of handling additional units of business are very small, especially up to the limits imposed by the seating capacity of a given complement of flight equipment. It was indicated that the most noteworthy attempts to reduce these costs have been made in connection with the furnishing of the commuter type of service, especially by Allegheny Airlines. Unfortunately, these types of service have not been in operation long
enough to permit the formulation of conclusions based upon the investigation of concrete operating results.

This writer feels that the costs associated with the equipment of the feeder carriers are of primary significance in explaining the major movements in total feeder costs. It was found that such costs are very pervasive inasmuch as they appear in the direct-flying operational costs, in maintenance, in depreciation, and in the interest payments on bonded indebtedness, to mention the most important ones. The effects which various characteristics of flying equipment, such as range, size, and speed, can have on operating costs were analyzed. It was pointed out that the feeders have continually been plagued by the absence of a plane which possessed all, or even a portion, of the attributes, especially the "correct" size, needed for the performance of feeder service. Finally, it was noted that competitive pressures often exert themselves in such a way as to result in the purchase of larger and more costly equipment than would be necessary to perform the feeder type of service.

With respect to prospects for the future reduction of costs through the equipment avenue, the absence of operating data developed from the utilization of the newer equipment prevented the formulation of meaningful conclusions at this point. It appears, though, on the
basis of a consideration of the limited evidence, that the conversion to newer types of equipment will initially increase the subsidy burden, although the utilization of such equipment may result in some reduction in operating costs, especially those of the flying-operations and maintenance types. It is believed, however, that the overall operating results will not lead to any significant reductions in feeder costs.

Another important factor influencing the costs of the feeder carriers was found to be the number of stations, as well as the strength thereof, served by the feeders. The feeder carriers are required to serve a large number of relatively weak stations with the results that in-flight time per craft is relatively small while ground time is comparatively great, that both the average length of haul and the average trip of passengers are relatively short, and that revenue-generating equipment utilization is lessened due to the necessity of making frequent take-offs and landings. All of these factors have an adverse effect on both direct and indirect expenses. In addition, the greater is the number of stations, the greater are both the total station costs and, thus, total feeder operating costs. It was found that a partial solution to this problem lies in the abandonment by trunk carriers of some of their stations to the feeders and in the approval of a larger number of
skip-stop authorizations and route extensions for the feeder carriers by the Civil Aeronautics Board.

Another significant factor affecting feeder costs was found to be the costs of financing these airlines. Several types of statistics relevant to the capital structure of the feeder carriers indicated that the industry capital structure is becoming increasingly dominated by debt capital. It was found that such a condition places the feeders in a vulnerable position during a period of declining traffic as a result of the fixed interest charges associated with such indebtedness. As might be expected, the largest amounts of such debt capital are acquired in the purchase of both flight equipment and the ground equipment required to service such flight equipment.

It was indicated that Congress has attempted to aid the feeder carriers in overcoming their equipment-financing obstacles through the passage of capital-gains legislation and the Guaranteed Loan Act. One of the major effects of these two enactments, especially the latter, has been that the feeders now find it somewhat easier to finance their equipment purchases through the use of borrowed funds. At the same time, however, such borrowing adds still larger amounts to the fixed indebtedness of the feeders and increases their liability for the
payment of fixed interest charges. It appears that one of the most fruitful means open to the carriers to reduce their reliance on debt capital is to increase their earnings to the point that their equity capital will be attractive to investors.

It was found that the feeder carriers are often confronted by Civil Aeronautics Board regulations which make it difficult for them to develop flexible scheduling patterns. Although the proponents of greater flexibility in scheduling feel that a relaxation of scheduling rigidity would have benign effects on feeder costs, it is believed by this writer that such favorable results would not be very likely to obtain, especially in view of the rather limited demand for feeder services at many of the points now served by these carriers.

It was pointed out that charges have been made to the effect that the subsidy payments supplied to the feeder carriers foster and perpetuate a greater degree of inefficiency on the part of the feeder managements than would be the case in the absence of such subsidy payments. Although any conclusions relative to this allegation will have to remain largely unsupported under present conditions, it is the opinion of this writer that the importance of these allegations is often exaggerated, especially in view of the increasing amount of subsidy-reduction pressure being placed on the feeders and because of the
ostensible "desire" of the feeder managements themselves to decrease their reliance on subsidy.

Though the major conclusions of this study will be presented in Chapter XI, it may be indicated at this point that the prospects of the feeder carriers for the diminution of subsidy requirements through reductions in costs are not very encouraging for the foreseeable future.
CHAPTER XI

CONCLUSIONS AND RECOMMENDATIONS

As a last step in the preparation of this study, Chapter XI will contain the conclusions drawn from the data presented in Chapters II through X and the recommendations, especially of a public-policy nature, based upon the findings of this research. Inasmuch as each chapter contained a summary of its contents, this chapter will not re-summarize the data which was presented earlier. Instead, it will incorporate the major findings of each chapter into the conclusions segment. As may be recalled from Chapter I, it was stated that the purpose of this study would be to determine the significance of the feeder system to the nation. It was also pointed out that the research would be directed towards an analysis of the results of feeder operations in the past and a forecast of the prospects for improvements in operating results and, therefore, for the reduction of subsidy in the future, both analyses being made for the purpose of determining whether the existence of the feeder system could be justified on both economic and non-economic grounds and whether the value to the nation of the feeder system warrants the incurrence of the costs necessary for its continuance. To achieve this purpose, the
research was directed primarily towards the making of a comprehensive costs-benefits analysis and to the development of data relative to the prospects of the feeders for diminishing, or eliminating, their subsidy requirements through improvements in revenues and/or reductions in costs.

Conclusions

With respect to the overall significance of the feeder system to the economy, it was concluded that the combination of user and non-user benefits afforded by the feeder system was not sufficient to offset the total of user and non-user costs incurred in the operation of the system. This conclusion was based upon data developed from the application of both market and welfare tests to the operations of the feeder system. In the evolving of this major conclusion, several significant minor conclusions were developed. Since the Federal Aviation Act declares it to be the responsibility of the Civil Aeronautics Board to encourage and develop an air transportation system adopted to the present and future needs of the commerce of the United States, of the postal service, and of the national defense, these three main categories of possible beneficiaries received the major consideration in the conduct of the cost-benefits analysis.
With respect to user benefits, the only users of the feeder system of any significance are those who fall into the "postal" and "commercial" categories, since the military utilization of the feeder system is inconsequential. As far as indirect, or non-user, benefits are concerned, it appears that the postal and commercial divisions of beneficiaries are not the recipients of these types of returns from the feeder system, although the proponents of continued, and expanded, feeder service argue, though usually without success when objective economic evaluations are the criteria, that the existence of the feeder system does provide certain types of intangible community and social benefits. Thus, any indirect benefits must accrue from the national defense value of the feeder system to the economy. In the conduct of the analyses made to determine whether the feeder system does make some contribution to national defense, the main approach was the development of data relative to, first, the military capabilities of the feeder system and, second, to the military requirements upon the feeder system. Major findings in these areas were then based upon a relating of the capabilities and the requirements data.

As far as capabilities are concerned, the feeder system offers either its total capacity, in the event that it should be necessary to commandeer the entire fleet
for military purposes, or its stand-by capacity, which is generally about fifty per cent of its total capacity. The military-usage value of this fleet would derive almost wholly from its utilization for the carriage of persons and property and would tend to increase under conditions in which the fixed-route requirements currently imposed upon the feeder carriers were relaxed or abandoned. When these capabilities are compared with the requirements of the military insofar as actual utilization of the feeder system is concerned, it seems reasonable to conclude that, under the present military plans and because of the many limitations of the feeder system for military purposes, the feeder system would be utilized directly, if at all, only under conditions of all-out national emergency of such a critical nature that all available airlift capacity in the economy would become subject to utilization in the meeting of the needs of defense. Aside from its potential direct-utilization value, the feeder system may make some contribution to the deterrence force of the nation, although it is believed that such deterrence value is relatively small, particularly as an obstacle to a potential aggressor that is familiar both with the plans for the contemplated military usage of the feeder system under conditions of limited and total war and with the limitations of the feeder system for defense purposes.
From the cost standpoint, it is concluded that the non-monetary costs of the feeder system are relatively insignificant and that only the monetary costs, including subsidy, merit serious consideration. In the allocation of these costs to users, the distribution was made only to the postal and commercial users of the feeder system inasmuch as the military makes insignificant direct utilization of the feeder system. A case could be made for the apportionment of some of the total costs of operation, especially subsidy, of the feeder system to the taxpaying public as a result of its receipt of non-user benefits, especially those associated with national defense, but the absence of any substantial non-user benefits precluded any such apportionment which would be made exclusively for the attainment of an optimal allocation of resources. As was indicated in Chapter II, this study was not to be directly concerned with the achievement of a distributional optimum. Thus, monetary costs were allocated among the postal and commercial users only. Inasmuch as the mail payments to the feeder carriers are designed just to compensate for the total costs, including a reasonable return, incurred in the transportation of airmail, it is concluded that the remainder of total costs, including all of subsidy, is allocable to the commercial users of the feeder service. In effect, then, it may be
said that passengers and the shippers of freight by these carriers are the beneficiaries of the subsidized operations of the feeder system.

It is further concluded that the feeder system is not currently at a position of allocative optimum. From the standpoint of welfare theory, it may be reasoned that an economic reorganization in the feeder system could be made in such a manner that somebody would be made better off or, synonymously, that the reorganization could be made in such a way that the total benefits received therefrom would exceed the total costs incurred in its making. Stated another way, the "gains" accruing in the form of consumers' surplus and indirect benefits [external economies of consumption] from the operation of the feeder system are less than sufficient to offset the "losses" incurred by the persons who pay the taxes from which the federal funds are derived to provide the subsidy support for the operation of the feeder system. Having concluded thusly, the next logical step will be one of formulating recommendations which will be designed to indicate the avenues to be followed for the possible attainment of optimum for the feeder system; the elaboration of such recommendations will be made in the concluding section of this chapter.
Since many of the preceding conclusions were based upon a somewhat static type of analysis, it seems necessary to take cognizance of the fact that the domestic air transportation system, including the feeder system, is an evolving and dynamic one by considering the prospects of the feeder carriers for decreasing, or eliminating, their subsidy requirements through the improvement of revenues or the reduction of costs. With respect to the improvement of revenues, it is concluded that the most salient single factor affecting feeder airline revenues is the route configuration. It would follow from this statement that any changes which would strengthen the route structures of the feeder carriers would tend to improve their revenue positions. Important changes are currently being made in the feeder route system, especially with respect to route extensions, authorization of additional skip-stop privileges, and relinquishment of trunk routes to the feeder carriers. The inauguration of these policies has been effected too recently to permit the formulation of meaningful conclusions, although it appears that route extensions are generally accompanied by relatively constant per-mile increases in subsidy requirements. From the standpoint of management action with respect to revenue betterment, it is believed that some improvements can be effected in many cases through a more imaginative and experimental approach to the
possibilities offered in the areas of pricing and promotion. In these areas, though, it is probable that any significant managerial innovation will have to be accompanied by the relaxation of Civil Aeronautics Board controls, especially with respect to pricing.

Relative to the possibility for the achievement of significant cost reductions, the prospects do not seem as favorable as do those for increasing revenues. The major cost factor is that associated with the direct operation, maintenance, and financing of equipment. Until recently, the feeder carriers have not possessed the types of aircraft which are economical for the "feeder" operations. Recent introductions of new flight equipment have been made, but sufficient time has not elapsed to permit the formulation of operating data which would provide significant revelations of the probable effectiveness of these craft once they have become an integral part of the feeder operations. It is concluded that the opportunities for cost reductions in areas other than those associated directly with equipment depend largely upon developments which would lead to a greater demand for the existing capacity of the feeder system, such greater demand, in a cost structure characterized by a large portion of constant costs, in turn resulting in at least a lower unit cost for the services performed by the feeder carriers.
A solution to the problem caused by the existence of low load factor can be approached more effectively from the revenue side through changes in the route configuration. Not only would such route changes provide the possibility for increasing load factors and total revenues, but they also could be made in such a way as to increase the length of haul, the length of hop, the station-to-station speed of the feeder craft, and the actual flight utilization of feeder equipment, such increases in these areas being likely to result in some cost reductions for the feeder industry.

Recommendations

The data developed from the conduct of this study have lead to the major conclusion that an economic reorganization is necessary if the feeder system is to attain a position of allocative optimum. The two obvious avenues of approach with respect to such a reorganization include either the abandonment of the entire feeder system or the making of adjustments within the current feeder system which would be designed to achieve a position of optimum, the realization of such goal taking place largely as a result of the elimination of subsidy to the feeder industry. It seems desirable to this writer that the feeder system be continued, although not necessarily within
the confines of the current definition of "feeder" and certainly not within the operating limitations currently imposed upon the feeder carriers, especially with respect to route configuration. The most obvious conclusion of this study is the one to the effect that, in view of the very great importance of the route structure as the major determinant of the success of any given carrier and of the industry taken collectively, the most important economic reorganization which offers some hope for an improvement in the economic health of the feeder industry is one of re-structuring the route pattern of the industry.

There seems to be three important lines along which such re-structuring may take place. The most promising of these is the extension by the Civil Aeronautics Board of feeder routes to additional important cities and city-pairs, especially those which would complement present route systems. The other two approaches involve the granting by the Board both of additional skip-stop authority and of permission for the trunk carriers to relinquish to the feeder carriers the right to serve those points mutually agreed upon by both classes of carriers. Not only will these changes lead to possible improvements in revenues but also to possible reductions in costs, as was indicated in the previous section of this chapter. Depending upon the nature and extent of these changes, some
of which are currently taking place, it may be necessary for the Board either to abandon or to re-define the "feeder" concept, as it now exists. Such an abandonment or re-defining would not necessarily mean that the feeder carriers would take on the aspects of trunk carriers and that, in effect, there would be two systems of trunk carriers in the nation. There is some evidence to indicate that the trunk carriers are in an evolving process themselves and that the "trunk" concept will not persist in the same form in which it exists today. In this respect, with the voluntary abandonment of present trunk stations and the increased concentration on long and relatively long flights, there might be emerging a trunk system which is predominantly of a relatively long-haul nature. Of course, the Civil Aeronautics Board has the authority to control the development of any types of route-structure changes for both the feeder and the trunk carriers.

Although this study has not produced data on the economic desirability of permitting the trunk system to develop into a predominantly long-haul type of operation, it has indicated the apparent need for a change in the feeder concept which would permit the feeder carriers to serve additional cities and do so under conditions in which they would not have to stop at certain cities unless there were departing or enplaning passengers at those
points. Such skip-stop authority would permit a more effective utilization of some of the more modern equipment which is becoming available to the feeder airlines. On the basis of an evaluation of the data of this study, it is hereby recommended that the Civil Aeronautics Board re-define the feeder concept, if not the trunk one, and implement this new concept by the types of route changes which would seem most likely to result in a feeder system which would be improved but not at the expense of a loss in efficiency on the part of the trunk carriers.

Another necessary policy measure, and one which is currently being effected to some degree, is the granting by the Board to the feeder carriers of permission to abandon those route segments which offer no apparent prospect of being able to develop a sufficient amount of traffic to warrant their continuation. These poor routes impede any feeder movement towards subsidy-free operation and should be eliminated. There is no doubt that complaints would arise from the affected communities, but the continued provision of service to such areas can no more be justified than can the inauguration of new feeder service for communities which seem equally incapable of supporting such service. It seems obvious that the indiscriminate approval of operating rights to serve just any community was not the intent of either the framers of the Civil
Aeronautics Act or the initiators of the feeder experiment. Economically speaking, such a policy can not be justified, particularly when it is indicated, as this study has attempted to do, that the welfare of the economy is not enhanced by the provision of unlimited amounts of feeder service.

It seems, on the other hand, that encouragement should be given to the commuter type of service, regardless of whether it is conducted by the feeders or by some new category of carrier. It seems desirable at the present time, however, to permit the feeder carriers to continue to develop this type of service. Not only does this type of service offer to the feeder carriers the possibility of enhancing their revenue positions through experimentation with a type of service which concentrates on the development of the short-haul traffic, but it offers possibilities for cost reductions through the elimination of certain of the conventional ground services.

At such time as the emerging route structure of the feeder system becomes relatively well-crystallized, it is recommended that the feeder carriers at least study the possibility of developing a plane which will be specifically adapted to the needs of the feeder type of operation. The funds for such research might be collected conjointly from the carriers of the feeder industry and
from interested aircraft manufacturers who would receive the exclusive right to manufacture such a plane in the event that the development of a satisfactory one seemed feasible. This exclusive-manufacturing privilege would aid in overcoming the reluctance of manufacturers to develop feeder craft because of the relative insufficiency of demand for that type of equipment.

Although it has been indicated that, by and large, the feeder system is not "responsive" to the needs of the military, it seems that the managements of the feeder carriers should exert a greater effort to obtain such military movements as would be susceptible to carriage by the feeders. The obtaining of as much military traffic as possible for movement over the currently authorized feeder routes would be particularly desirable in view of the relatively large availability of unutilized capacity which characterizes the operations of the feeder system. As a step in the same direction, any action, Congressional or otherwise, which would have the effect of causing the military to transport personnel and cargo, whenever it is strategically possible, by the feeder system would seem desirable whenever such carriage could be made as economically as by alternative modes. Often such carriage cannot be effected as economically by feeder carriers as by alternative modes. In such cases, the feeder managements
should strive to obtain such traffic through the establishment of contract rates which would be at least compensatory to the feeder carriers. In this respect, it might be necessary, and desirable, for the Civil Aeronautics Board to permit the utilization of such "special" rates without the necessity of the feeder carriers having to follow the conventional procedural steps which are time consuming and which may be inimical to the best interests of the feeder carriers. For the purpose of increasing the responsiveness of the feeder system for the movement of military traffic, equipment designers should explore the potentiality for making modifications in future feeder craft which would increase their attractiveness to the military. It is unlikely, though, that significant changes of this nature will be made just for the purpose of obtaining military traffic, largely because of the lack of any assurance that such changes would enhance the overall value of the feeder system to the military. On the other hand, one of the stated objections to the utilization of feeder carriers by the military is that these carriers do not have suitable equipment types.

Generally speaking, it is recommended that the managements of the feeder carriers be encouraged and permitted by the Civil Aeronautics Board to engage in reasonable experimentation with respect to their pricing and
promotional activities. It is the belief of this writer, though largely unsupportable through the introduction of concrete data, that a more vigorous and imaginative approach in these two areas would result in the development of substantial amounts of new traffic. It is evident that much of the general sales activity of all air carriers is focused either upon the development of greater sales, such as round-trips, to current buyers of their services or upon the solicitation of "repeat" patronage from those buyers who had formerly availed themselves of the services offered by air carriers. Inasmuch as there is only a limited amount of repeat business, starting from a given base, the area of greatest promise seems to lie in the fostering of this hitherto unexploited traffic potential.

As may be inferred from a consideration of the foregoing data, the future success of the feeder system in the achievement of an optimum position depends upon the results of several already approved and herein recommended changes in the feeder system. Ultimately, the key to the attainment of optimum resides with the current and potential users of the feeder system, with the managements of the feeder carriers, and with the Civil Aeronautics Board. Even under conditions in which the recommendations of this study took the form of courses of action which would be reacted to favorably by these three groups, the
likelihood for the attainment of an allocative optimum by
the feeder system would seem to be somewhat unpredictable.
In the continuing research of the future, this writer will
both observe the unfolding events in an evolving air trans­
portation system, including both the trunk and the feeder
carriers, and formulate the types of recommendations which
would seem most likely to result in the establishment of
the most efficient air transportation system for the
economy.
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