Document
Y
4
Ec7
Su1/4
pt. 6

1000

Congress
Session } JOINT COMMITTEE PRINT

MENTS

1973

GOVERNMENT
Storage

KANSAS STATE UNIVERSITY LIBRARY

THE ECONOMICS OF FEDERAL SUBSIDY PROGRAMS

A COMPENDIUM OF PAPERS

SUBMITTED TO THE

SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT

OF THE

JOINT ECONOMIC COMMITTEE CONGRESS OF THE UNITED STATES

PART 6—Transportation Subsidies

FEBRUARY 26, 1973

KSU LIBRARIES
A11900 980664

Printed for the use of the Joint Economic Committee

U.S. GOVERNMENT PRINTING OFFICE

72-463 WASHINGTON : 1973

For sale by the Superintendent of Documents,
U.S. Government Printing Office, Washington, D.C. 20402
Price $1.50 Domestic postpaid or $1.25 GPO Bookstore

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

JOINT ECONOMIC COMMITTEE

(Created pursuant to sec. 5(a) of Public Law 304, 79th Cong.)

WRIGHT PATMAN, Texas, *Chairman*
WILLIAM PROXMIRE, Wisconsin, *Vice Chairman*

HOUSE OF REPRESENTATIVES	SENATE
RICHARD BOLLING, Missouri	JOHN SPARKMAN, Alabama
HENRY S. REUSS, Wisconsin	J. W. FULBRIGHT, Arkansas
MARTHA W. GRIFFITHS, Michigan	ABRAHAM RIBICOFF, Connecticut
WILLIAM S. MOORHEAD, Pennsylvania	HUBERT H. HUMPHREY, Minnesota
HUGH L. CAREY, New York	LLOYD M. BENTSEN, JR., Texas
WILLIAM B. WIDNALL, New Jersey	JACOB K. JAVITS, New York
BARBER B. CONABLE, JR., New York	CHARLES H. PERCY, Illinois
CLARENCE J. BROWN, Ohio	JAMES B. PEARSON, Kansas
BEN B. BLACKBURN, Georgia	RICHARD S. SCHWEIKER, Pennsylvania

JOHN R. STARK, *Executive Director*
LOUGHLIN F. MCHUGH, *Senior Economist*

ECONOMISTS

WILLIAM A. COX — LUCY A. FALCONE — ROSS F. HAMACHEK
JERRY J. JASINOWSKI — JOHN R. KARLIK — RICHARD F. KAUFMAN
L. DOUGLAS LEE — COURTENAY M. SLATER

MINORITY

LESLIE J. BANDER — GEORGE D. KRUMBHAAR, Jr. (Counsel) — WALTER B. LAESSIG (Counsel)

SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT

WILLIAM PROXMIRE, Wisconsin, *Chairman*

SENATE	HOUSE OF REPRESENTATIVES
JOHN SPARKMAN, Alabama	WRIGHT PATMAN, Texas
J. W. FULBRIGHT, Arkansas	MARTHA W. GRIFFITHS, Michigan
HUBERT H. HUMPHREY, Minnesota	WILLIAM S. MOORHEAD, Pennsylvania
CHARLES H. PERCY, Illinois	HUGH L. CAREY, New York
JAMES B. PEARSON, Kansas	BARBER B. CONABLE, JR., New York
RICHARD S. SCHWEIKER, Pennsylvania	CLARENCE J. BROWN, Ohio
	BEN B. BLACKBURN, Georgia

Document
Y
4
Ec7
Su 1/4
pt. 6

LETTERS OF TRANSMITTAL

FEBRUARY 23, 1973.

To the Members of the Joint Economic Committee:

Transmitted herewith for the use of the members of the Joint Economic Committee and other Members of Congress is the sixth part of a compendium of papers, entitled "The Economics of Federal Subsidy Programs," submitted to the Joint Economic Committee.

The views expressed in these papers do not necessarily represent the views of members of the committee or the committee staff. They represent studies of a number of subsidy programs, which it is hoped will provide a focus for further hearings and public debate.

WRIGHT PATMAN,
Chairman, Joint Economic Committee.

FEBRUARY 21, 1973.

Hon. WRIGHT PATMAN,
Chairman, Joint Economic Committee, Congress of the United States,
Washington, D.C.

DEAR MR. CHAIRMAN: Transmitted herewith is the sixth part of a compendium of papers entitled "The Economics of Federal Subsidy Programs."

The Joint Economic Committee published a staff study in January 1972, entitled "The Economics of Federal Subsidy Programs," which identified the overall size and cost of Federal subsidies for fiscal 1970. The committee also invited some 40 experts to contribute papers to a compendium that would compliment the staff study by evaluating particular aspects of the subsidy system. The papers in this sixth part discuss subsidies to different modes of transportation.

The papers contained herein should be interpreted as representing only the opinions of their authors, and not necessarily reflective of the views of committee members or staff.

Sincerely yours,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Priorities and Economy in Government.

FEBRUARY 16, 1973.

Hon. WILLIAM PROXMIRE,
Chairman, Subcommittee on Priorities and Economy in Government,
Congress of the United States, Washington, D.C.

DEAR SENATOR PROXMIRE: Transmitted herewith is the sixth part of a compendium of papers entitled "The Economics of Federal Subsidy Programs."

The Joint Economic Committee has invited some 40 experts to contribute papers to this compendium which will be published in several parts. The papers in this sixth part discuss subsidies to different modes of transportation. The first paper considers the cost to the economy of various Interstate Commerce Commission regulations. Other papers examine subsidies to feeder airlines and to general aviation, and subsidies to the maritime industry. Another paper discusses the use of capital grant subsidies in the development of mass transportation systems.

The committee is indebted to these authors for their excellent contributions which, in conjunction with the study prepared by the staff, should stimulate widespread discussion among economists, policymakers, and the general public on the Federal subsidy system. It is hoped that, by focusing attention on the subsidy system, this study will contribute substantially to improvements in public policy and the efficient management of public funds.

Mr. Jerry J. Jasinowski of the committee staff is responsible for planning and compiling this compendium with suggestions of other members of the staff. He was assisted in research and editorial work by Lucy Falcone and in administrative and secretarial work by Beverly Park.

The papers contained herein should be interpreted as representing only the opinions of their authors, and not necessarily reflective of the views of committee members or staff.

Sincerely yours,

JOHN R. STARK,
Executive Director, Joint Economic Committee.

CONTENTS

	Page
Letters of Transmittal	III

COMPENDIUM ARTICLES

The Costs to the Economy of the Interstate Commerce Commission *By* George W. Hilton	707
The Impact of Regulation on the Local Service Airline Subsidy *By* George Eads	734
Federal Aids to the Maritime Industries *By* Gerald R. Jantscher	763
The Capital Grant as a Subsidy Device: The Case Study of Urban Mass Transportation *By* William B. Tye	796
Subsidies to General Aviation *By* Jeremy J. Warford	827

COMPENDIUM AUTHORS

[Alphabetical listing]

Eads, George	734
Hilton, George W	707
Jantscher, Gerald R	763
Tye, William B	796
Warford, Jeremy J	827

THE COSTS TO THE ECONOMY OF THE INTERSTATE COMMERCE COMMISSION

By George W. Hilton*

Summary

The Interstate Commerce Commission administers an incomplete cartel of common carriers, which, like non-competitive situations more generally, entails costs to the economy. As in most cartels, the worst of these are idleness of resources in the industry. Both trucking and railroading have been characterized as industries operating at what industrial firms would consider about 50 percent of capacity.

In trucking, idleness of resources follows from the nature of operating rights and from the ICC's efforts to maintain the rate structures which the industry adopted upon regulation. Operating rights were issued on the basis of habitual operation before 1935. This reduced what had been a competitive industry into a series of limited monopolies on individual routes, in which the majority of carriers were restricted to specified commodities, or enumerated geographical points. More important, the ICC early enunciated a doctrine that it would prohibit rates which merely covered the incremental cost of filling an otherwise empty backhaul. Private carriers, who were exempt from regulation, were mainly engaged in one-way operation.

Idleness of capital in railroading stems from impediments to abandonment of lines, obligations to provide uneconomic service, and restriction on diversification. In barge operation, underutilization of capital stems mainly from rules on the handling of exempt versus non-exempt commodities which prevent the full utilization of towboats.

The survival of discriminatory tariffs (i.e., rates based on the value-of-service) prevents the market determination of prices from allocating traffic among carriers in accordance with their comparative advantages. The ICC, when confronted by rates in conflict between carriers of the three major classes, barge, truck, and rail, customarily splits differences, setting rates at levels which approximately compensate for the dfferences in the quality of the service, thereby assuring that each class will secure some of the traffic. Inevitably, much traffic moves in inappropriate modes. Academic writers have recently argued that discrimination in tariffs results in freight moving too long distances in trucks relative to railroads, but the railroads' own behavior indicates that they view their possible expansion area, with present technology, as being in barge-competitive bulk traffic. This is consistent with the adverse damage experience of the railroads, owing to the survival of a technology of separate cars brought together with couplers containing longitudinal travel called "slack." Coupling impact, and to a lesser extent the taking in and letting out of slack while moving cause

*Professor of Economics, University of California, Los Angeles.

extensive damage to cargo. This technology is also the source of the low rate of utilization of railroad cars and the low speed of railroading, relative to trucking. Regulation is highly biased to present rail technology, both in carload rates and in use of the individual car in safety and car-service requirements. An alternative is available in slack-free integral trains, carrying general cargo in containers and bulk cargo in hoppers. Under competitive organization, railroads would probably move to this technology.

The disadvantages of the present economic organization of common-carrier transportation are a direct consequence of the statutory authority of the ICC. The Commission was established to stabilize the railroad cartels of the late nineteenth century, which were proving themselves intolerably unstable under a framework of common law hostile to cartelization. The Transportation Act of 1920 converted the ICC into an outright cartelizing body, vested with the right of minimum rate regulation, control of entry and exit, supervision of capital formation, and other typical powers of the supervising agency of a cartel. The ICC's powers were extended to about a third of trucking and less than 10 percent of barge transportation in 1935 and 1940. The partial character of the cartel, combined with the nebulous character of the ICC's directives, produced the present situation.

Several economists have recently estimated the costs to the economy of the cartelization. The cost of misallocation between truck and rail has been variously estimated between $300 million and $2 billion per year. Idleness in the railroad plant has been estimated at $2.4 to $3.8 billion per year. Professor Thomas G. Moore has recently estimated an annual over-all cost between $3.6 billion and $6.9 billion, with a best estimate of $4.8 billion. If this errs, it errs on the side of conservatism, for it neglects misallocation between rail and barge, and other costs which Moore considered unquantifiable.

A cartel as costly as this to society might reasonably be expected to result in enrichment of important numbers of people, but this does not appear to be true. Large trucking firms with general operating rights apparently to receive some monopoly gain in what would otherwise be a competitive industry. Similarly, the Brotherhood of Teamsters is more successful than it could be in a competitive trucking industry. Otherwise, the cartelization mainly attracts unspecialized resources and wastes them in underutilization. Decartelization would annihilate some monopoly rights in trucking, but otherwise would simply end waste of resources.

The cartelization of common carriers administered by the ICC is in the nature of a tax on the economy and owing to the large size of the transportation industry and the extreme imperfection of the cartel, the tax is of very large magnitude. In this paper I shall, first, describe the characteristics of the cartel which entail costs to the economy; second, endeavor to demonstrate that these costs follow directly from the organization of the cartel set out in the ICC's statutory body of authority; third, summarize the recent efforts of several economists at quantification of the cost to the economy of the cartel; and finally, discuss the nature of the subsidy implicit in the arrangement and the uses to which it is put.

I. Characteristics of the Cartel

A. Idleness of Resources

The principal objection to cartels generally, and to this one in particular, is that they generate idleness of resources. Underutilization of resources in common-carrier transportation is pervasive. Motor carriage was regulated in 1935 by issuance of "grandfather rights" to existing carriers on the basis of their ability to demonstrate habitual or customary service between points. Since the industry had been generally competitive, there had been a large number of small carriers who could document operation only to a limited number of points. The Commission also limited certificates by commodities and by direction. Subsequent certification was of the same character. The usual extreme example is the carrier which received authority to carry frozen hush puppies in one direction only from High Point, N.C., to various destinations.[1]

The net effect of this method of regulating trucking was to carve up what had been, and could have continued to be, a competitive industry into a series of small monopolies. Trucklines generally grouped themselves into rate bureaus and began issuing tariffs based on the value of service as the railroads had been doing since the 19th century. At the outset, the truckers customarily issued tariffs at the same rates as the railroads and trusted their superior speed and damage experience to attract the traffic. The railroads' use of discriminatory tariffs had stemmed from what were thought to be inherently monopolistic characteristics of railroad technology. For the trucklines to use such pricing, however, required some severe restraints on a technology equally inherently competitive. Notably, it was necessary for the Commission to prevent the use of trucks for carrying freight at rates which merely cover the incremental expense of filling an otherwise empty backhaul.

If the common carrier trucking industry were free to fill empty backhauls at incremental rates, the structure of value-of-service rates which the industry had adopted following regulation would collapse. Backhauls would be in the nature of a nationwide motor carrier charging rates approximately equal to marginal cost. Thus, even though the Commission never had a specific statutory authority for a policy of prohibiting rates which merely covered the incremental cost of filling an otherwise empty backhaul, it was necessarily driven to such a policy by the logic of its position. The Commission customarily justified the policy under the general prohibition of "unfair or destructive competitive practices" in the national transportation policy, the preamble to the Interstate Commerce Act added in 1940.

Since the incentive for truckers to fill up backhauls was considerable, and the Commission's refusal to allow rates for the purpose highly consistent, the policy created incentives for illegal carriage, avoidance of the common carrier classification, or activities on the borderline of legality generically known as the "grey area." These incentives were generally resisted by the larger carriers, but had to be policed extensively for the smaller carriers. Further, the policy created similar incentives

---

[1] Alterman Transport Lines, Inc., Extension, High Point, N.C., MC-107107 (1960). The authority was subsequently broadened to frozen foods more generally.

for private carriers. Joseph B. Eastman, who, as Coordinator of Transportation under the Emergency Transportation Act of 1933, was immediately responsible for the Motor Carrier Act of 1935, argued that private carriage would be an inadequate rival to common carriage because of the extensive empty backhauls of private trucks.[2] This was an extremely poor prediction, because the nature of the regulation after 1935 was to generate such extensive empty backhauls of common carriers as to give them some of the same handicaps as private carriers.

Private carriers were so numerous, so small in size, and so ephemeral in operation that their opportunities for evasion of the regulation were abundant. Apart from outright illegal carriage, which has been characterized as probably the most common crime in the country, private carriers and those operating under the exemption of agricultural carriers under the act of 1935, practiced a variety of devices in the category of the "grey area." The most common of these practices was "buy and sell" operations, in which the trucker nominally took title to the cargo from the consignor and delivered it to the consignee, who paid him a price equal to the price the trucker had paid, plus an additional compensation for transportation. The Commission successfully applied to such operations the "primary business test," in which the nature of the operator's primary business was taken as the indicator of the validity of the carriage.[3] This test was used mainly to put down operators who established sidelines, usually in sugar, salt, or other widely traded commodities, to fill their backhauls.

Other efforts of the Commission to put down illicit private carriage were prohibitions on "trip leasing" of trucks for single trips, leasing of vehicles with drivers, and operations of bogus cooperatives. The last of these is notable, since recent legal history in the area is a particularly clear indication of the central role of preventing cheap filling of empty backhauls in the regulatory process. Several firms may legally band together to operate private or agriculturally exempt carriage. Such an arrangement, however, presents the opportunity for illicit common carriage on backhauls, so that the Commission had to police such cooperatives closely. In general, the Commission requires that a cooperative must be controlled by its members through duly elected officers and directors; that it must own its own vehicles or operate them under long-term lease; that members be limited to those who produce the commodity carried; and that it provide only services directly related to the owner's primary business. A long legal battle concerning the enforceability of these criteria resulted in a serious defeat for the Commission in the Federal courts in 1965. A bona fide cooperative of dairy farmers regularly filled its backhauls with general commodities in precisely the fashion which the Commission most opposed. The Circuit Court of Appeals for the Ninth District denied the Commission's efforts to put down the backhauls, and instead held, that the cooperative might legally handle any commodity on backhaul, even for nonmembers, if the movement was "incidental and necessary" to the continued operation of the cooperative.[4] The decision apparently authorized agricultural cooperatives to haul anything for anybody,

---

[2] "Regulation of Transportation Agencies," U.S. Senate Doc. No. 152, 73d Cong., first sess., 1934, p. 33.
[3] Lenior Chair Co. Contract Carrier Application, 51 MCC 65 (1949). This test was upheld by the Supreme Court in *Brooks Transportation Co.* v. *U.S.*, 340 U.S. 925 (1951).
[4] *Northwest Agricultural Cooperative Association* v. *ICC*, 350 F. 2d 252 (1965).

provided only that more than 50 percent of its business was carried on for members. Thus, the courts created a limited class of carriers which might legally fill otherwise empty backhauls at rates approximating marginal cost. Proliferation of genuine and bogus cooperatives was inevitable. This situation was intolerable to the Commission, which quickly sought remedial legislation and obtained it in 1968 in the form of Public Law 90–433, which limited agricultural cooperatives to carriage incidental to the cooperatives' primary, and restricted carriage for nonmembers who were neither farmers nor farm cooperatives to 15 percent of the cooperative's interstate transportation services for the year.

The urgency of dealing with this rather limited loophole in the prohibition of filling empty backhauls cheaply is a demonstration of how basic is this policy to motor carrier regulation. The undesirable consequences of the policy are obvious. The policy clutters the roads with movements of empty trucks, which are both a waste of transportation facilities and a source of unnecessary traffic congestion. The policy is a denial of economists' most basic welfare criterion, that people who are willing to pay the marginal cost of providing a service ought to receive it. The policy amounts to an explicit denial of marginal cost pricing. In fact, the policy more directly than anything else in the regulatory framework produces the undesirable consequences of cartelization: discrepancy between price and marginal cost, and idleness of resources.

Policy toward empty backhauls is not alone in generating idleness of resources and wasteful use of resources in trucking. It should be obvious that a carrier of frozen hush puppies in one direction only is likely to move partly empty even in the one specified direction. Prohibitions on mixing regulated and exempt commodities in the same truck are inducements to partly empty movements. Similarly, many truckers have certificates for limited numbers of towns or cities, with prohibitions on serving intermediate points; this, again, is a restriction on filling trucks. Many truckers have certificates for roundabout routes, the traversing of which is a wasteful operation.

James C. Nelson found that in 1942, when the initial regulation on the basis of "grandfather rights" was nearing completion, 40 percent of motor carriers were limited to one commodity, and 88 percent to six commodities or less. Approximately 70 percent had less than full authority to serve intermediate points and over 10 percent had no intermediate authority at all.[5] This pattern of partial coverage had the incidental disattraction of being a powerful incentive to merger, simply to secure more complete and consistent route patterns, in spite of the apparent absence of economies of scale in the industry.[6]

The idleness of resources engendered by these policies is very great, indeed. John Meyer and his associates estimated that only about 50 percent of the physical capacity of the trucking industry is utilized.[7] The Highway Research Board, in 1961, on the basis of a sample of 23,610 loadings, found that 52.4 percent of common carriers had full

---

[5] James C. Nelson, "The Effects of Entry Control in Surface Transport," Transportation Economics, National Bureau of Economic Research, Special Conference 17 (1965), p. 390.

[6] On the lack of economies of scale in motor transport, see Merrill J. Roberts, "Some Aspects of Motor Costs: Firm Size, Efficiency and Financial Health," Land Economics, XXXII (1956), pp. 228–238.

[7] John R. Meyer, Merton J. Peck, John Stenason, and Charles Zwick, "The Economics of Competition in the Transportation Industries" (Cambridge: Harvard University Press, 1960), p. 409.

loads in both directions, but that the comparable figure for contract carriers was 7.9 percent, for private carriers 7.3 percent, and for agriculturally exempt carriers, 5.2 percent. Exempt carriers had the highest rate of utilization of their trucks, however.[8]

The ability of intercity trucking to expand in the face of such an impediment, and also under the handicap of a pricing system grossly inappropriate to its technology, is an impressive testimony to the inherent advantages of this form of transport.[9]

Idleness of resources also afflicts rail transport, but it is of different origin. The railroads are also prevented from making rates which merely cover the marginal cost of filling an otherwise empty backhaul, but the institutions of the industry are such that the occasion does not frequently arise. The railroads are multiproduct firms in which cars are normally used for a variety of cargoes to a variety of destinations. In general, a backhaul simply hasn't the unambiguous definition that it does in trucking.

Rather, the idleness in railroading stems from a mixture of the direct consequences of the cartelization, the survival of the industry's traditional technology of separate cars, and restrictions on disinvesting in redundant facilities. As Ernest W. Williams has pointed out, the ICC's customary response in cases in which railroads and motor carriers are rivals for traffic is to set rates at levels which approximately compensate for the difference in quality of the service, so that some shippers will prefer the higher quality of service and others the lower rate.[10] This practice, though it serves the Commission's political purposes in minimizing acrimony among the parties, has thoroughly undesirable consequences, not only in misdirecting traffic between modes, but in maintaining rail facilities for some commodities carriage of which should be phased out. Similarly, the common carrier obligations of railroads require them to provide transportation on reasonable demand, which in turn requires maintenance of facilities of the character of LCL houses and cattle-loading pens which have long since ceased to be economic. Practically all urban yard facilities ought to be done away with or relocated in peripheral areas. Coach yards, LCL facilities and transit sheds on the south side of Chicago occupy as much space as the central business district; the municipal government is acutely aware of the impediment to the city's development of this misallocated land.

Virtually all rail branch-line operations, with the exception of those serving major sources of mineral traffic, have become uneconomic following the rise of highway transport, and ought to be replaced with truck operations. The impediments to abandonment of branch lines and entry into motor transport have perpetuated most of the branch-line mileage. In the 55 years in which the industry has been declining, mileage has shrunk only about 20 percent. It is usually thought that at least 35 percent of remaining mileage has so little justification that it should be abandoned forthwith, and that half or more of mileage could be dispensed with in a better-ordered system. Similarly, the

---

[8] "Line-Haul Trucking Costs in Relation to Vehicle Gross Weights," Highway Research Board, Bulletin 301 (1961), p. 83.

[9] On the impediment to highway common carriers of the pricing system forced on the industry, see George W. Wilson, "Effects of Value of Service Pricing upon Motor-Carriers," Journal of Political Economy, LXII (1955), pp. 337–344.

[10] Ernest W. Williams, "The Regulation of Rail-Motor Rate Competition" (New York: Harper, 1958), pp. 213–214.

preservation of the passenger train in the Amtrak system requires retention of extensive terminal and maintenance facilities for a form of transportation that has long since failed a market test.

The separate-car technology to which, it will be argued below, regulation is biased, produces a major form of idleness. Boxcars average somewhat under 3 hours of movement per day; they stand in yards or sidings over 21 hours a day. A boxcar averages about one-and-a-half revenue round trips a month.

If only because "capacity" is a nebulous and imprecise term, it is impossible to state what percentage of railroad capacity is idle, but it appears unlikely that the physical plant is utilized any more than the trucking facilities previously stated to be about 50-percent utilized.

Idleness in barge operation stems mainly from the "rule of three" whereby tows of over three commodities lose their bulk exemption, and the "mixing rule" whereby commodities enjoying the bulk exemption lose their exemption when mixed with cargoes subject to regulation. Barge operators are forced to tow smaller tonnages than their towboats are able to handle in order to satisfy these two rules. Similarly the two rules require frequent empty movements of barges which, if filled on a backhaul, would involve violation of one or the other.

B. Misallocation of Traffic Among Modes

As was pointed out in the previous section, the Interstate Commerce Commission's basic practice in dealing with traffic in controversy between rival classes of carrier is to set the rates at levels such that the contending parties can compete for the traffic on the basis of the relative quality of service. Inevitably, some of the traffic moves by the mode less suitable to it. Similarly, the obligations of railroads as common carriers result in their continuing to handle shipments of commodities for which they are no longer well suited. It was estimated in the early 1960's that some 23 percent of railroad freight tonnage did not cover its variable costs.[11] Owing to the deterioration of the railroads' position subsequently, this figure has since risen, probably to more than 30 percent. There is a strong presumption that most of this freight should have been moving in other modes. On the other hand, the behavior of the railroads in the "umbrella ratemaking" cases indicates that the industry has the potential ability to reattract considerable absolute tonnage from barges. Owing to the railroads' high incidence of damage from switching impact and slack action in moving trains, their ability to reattract traffic from trucks is probably more limited. Merton J. Peck, however, has estimated that with full deregulation, the railroads could probably attract about 10 percent of truck and barge traffic in terms of revenue.[12] This is approximately equal to the secular growth of truck traffic in 3 years and barge traffic in 2 years.

An alternative estimate indicating that the misallocation between modes is much more severe has recently been produced by Prof. Ann F. Friedlaender. Basing her analysis on the data on relative costs in Meyer, Peck, Stenason, and Zwick's study, she concludes that the survival of discrimination in freight rate structures has systematically

---

[11] George W. Hilton, "The Transportation Act of 1958" (Bloomington : Indiana University Press, 1969), p. 26.

[12] Merton J. Peck, "Competitive Policy for Transportation?" Almarin Phillips, ed., "Perspectives on Antitrust Policy" (Princeton: Princeton University Press, 1965), pp. 244–272.

diverted traffic from railroads to trucks for distances of more than 200 miles.[13] Her analysis indicates that the railroads could recapture most such freight. If she is correct, the railroads could recapture some 65 percent of highway freight with free pricing under present technology. This estimate appears to be based on an underestimate of the effect of the adverse damage experience of the railroads on the demand for their services. It is difficult to conceive of any economic policy producing a distortion of this magnitude. With such limited additional freedom in ratemaking as the railroads achieved in 1958, they reattracted traffic mainly from barges, rather than trucks. The diversion was a fraction of 1 percent of national tonnage, a figure more consistent with Professor Peck's estimates than with Professor Friedlaender's. Professor Friedlaender suggests that there may be a further misallocation of traffic from barges to railroads by the survival of discrimination—a suggestion which seems even more inconsistent with observed experience under the revised rule of ratemaking under the Transportation Act of 1958.

Short of experience under deregulation, there is no way to know the precise degree of misallocation of freight between carriers. The welfare loss is undoubtedly minor relative to the idleness of resources which the present organization of the industry generates, or relative to the direct enhancement of the common carrier freight bill.

C. Incentives To Avoid Common Carriage

Related to the foregoing is the problem that the present organization of the industry is a comprehensive incentive to relative decline of common carriers. Interest in this problem was concentrated in the early 1960's, when extrapolations of the trend of the relative share of common carriers appeared to portend disaster for common carriage as a whole by 1975 or thereabouts. Retrospectively, it is clear that most of the decline of common carriage being observed was the continuing decline of the railroads. Somewhat surprisingly, since the evidence that common carrier truck rates are above marginal cost is probably the most unambiguous of any in this area, the relative share of ton-miles of common carrier versus unregulated trucks has moved only slightly adversely to regulated trucking. Walter Oi and Arthur P. Hurter, Jr., found that private and other nonregulated trucking produced a relatively constant 62 to 67 percent of intercity highway ton-miles from the outset of regulation to 1959, excepting the war years. Regulated trucking produced the remaining 33 to 38 percent, with no trend apparent.[14]

Other observers found a mild tendency to relative decline of common carrier trucking, though both regulated and unregulated trucking were expanding rapidly. George P. Baker, presenting data of the Transportation Association of America in 1962 demonstrated a mildly greater growth of unregulated trucking. On a base of 1946 as 100, the index of ton-miles by regulated trucking was 313 and of unregulated 383.[15] The Doyle Report of 1961 showed the regulated share of trucking, in relative ton-miles, shrinking from 37 to 32 percent from 1946 to 1958.[16]

---

[13] Ann F. Friedlaender, "The Dilemma of Freight Transport Regulation" (Washington: Brookings Institution, 1969).

[14] Walter Oi and Arthur P. Hurter, Jr., "Economics of Private Truck Transportation" (Dubuque: William C. Brown C., 1965), p. 14.

[15] Decline of Regulated Common Carriage, hearings before the Surface Transportation Subcommittee of the Committee on Commerce, U.S. Senate, 87th Cong., first sess. (1969), p. 31.

[16] "National Transportation Policy" (Washington: GPO, 1961), p. 50.

The reregulation of frozen food movements and extension of regulation to foreign produced agricultural products, wool, and certain other items in 1958 thereafter raised the regulated sector slightly.

It appears that the incentives to use private carriage are relatively constant over time. The fact remains that there are disadvantages in a system which gives such heavy incentive to use private carriage. As was shown earlier, private trucks have an extremely low rate of utilization on return trips. Firms which engage in private carriage devote managerial effort to the activity which could otherwise be devoted to the firms' primary business. There is a welfare loss in firms being less than optimally specialized.

The South African economist, W. H. Hutt, writing in reference to his own country, stated: "If privately owned freight vehicles are found profitable, it is the clearest proof of exploitative charging on the part of the established transport companies." [17] This is consistent with a presumption that in a cartelized system (or in Hutt's context, as an exemption from the comprehensive protection of a state railway), the existence of relatively free private trucking yields welfare gains. This is the explicit conclusion of Oi and Hurter's study. They conclude that the existence of exempt private trucking probably results in a system closer to Pareto optimality than a cartelized system in which no exemption existed.[18]

D. Bias of Regulation to Separate-Car Technology

Central to the current railroad problem is the survival of a technology based on separate cars. As noted previously, boxcars move less than 3 hours a day, and have approximately one and one-half revenue trips per month. There is virtually no secular improvement in this figure; there was a gain in time in movement of only 17 minutes between 1960 and 1970. Under the circumstances, especially at current interest rates, it is not economic for the railroads widely to invest in new boxcars. The number of standard boxcars in service fell from 685,000 in 1958 to 402,000 in 1969, and cars in good order showed an even more drastic decline. This situation, combined with the way in which the services of cars are priced, produces an annual boxcar shortage. As is well known, the railroads pay one another for the use of cars with a flat fee, per diem, charged to the railroad on whose tracks the car stands at midnight. This rate is set jointly in what is known as the per diem agreement. Formerly, all cars, however equipped, were priced at the same daily rate. Currently, the per diem rate varies by the type of car. It does not, however, vary by season. The per diem fee is not a market determined price, free to fluctuate. Accordingly, it does not serve the function of a freely moving price to ration existing supply in the short run. Consequently, each fall, when the agricultural harvest occurs, there is a shortage of boxcars. The railroads, predictably, engage in nonprice rationing, mainly for the benefit of regular shippers, causing the shortage to be felt mainly by farmers, elevator operators, and other occasional shippers. This, naturally, maximizes the political unpopularity of the shortage.[19]

---

[17] W. H. Hutt, "The Principles of Railway Rate fixing With Special Reference to the South African Railway" (Capetown, n.d., mimeographed), p. 212.

[18] Op. cit., p. 357.

[19] Ralph Nader, et al., *The Interstate Commerce Commission*, Institute for Responsive Law, 1970.

Further, as argued previously, the slack action in couplers is the source of the adverse damage experience which is, with the possible exception of the survival of discriminatory pricing structures, the railroad industry's worst handicap. There is a lesser problem that present technology requires that any given car be built strongly enough to operate at the head end of a train, even though where it operates in a train is random. The current per diem arrangement results in the railroads' having an incentive to make the minimal investment in any car of a given type to qualify it for the target per diem rate. The consequences of this unfortunate combination is to give the railroads an incentive to buy unsubstantial cars, but to put an excessive amount of the investment into underframes, end sills and draft gear.

Essentially, this technology will survive only if the Government begins investing in it, either through investing in cars, or subsidizing private investment in cars, or in nationalization of the railroads. The private sector of the economy will continue to provide the rapid net disinvestment in railroad cars it has done in recent years.

The railroads have an alternative, reportedly to be introduced by the Santa Fe, of integral trains with slack-free couplings between units, arranged with the power under the cargo. Such trains would carry general cargo in containers; there would presumably also be configurations for bulk commodities, such as movements of coal to generating stations. A complete conversion to such technology would allow the industry massive disinvestment in yards, sidings, switch engines, and terminal facilities. Even a partial conversion will allow considerable disinvestment. Trucks, under such a technology, provide the classification and delivery function.

Apart from technological considerations, this means of reorganizing the railroads is most consistent with an economic organization of them as integrated transportation companies. That is, integrated transportation companies would probably move most freight in containers using whatever mode is most economical. This would presumably be truck for short movements, rail for longer movements, and water for movements of low-value commodities. Integrated transportation companies would presumably maintain a basic network of main-line railroad, but would disinvest in the majority of the present railroad plant. Since the conversion would entail such massive disinvestment, it could be carried on entirely in the private sector without Federal financing.

The current framework of policy is biased toward the present technology of the railroads in several major ways. First, the railroads have extensive car-service requirements based on the provision of individual cars. Interchange requirements and safety standards, such as brake specifications, are based on a presumption of present technology. The same must be said for most tariffs on carload lots.

Second, the ICC has a long-standing hostility to multicarload rates. At the outset, the ICC resisted even carload rates as possible discriminations against small shippers, and did not allow them until 1910. Thereafter it resisted multicarload rates until 1939, when it accepted reduced rates for minima of about 38½ carloads on molasses from New Orleans to the Peoria area from railroads which were seeking to regain traffic from barge lines.[20] Given the Commission's

[20] *Molasses from New Orleans to Peoria and Pekin*, 235 ICC 485 (1939).

willingness to protect barge traffic—for which it has statutory authority under section 305(c) of 1940—it has approached multitrainload rates with circumspection, if not suspicion. Recent writers who have treated the subject have uniformly concluded that the Commission's behavior has inhibited the development of multicar technology. This inhibition has been against unit trains, which do not represent a major technological change; unit trains are merely sets of conventional equipment, coupled together for long periods for bulk movements on specified routes. Obviously, it would apply also to integral trains.[21]

Third, the survival of discrimination in railroad tariffs is an inhibition to attracting container traffic from firms which currently engage in private carriage. That is, private carriage is cost-based, whereas value-of-service elements survive in railroad pricing. This objection has somewhat lost force in recent years, since plan III piggybacking entails many rates for vehicles, regardless of content.

Fourth, the restrictions on entry of railroads into trucking and barge transportation are a comprehensive inhibition to adopting intermodal technology.

The bias of regulation to present railroad technology is a serious problem. The largest firm in the industry is already bankrupt; its ability to continue operations without continuing Federal assistance is currently in doubt. The ability of the Chicago & North Western to continue as an operating entity is extremely doubtful. Especially if present interest rates persist, the weak railroads will find it chronically difficult to raise working capital or to engage in enough investment in cars and facilities to continue in operation. By 1980 a large part of the railroad system should be inoperable, if present technology persists.

E. Inhibition of Phasing Out of Obsolete Services

One of the attractions of allocation of resources through the private sector, as distinct from the public sector, is that the market processes provide a systematic method of phasing out of services which society no longer wants. The public sector, unfortunately, has no systematic method for this function. Public bodies such as the Tariff Commission and the Subversive Activities Control Board, which are widely thought to be obsolete or nonfunctional, are perpetuated out of political pressure for continuance.

A mixture of public and private decisionmaking in a declining economic activity results in a thoroughly unsatisfactory combination of economic forces for annihilation of the activity and political efforts for its perpetuation. In particular, in the demise of any major economic activity, the absolute level of demand at the end is likely to be considerable, and thus the source of political pressure for perpetuation large.

The principal example of this situation was the passenger train, powers over the discontinuance of which were vested in the ICC in 1958. The service was considered by most intercity travelers intermediate in quality between plane and bus, but its costs were more than double those of either. The service had a strongly negative income

---

[21] Paul W. MacAvoy and James M. Sloss, *Regulation of Transport Innovation*: The ICC and Unit Coal Trains to the East Coast (New York: Ramdom House (1967); George E. McCallum, *New Techniques in Railroad Ratemaking*, study No. 44, College of Economics and Business; Bureau of Economic and Business Research, Washington State University (Pullman, 1968).

elasticity, estimated at —0.6 in the mid-1950's, owing to the high implicit cost in time of using it relative to planes. Patronage had been declining relatively since the mid-1890's and absolutely since the early 1920's. The ICC was entrusted with control over the service essentially at its end. The Commission was confronted by conflicting pressures of the industry to accelerate the decline and from representatives of remaining passengers or people who received an external benefit from the trains for halting of the decline. The Commission characteristically responded with the antithetical doctrines that it would not indefinitely require the perpetuation of a demonstrably unprofitable passenger train, but that the passenger train as a national institution was viable and vital. Since the eventual unprofitability of any individual passenger train could be predicted with perfect confidence, efforts to implement the doctrines necessarily involved the Commission in highly inconsistent behavior, and drove it to be a principal advocate of the Amtrak system of Federal operation of passenger trains. The misallocation of resources to this purpose is now being carried on out of general tax revenues instead of what was an implicit tax on the railroad industry.[22]

Similar situations remain, however. Bus operators have an analogous problem on lightly-traveled routes, though the impediments to discontinuance are in State statutes. Inhibitions to railroads' dropping LCL service and branch-line service of all sorts have previously been noted.

II. Extent to Which the Disadvantages Are Inherent in the Policy

Objections to the behavior of the Interstate Commerce Commission along the general lines of the foregoing section are widespread, although individual critics divide on several specific issues. A particularly common opinion among writers hostile to the current behavior of the ICC—possibly the most common, in fact—is that the Commission was originally established in a populist effort to restrain the trade practices of an inherently monopolistic railroad industry, and perverted to its present behavior by a mixture or the political pressures of the railroads, notably as manifested in the Transportation Act of 1920, the inevitable conservatizing influence of long association with the regulated industries, and the self-seeking of current or recent political appointees.[23]

Recent historical scholarship has shown this view to be in error, and has demonstrated that the ICC was a cartelizing body from the outset. This distinction may appear trivial, especially to people who have no taste for antiquarian inquiries, but it is actually of extreme importance, since the origin, early behavior, and evolution of the statutory authority of the Commission demonstrate that the body's present behavior is inevitable. That is to say, staffing the Commission with different people, or making minor changes in the statutory delegation of authority cannot result in significantly different behavior. The disadvantages of the present system are intrinsic to the Commission's existence, and can be rectified only by its abolition.

---

[22] The foregoing is the argument of ch. IV of George W. Hilton, The Transportation Act of 1958, op. cit.
[23] Gilbert Burck, "The Great U.S. Freight Cartel," Fortune, January 1957, p. 102; Samuel P. Huntington, "The Marasmus of the ICC," Yale Law Journal, LX (1952), pp. 467–509.

The Interstate Commerce Commission was established to stabilize railroad cartels which had proved themselves impossibly unstable with the private measures open to railroad managements within the framework of a common law hostile to cartelization. The railroads had begun pricing collusively in the 1850's, but on a systematic basis the practice dates from the immediate post-Civil War period. In particular, in 1869 the three railroads which connected Chicago with the Union Pacific's railhead at Omaha-Council Bluffs began to pool traffic. Collusion allowed them to engage in the discriminatory pricing for Chicago-Omaha traffic that their monopoly positions is intermediate towns permitted themselves. By the mid-1880's, pooling either of traffic or revenue had become the normal organization of the industry, but as usual in industries in a mature state of cartelization, the pools were proving themselves chronically unstable. The cartelization had caused the usual proliferation of investment, in this instance parallel main lines between major points, and branch lines into lightly populated agricultural lands. Both of these problems became principally characteristic of the railroads between Chicago and Omaha, the so-called Grangers. Eventually (though not by 1887), seven railroads came to parallel one another between these cities. Since pooling did not apply to traffic the railroads originated, but only to what they received from connections, the same railroads became particularly characterized by light-density branch lines in an effort to originate as much as possible, relative to what they received in interchange. The excessive investment in duplicating main lines and minor branch lines of the Granger railroads, it should be noted, is still one of the major problems of the industry.

As railroads entered the Chicago-Omaha market, they typically precipitated rate wars in an effort to secure as large quotas as possible from the pool. Quotas sank as low as 13 percent, however. Rates were considerably in excess of marginal cost, and as usual, the incentive to increase output by cutting prices was considerable. The elimination of most gage differences in the 1870's had caused an infinity of possible routings. Rivalries of Atlantic ports were responsible for some ratecutting, and bankrupt railroads were a chronic source of instability as they strove to strengthen their positions for reorganization. The courts as of 1887 had never decided whether the usual common-law prohibition of collusive pricing was applicable to railroads, but it was at least clear that collusive agreements among railroads were non-enforceable. All of this produced an industry that lapsed continually into rate wars.

The instability of the railroad cartels was intolerable alike to railroad managements, shippers, and to governmental shippers. A particularly unpopular manifestation was the practice of cutting rates between points served jointly, such as Chicago-Omaha, but leaving them unchanged to intermediate points which the railroads served individually, such as Des Moines, Cedar Rapids, and Ottumwa. This resulted in the railroads during the rate wars charging more for a short haul than for a longer haul. The railroads, however, also engaged chronically and systematically in charging more for shorter hauls than for longer hauls to discriminate against areas with inadequate water transport; this was a part of a general pattern of value-of-service pricing. Albert Fink,

the leading figure in railroad pooling in the 1880's, considered the latter bad practice, and stated that the spasmodic type of long-haul short-haul ratemaking as a symptom of rate wars was the more common.

Dissatisfaction with the instability of the railroad cartels was so widespread that various solutions were presented. The Cullom bill in the U.S. Senate, which mainly embodied the ideas of Charles Francis Adams, Jr., president of the Union Pacific Railroad, entailed establishment of a regulatory body, the Interstate Commerce Commission, to stabilize the industry. Adams felt that a commission was necessary to distinguish between the chronic or discriminatory form of long- and short-haul ratemaking and the spasmodic form which was symptomatic of rate wars. Naturally, he wanted the former preserved and the latter eliminated. The Reagan bill in the House of Representatives embodied mainly the ideas and interests of Pennsylvania oil shippers and western farmers. This bill did not entail establishment of a commission, which Congressman Reagan expected to be railroad dominated, and had an absolute prohibition on charging more for a short haul than for a longer haul, and included a prohibition on pooling. Both required that rates be just and reasonable, and that they be adhered to. Neither contained any provision for rate setting by a public body. The Reagan bill was to be enforced by court actions. Adams was so thoroughly in favor of a highly discretionary commission that he expressed a preference for a commission without a law to a law without a commission.

The reconciliation of the two bills before final passage produced an inconsistent and unsatisfactory statute. With one major exception, the content of the Cullom bill was enacted. The act established a highly discretionary commission, the ICC, as Adams had wanted, and also included as section 4 the elastic prohibition of long-haul short-haul ratemaking with the waiver at the Commission's discretion that had been crucial to Adams' formulation. The requirements that rates be just and reasonable, nondiscriminatory among persons, and nonpreferential between areas were enacted. The exception to the enactment of the Cullom bill was inclusion of the Reagan bill's prohibition on pooling at Reagan's insistence in the reconciliation. This produced an inconsistent statute which prohibited the principal private means of stabilizing the railroad cartels in an enactment otherwise entirely devoted to an effort at stabilization. The Interstate Commerce Act of 1887 was also inadequate in other respects. Probably out of fear of rendering the statute unconstitutional, the drafters nowhere stated the act's purpose. Worse, they neglected to declare legal the collusive pricing which they were endeavoring to facilitate; when 3 years later the Sherman Act was passed, declaring every restraint of trade to be illegal, the courts interpreted the prohibition to apply to collusive pricing among railroads for absence of a directive to the contrary in either statute. Section 4 was so ineptly drafted that the courts interpreted it in the fashion exactly opposite to what Adams had wanted: the Supreme Court held that where railroads were rivals, the "substantially similar circumstances" specified in section 4 did not apply, and the railroads might charge more for a shorter haul than for a longer haul. This decision and the court's recognition that the Act had granted the Commission no powers to set rates for the future reduced the Commission to impotence by the late 1890's.[24]

[24] The foregoing is the argument, updated, of George W. Hilton, "The Consistency of the Interstate Commerce Act," the Journal of Law and Economics, IX (1966), pp. 87–113.

Most of the subsequent development of the statutory authority of the ICC is best looked upon as an effort to rectify the shortcomings of the act of 1887 as a cartelizing statute. In the Elkins Act of 1903, the Hepburn Act of 1906 and the Mann-Elkins Act of 1910, Congress rectified most but not all of what had been inadequate in the Act of 1887. The Elkins Act of 1903, which was written in the legal department of the Pennsylvania Railroad, provided that recipients of discriminatory favors should be liable to penalties. Railroad companies, as distinct from their officers, were made liable to prosecution for favoritism among shippers. Departure from published rates was made a misdemeanor, and rendered enjoinable.

In 1906 the Hepburn Act granted the Commission its first specific authority to set rates. The authority was for maximum rates, but the fact that the rate was enforced by a public body and given the legal authority of a statute greatly facilitated collusive ratesetting. The act also required 30 day notice of a change in rates—a major inhibition to promiscuous rate-cutting. The ICC was given control of express companies, sleeping cars and pipelines. The Commission was vested with powers over "accessorial services," such as icing in transit, which might be used for shading rates clandestinely. In an effort to deal with the monopology of anthracite coal of the railroads in eastern Pennsylvania, the railroads were prohibited from carrying goods of their own production for sale, with the exception of lumber.

The Mann-Elkins Act of 1910 was mainly notable for revising the text of section 4 to restore the efficacy of the long- and short-haul provision. This statute also initiated the Commission's powers of investigation and suspension of rates, and also its powers to enforce divisions of rates. The bill had initially contained a legalization of collusive ratemaking, but this was not enacted; thus the statutory framework as of 1910 continued to have the major hiatus that the cartelization which the Commission was established to facilitate—and which it was continuing to facilitate—was still illegal. The enactments of 1903, 1906, and 1910 jointly accomplished their end; by the eve of World War I, the railroad industry was stable without pooling.[25]

About 1915–16, however, the railroads began to decline. The principal forces for the decline were the high incidence of damage claims inherent in the technology of separate cars with coupler slack, the inflexibility of rails in origins and destinations, the low speed of movements relative to motor transport, the value-of-service rate structures which the act of 1887 had perpetuated, and the proneness of the industry to the incursions of tax collectors and labor unions because of its large volume or irrecoverable investment in rights-of-way. By coincidence, the onslaught of the decline occurred simultaneously with World War I, during which the Federal Government assumed control of the railroads. In retrospect it is apparent that Congress should have recognized that the properties of the railroads which had appeared to require a permanent noncompetitive organization of the industry were proving transitory; rival forms of transportation were arising, and the heavy debts incurred in building railroad rights-of-way in the 19th century had been reduced in part by the bankruptcies of the 1890's. It was not, however, apparent in

---

[25] This summarizes very briefly the account of the Commission's early history by Gabriel Kolko, "Railroads and Regulation 1877–1916" (Princeton: Princeton University Press, 1965).

1920 that the railroads had begun to decline. Accordingly, Congress moved not toward a more competitive framework, but in the opposite direction, converting the ICC in 1920 from a body which facilitated private collusion to the governing body of an outright compulsory cartel of railroads.

The Transportation Act of 1920 was as straightforward a cartelizing statute as any Congress has enacted. The act provided the ICC with minimum rate control powers over entry, exit, capital formation, and accounting procedures. The new enactment modified the anomalous prohibition of pooling by giving the ICC discretion to approve pooling agreements. Since the industry was already stable in absence of pooling, this change in policy was less important than might have been anticipated. Rather, administration of minimum rate control became the Commission's principal activity.

The act of 1920 provided several devices, all unsuccessful as they proved, in an effort to equalize earnings among railroads. First, the Commission was directed to prepare a set of plans for voluntary mergers of strong and weak railroads; it engaged Prof. William Z. Ripley to develop the plans but the unwillingness of strong railroads to dilute their strength through merger with weaker railroads caused the plans, without exception, never to be implemented. Second, in section 15A the act provided a rule of ratemaking whereby a fair rate of return on a fair value of property was stated to be the goal of public policy. The Commission was also directed to consider rates of return of carriers in divisions of rates. Third, the act established a recapture system, whereby half the earnings of railroads over 6 percent were put in a fund administered by the ICC for lending to weaker railroads. The other half of earnings in excess of 6 percent were retained by the railroads as a contingency reserve.

As is usually true, cartelization of a declining industry accelerated the decline. The ICC in an effort to generate a target rate of return of 5.75 percent raised railroad rates from 25 to 40 percent; railroad rates in the early 1920's were about 165 percent of the 1913 level, although prices were only 140 percent of the same base. Inevitably, trucks proliferated and after 1926 intercity trucking was a significant part of the national transportation pattern. In addition, the high level of railroad rates created dissatisfaction among farmers, whose political pressures resulted in the Hoch-Smith resolution of 1925, an unclear enactment whereby Congress directed the Commission to consider "the conditions which at any given time prevail in our several industries * * * to the end that commodities may freely move." The resolution may be interpreted as a directive to the ICC to set rates at levels such that producers of agricultural commodities in various areas of the country might compete with one another in major metropolitan markets.

The spread of intercity trucking after 1926 produced political pressure from the railroads, from some large truckers and to some extent from others for extension fo the cartelization to motor transport. A mixture of the low ebb of the railroads in the depths of the depression, the authority of Joseph B. Eastman, as Coordinator of Transportation under the Emergency Transportation Act of 1933, and the brief wave of revulsion to the market processes characteristic of the early and mid-1930's brought the extension of the cartel to trucks and buses in

the form of the Motor Carrier Act of 1935. This statute regulated common carriers by highway in a fashion similar to existing railroad regulation, but for contract carriers provided only minimum rate regulation—the trappings of public utility regulation were not even enacted for contract carriers. More important, motor carrier regulation, through its exemption of private and agricultural carriage, was limited to approximately a third of the industry.

Exemptions of bulk and agricultural commodities were also provided in water carrier regulation, which was inaugurated in the Transportation Act of 1940, but this statute also exempted liquid cargoes and any cargoes requiring special equipment. The exemptions were limited to tows of not more than three commodities, and to tows which were free of mixing of exempt and nonexempt commodities. The net effect to exempt some 93 percent of water traffic from regulation. More broadly, the exemptions from highway and water transportation were sufficient to create a thoroughly unworkable partial cartel, essentially without pooling or quotas, without marginal calculations, without the explicit recognition of the cartelizing authorities that they were running a cartel, and without adequate directives, which is to say with excessive discretion, in all major aspects of their activity.

The act of 1940 inaugurated a preamble to the Interstate Commerce Act, called the national transportation policy, which in one respect compensated for the inadequate character of the Commission's statutory delegation of authority, but which in another reinforced the highly discretionary character of that authority. This preamble, ostensibly a directive to Commission to regulate transportation equitably with regard to the several classes of carrier, and with due regard to the interests of the economy, defense, and the postal service, directed the Commission to "foster sound economic conditions in transportation and among the several carriers; to encourage the establishment and maintenance of reasonable charges for transportation services, without unjust discriminations, undue preferences or advantages, or unfair or destructive competitive practices. * * *"

The Commission's delegation of authority is so vague that it does not provide specific authorization to do what the Commission must do to carry out the general directives to run a cartel in transportation. The statutory delegation of authority tells the Commission that rates must be just and reasonable, whereas, as argued at the outset, the Commission must prohibit rates which merely cover the variable costs of an otherwise empty backhaul if it is to maintain the overall framework of discriminatory pricing which it was established to buttress. Rates to fill backhauls can be treated as "unfair or destructive competitive practices." Similarly, the Commission has no specific authority to prohibit rates less than cost. To compensate for its inability to issue quotas on the basis of marginal calculations, as a well-organized cartel would do, the Commission endeavors to allocate traffic among contending common carriers on the basis of their relative average total costs, or in the ICC's terminology, "fully distributed costs." When a regulated carrier is contending for traffic with an unregulated carrier, the Commission typically allows rates approximately equal to average variable costs, or "out-of-pocket costs." Rates which cover fully distributed cost are, in the ICC's lexicon, "fully compensatory" and rates which cover out-of-pocket costs are "reasonably compensatory."

The Commission in the recent *Ingot Molds* case was held to be in valid exercise of its discretion to engage in cost comparisons on the basis of fully distributed cost and also to engage in market sharing by setting rates at which the parties could contend for traffic on the basis of relative quality of service.[26] The principal authority for this behavior is the general power to prevent "unfair or destructive competitive practices."

Presumably the same general authority is the basis of the Commission's practice of prohibiting rates which are lower than necessary to meet competition, although this is less clear. One recent writer has argued that there appears to be no statutory authority for this characteristic behavior of the Commission.[27]

The national transportation policy is also the Commission's authority for its efforts to keep all carriers prosperous. The directive to "foster sound economic conditions in transportation and among the several carriers" the Commission has interpreted to mean that each existing class of carrier is to be kept prosperous. Since demand conditions and cost conditions are dynamic, it is manifestly impossible to achieve this end; some of the transportation industries must be declining at any given time. Further, the effort to achieve this end necessarily involves the Commission in what is popularly known as "unbrella ratemaking," the practice of holding up the rates of one class of carrier to protect the traffic of another. The Transportation Act of 1940 was characteristically unhelpful on this point, since in an amendment to section 15a(2) of 1933, the act apparently directed the Commission to refrain from this practice. The Commission responded, not surprisingly, by alternating between engaging in the practice and denying it ever engaged in the practice. The principal clause of the Transportation Act of 1958, to be discussed below, was intended to resolve this point.

In an inconspicuous provision, the act of 1940 placed the burden of proof in rate reductions on the carrier proposing the rate change. This was greatly to facilitate one class of carrier opposing the rate-reduction efforts of another. Finally, the act of 1940 repealed the provisions of the Transportation Act of 1920 for consolidation, which had proved themselves unworkable. Two years later, Congress extended regulation to freight forwarders in an enactment of 1942.

The extension of rate bureaus to motor and water carriers caused a renewal of interest in the private aspect of the cartelization of the industry. In the early 1940's the State of Georgia, motivated by what it considered systematic discrimination against its industrial development in railroad tariff structures, and the Antitrust Division brought separate actions against the rate bureau system. Georgia accused the ICC of being a party to an illegal collusion against its citizens. Georgia's receiving from the Supreme Court the right to proceed as parens patriae in the action was widely interpreted as indicting that collusive ratemaking remained illegal; nothing had occurred at law since the decisions of 1897–98 to indicate otherwise. Congress responded by passing the Reed-Bulwinkle Act over President Truman's veto in 1948, legalizing the collusive ratemaking which the ICC was established to facilitate 61 years earlier. This enactment granted

---

[26] *American Commercial Lines, Inc., et al.* v. *Louisville & Nashville RR. Co., et al.*, 392 U.S. 571 (1968).
[27] McCallum, op. cit., p. 43.

carriers antitrust exemption for collusive ratemaking provided that the bylaws of rate bureaus were made in conformity with the act, and approved by the Commission. Notably, rate bureaus were limited to carriers of a single class, and individual carriers were guaranteed the right of individual submission of rates.[28] It should be emphasized that this act was not the result of temporary political pressures of carriers, but rather the rectification of the last of the shortcomings, inconsistencies and hiatuses of the original Interstate Commerce Act of 1887.

The only major statute added to the ICC's body of authority since 1948, the Transportation Act of 1958, was an effort to relieve the distress of the railroads during the recession of 1957–58. In its principal provision, the act of 1958 endeavored to rectify the anomaly, mentioned earlier, that the act of 1940 had directed the Commission to maintain "sound economic conditions" among all classes of carrier, but also to refrain from holding up the rates of one class of carrier to protect the traffic of another. Maintenance of "sound economic conditions" among the one class frequently, in the Commission's view, required protection from rate cutting of other classes. The railroads in the 1950's had felt that this practice, which they called "umbrella ratemaking" was particularly directed at their efforts to reattract traffic from barge lines. The act of 1958, after long controversy concerning phraseology, endeavored to solve the problem with a new section 15a(3), which read, in part, "Rates of a carrier shall not be held up to a particular level to protect the traffic of any other mode of transportation, giving due consideration to the objectives of the national transportation policy." Since the National Transportation Policy was the source of the "umbrella ratemaking" which the Commission had engaged in, the new directive was guilty of perpetuating the ambiguity with which it was designed to deal. The Commission continued to engage in "umbrella ratemaking," intermittently with refraining from the practice and denying its existence. Partly owing to some early court reverses, the Commission showed generally greater willingness to allow competitive rate reductions in the early 1960's. The *Ingot Molds* case represented a massive reversion to the behavior of protecting barge traffic from railroad rate-reduction; the Supreme Court's decision in favor of the Commission in 1968 essentially gave the ICC carte blanche to use fully distributed costs as a means of cost-comparison between carriers, and to set rates to compensate for difference in quality of service, both of which had been intrinsic to the "umbrella ratemaking" behavior. By 1968 the railroads were sinking to such low ebb that their opportunities for attraction of traffic through rate reduction were relatively limited; accordingly, the importance of the decision should not be overstated.

In other major provisions, the act of 1958 initiated a program of guaranties of loans to railroads which was allowed to expire in 1963, gave the ICC control of discontinuance of passenger trains, and restored motor carriage of frozen foods to regulation. Previously, it was pointed out that in implementing its powers over discontinuance of passenger trains, the ICC endeavored to pursue the irreconcilable policies of not indefinitely perpetuating an individual unprofitable train on the ground that the railroad as a whole was profitable, and holding that the passenger train as a whole was a permanent and vital

---

[28] George W. Hilton, "Experience Under the Reed-Bulwinkle Act," ICC Practitioners' Journal, XXVIII (1961), pp. 1207–1219.

part of the national transportation system. Similarly, in issuance of loan guaranties, the Commission endeavored to implement Congress' directives that loans be guaranteed only if the loan could not be made in the absence of a Federal guaranty, and also that loans be guaranteed only if there were reasonable assurance of repayment. Obviously, if there were reasonable assurance of repayment, the loan could be made in absence of the guaranty. Here again, the Commission endeavored to pursue both policies simultaneously without acknowledging that it had two inconsistent doctrines.[29]

The Commission is not to be blamed entirely for this sort of behavior. Congress has provided it either with explicitly contradictory directives or, more frequently, with directives so nebulous as hardly to be directives at all. In addition, since the Commission is engaged in political resource allocation, it is politically convenient to have alternative policies to choose, depending on the political pressures in the case.

The other principal conclusion to be drawn from the Transportation Act of 1958 is that minor modifications of present policy are unlikely to be of much significance. The argument of this and the previous section has been that what is undesirable about the present organization of the transportation industry is the direct consequence of the policy which Congress has laid out since 1887. Telling the ICC to refrain from "umbrella ratemaking," even if this were done more forthrightly than in the act of 1958, would be ineffective because, given the imperfection of the cartel the Commission administers and the conflicting political pressures upon it, "umbrella ratemaking" suits the Commission's needs extremely well. As argued previously, the Commission has no alternative to prohibiting rates which simply cover the marginal cost of an otherwise empty backhaul if it is to preserve the discriminatory rate structures which it was established to protect.

Conversely, the present framework of policy could create only the present situation. It is frequently argued by critics of the ICC that different personnel could produce a different situation. The recent report by Ralph Nader's study group, for example, argues that the members of the Commission are political appointees of negligible professional competence in what they are doing. The authors demonstrate that the majority of members after leaving the Commission enter the industries which they formerly regulated. The authors, who define the public interest roughly as it is defined in an adversary proceeding before a regulatory commission, rather than by a market test, argue that the Commission is essentially a forum wherein transportation companies resolve disputes among themselves, rather than a body which imposes the public interest on an industry of certain inherently noncompetitive characteristics.[30]

Basically, the foregoing complaints are correct; the authors fail to recognize that the situation they describe with general accuracy stems from the historical development of the Commission, not from the composition of the membership. Typically, they treat rate bureaus as excrescences that are improperly tolerated in the system, rather than as the central elements the stabilization of which gave rise to the system.

---

[29] The Transportation Act of 1958, op. cit.
[30] Ralph Nader, et al., cp. cit.

It is the argument of the foregoing pages that the Commission is essentially correct that observation of the letter of the Interstate Commerce Act requires collusive ratemaking. As enthusiasts for collusive ratemaking have customarily argued, section 4 alone essentially demands collusive ratemaking, since any one carrier engaging in unilateral rate reduction will probably involve either itself or other carriers in charging more for a short haul than for a longer haul.

Further, it should be borne in mind that members of regulatory bodies respond to the political and economic incentives which they face in the same fashion as other men and women. Members of a regulatory commission are motivated by a desire for self-advancement, reappointment, pecuniary gain, professional respect and minimization of acrimony in the same fashion as anyone else. Pursuing two irreconcilable policies simultaneously, as argued previously, is useful to the Commission in adapting to the political pressures to which they are subjected. This course of action probably minimizes acrimony. It probably also minimizes hostility of the regulated industries. Commissioners sit for finite periods; they must be concerned with their careers after leaving the Commission. They cannot be expected to ignore the possibilities of employment in the industries with which they are becoming most familiar.

A corollary of this proposition is that the Commission cannot be an effective planning body. The Nader Report argues that the Commission ought to be a planning organization, mapping out raliroad mergers along the lines of the Ripley plans of the 1920's, rather than accepting voluntary mergers of the railroads themselves. Similarly, the report envisions the Commission planning for the revitalization of passenger service. Apart from the fact that the statutory body of authority is designed for nothing but cartelization, the term of the commissioners is too short for them to engage in planning activity, the results of which would come long after they have left office, and the fruits of which would do them no good professionally.

More basically, whatever the wording of a statute, or whatever the content of the common law, in *Smyth* v. *Ames* or otherwise, all that a regulatory commission vested with powers of rate regulation can do is generate monopoly gain in one activity and dissipate it in another. The municipal regulatory commission in Los Angeles grants Yellow Cab a monopoly, but requires it to dissipate part of the gain on responding to phone calls in lightly populated areas which generate small demand for taxi service. Phone companies are required to string long lines to isolated houses. The foregoing are examples of situations in which a single firm is given the monopoly right. In regulating an industry of a large number of firms, such as transportation, there is nothing to do but run a cartel. It might be a better cartel than this one, but it would still be a cartel. One of the reasons why the present arrangement is so unsatisfactory is that the monopoly gain is generated mainly for truckers, whereas the principal uneconomic service being operated until recently was railroad passenger service. Thus, the monopoly gain is being generated in one area and what is being dissipated is the rail passenger deficit out of the earnings of an industry far advanced in its secular decline, essentially without monopoly gain at all.

By way of summary, the argument of this section has been that the present undesirable situation in transportation is the direct and unavoidable consequence of the policy pursued since 1887. Public policy between 1887 and 1948 established a mixed system of private and public cartelization, under a highly discretionary cartelizing body with a grossly inadequate statutory body of authority and too large a volume of exemptions from its powers to be effective. Minor changes in public policy can effect only trivial improvements or worsenings of this situation. A better cartel or a worse cartel is still a cartel. A better cartel, with a cartelizing body engaging in marginal calculations in issuance of quotas would probably have a smaller welfare loss than this one, but society would still unnecessarily suffer from a cartel of one of the largest industries in the economy. Further, as an empirical matter, there appears to be no prospect of ending the exemption of private carriage from ICC regulation, and thus no real prospect of rendering this cartel ordinarily workable.

III. Cost to the Economy of the Cartel

Several economists in recent years have attempted estimates of the cost of various aspects of the cartelization, and more recently, Prof. Thomas G. Moore has attempted a synoptic estimate of the cost to the economy of the entire cartel on the basis of the several partial studies.

Most simply, an estimate of the enhancement of the national freight bill by the cartel is possible on the basis of the sample of commodities deregulated under the agricultural exemption by judicial action in the 1950's. By a decision of 1955, movements of chicken by truck were declared subject to the agricultural exemption. The Department of Agriculture found that by 1957 rates on fresh poultry had fallen from 12 to 53 percent, and that rates for frozen poultry had fallen by 16 to 59 percent in various areas. On the average, rates on fresh poultry had fallen 33 percent and frozen poultry 36 percent. When frozen foods generally were deregulated by a similar decision in the following year, rates fell by an average of 19 percent, while rail rates rose from 6 to 14 percent. In both cases, the fall in truck rates was associated with a greater willingness to provide multiple destinations for cargo.[31]

There is no reason to believe that these commodities were other than randomly chosen; that is, the deregulation occurred merely because of the phraseology of the statute, not because the rates of these commodities were exceptionally enhanced by the regulation.

If these commodities could be taken as a valid sample of common-carrier rates, we could conclude that rates are somewhat more than 20 percent above the rates which would prevail under competition. With a common-carrier freight bill in excess of $20 billion, this would imply an enhancement of costs by some $4 to $5 billion. For various reasons, such an estimate would overstate the enhancement. First, in a segment of a cartelized industry which is decartelized, resources will flow in from the rest of the industry, depressing the price below what would

[31] "Interstate Trucking of Fresh and Frozen Poultry under Agricultural Exemption," Marketing Research Report No. 224, U.S. Department of Agriculture, 1958; "Interstate Trucking of Frozen Fruits and Vegetables," Marketing Research Report No. 316, U.S. Department of Agriculture, 1959.

have prevailed in the absence of cartelization. Second, there is no presumption all rates are artifically enhanced. There is no reason to expect the railroad rates currently thought to be below average cost to fall. Some such rates might rise under deregulation. The biases in such considerations cannot be more than 50 percent; thus, this sample of deregulated commodities warrants a minimum estimate of $2 billion as an addition to the national freight bill.[32] An assumption that only motor freight rates are enhanced by 20 percent would justify an estimate of $2 billion.

Such an estimate, apart from its crudity, ignores several additional costs, notably the welfare loss to society from freight that does not move at all owing to the increase in freight rates consequent upon the cartelization.

Two economists have recently attempted to estimate the welfare loss from misallocation of freight among modes. Ann F. Friedlaender, as mentioned previously, estimated that the railroads under free pricing would be able to reattract most freight moving by truck for distances of over 200 miles. On the basis of this, she estimated a welfare loss of some $500 million per year from the misallocations.[33] As stated earlier, her estimate of the ability of the railroads to reattract freight may well be excessive, given the railroads' adverse damage experience relative to motor carriers.

Robert W. Harbeson, however, makes an even greater estimate of the welfare loss from misallocation. Professor Friedlaender's estimate was explicitly a casual one, an informed guess of the magnitude of the loss. Professor Harbeson, however, analyzed the relative costs of movement by road and rail on the basis of various ICC cost studies of the 1960's, plus data in the Bureau of the Census' study of 1963, commonly known as the Census of Transportation, published in 1966. Professor Harbeson estimated that the use of trucks instead of carload rail transportation as a consequence of regulation resulted in an economic loss from $1,128,623,300 to $2,921,001,800. Correcting his estimate for the inferiority of the quality of rail service, he posits a loss in the range of $1,041,490,710 to $2,833,869,234.[34]

Professor Friedlaender has recently made a second estimate of the costs to the economy of regulation, in this instance an attempt to quantify the cost of excess capacity in the railroad plant in 1969. In this paper, Mrs. Friedlaender estimated the cost of excess capacity in railroading in 1969 at $2.4 to $3.8 billion, as compared with a "deadweight" loss from the consequences of survival of value-of-service pricing of approximately $300 million.[35] This estimate with the usual presumption that the worst costs of the cartel are in idleness of facilities.

Other economists have attempted quantifications of the costs of individual aspects of the cartelization. Paul W. MacAvoy and James Sloss estimated that the economic loss from the ICC's refusal to allow

---

[32] George W. Hilton, "Competitive Transportation: The Law of the Jungle?", Business Horizons, XI, No. 2 (June 1968), pp. 69–77.

[33] Friedlaender, op. cit., p. 78.

[34] Robert W. Harbeson, "Toward Better Resource Allocation in Transport," the Journal of Law and Economics, XII (1969), 321–338 at 332.

[35] Ann F. Friedlaender, "The Social Cost of Regulating the Railroads," American Economic Review, LXI (1971), proceedings number, 226–234 at 234.

rates for unit trains of coal amounted to about $9 million per year.[36] This is a good indication how large can be the consequences of a fairly minor facet of the entire cartel. In this instance, the unit trains required no new technology; they were simply strings of existing cars permanently assigned to specific routes. The inhibitions on moving from present technology to some slack-free technology must be far greater.

Similarly, Karl Ruppenthal studied the consequences of another inconspicuous portion of the cartelization. In 1967 the Supreme Court upheld an ICC order banning the practice of regulated barge lines filling out tows with barges of bulk commodities carried at a special towing rate for unregulated carriers. Previously, unregulated carriers of bulk commodities had assembled barges at major junctions or terminals and turned them over to regulated common carrier barge lines for movement. The regulated carriers charged a special rate for towing only, without the usual common carrier obligations of bailment or delivery to the consignee. The unregulated carrier then reassumed control of the barges at a junction point near the consignee and delivered them to their destinations. The Commission prohibited the practice as a violation of its mixing rule.

An end of this practice necessarily reduced the loads of regulated towboats. Ruppenthal estimated that the new rule increased cost per ton-mile from 2.3 mills to something between 3.02 mills and 3.34 mills, depending on the size of the tow. The ruling, then, probably added from $207 to $287 million to the cost of moving freight.[37]

In a paper recently delivered at a meeting at the Brookings Institution, Prof. Thomas G. Moore has attempted an estimate of the economic loss from ICC regulations on the basis of the foregoing studies, with the exception of the Harbeson paper. In place of Harbeson's estimate, Moore made his own estimate of the cost of diversion of freight from rail to truck on the basis of Merton J. Peck's estimates of the railroads' ability to reattract traffic from trucks, and an estimate of Charles River Associates in a paper of 1969. Peck's estimates led Moore to calculate a saving from the shift in traffic of $450 to $900 million, and the Charles River Associates estimate led him to an upper bound of $2 billion. In his tabulation, Moore used only a range of only zero to $900 million. This is a considerably lower range than Harbeson's estimate.

Moore made no estimates of the cost of diversion of traffic from rail to water carrier and rail to pipeline. Virtually all the academic studies have been concerned with the supposed diversion of freight from rail to truck, whereas the railroads' own behavior, as stated earlier, indicates that with additional ratemaking freedom they attempt almost exclusively to reattract freight from water carriers. Thus, an estimate which does not include the cost of this diversion is necessarily understated. Moore also attempts an estimate of $175 to $400 million as the economic loss from commodities which do not move at all owing to the enhanced costs of movement consequent upon the cartel. Moore's net estimate is a range of $3.6 billion per year to $6.9 billion with an intermediate estimate of $4.8 billion. Recognizing that his estimate

---

[36] MacAvoy and Sloss, op. cit., p. 61.

[37] Karl Ruppenthal, "Some Economic Aspects of the Barge Line Mixing Rule," Transportation Journal, IX, No. 3 (spring 1970), 5–43. The estimate of total cost is from Moore, cited in footnote 38.

neglects important costs, he suggests an actual range of some $4 to $10 billion.[38]

Moore's estimate is the most careful and comprehensive attempted to date. Insofar as it errs, the error is unquestionably on the downward side. From his estimate, we can presume that the existence of the Interstate Commerce Commission entails an implicit tax on the economy probably on the order of $5 billion. We may then proceed to consider the uses to which this tax is put.

IV. The Subsidy Implicit in the ICC

The principal beneficiaries of the cartelization are the proprietors of the major intercity truck lines. In what would otherwise be an entirely competitive industry, they receive a monopoly gain from exclusive routes and from the ability to engage in discriminatory pricing. No one, to my knowledge, has attempted to quantify the monopoly gain of large truckers, but the prices at which major trucking companies sell are enough in excess of the value of the assets being transferred that monopoly gain has clearly been capitalized. Unsurprisingly, major trucking companies, especially through the American Trucking Association, are the principal spokesmen for the perpetuation of the cartel.

Similarly, the Brotherhood of Teamsters benefits from the cartel, since the monopoly gain generated among truckers is in the nature of an economic rent on which the union can prey as if the union were a tax collector. The industry, in absence of cartelization, would have negligible economic rents, so that a union would not be effective. That is to say, the industry would be highly competitive, with almost entirely unspecialized resources and freely fluctuating prices. Under the circumstances, a union's effort to raise the wage would affect any one employer like a tax with no possibility of shifting, and merely drive him out of business. Accordingly, this union is particularly characterized by cartelizing behavior; Prof. Milton Friedman has described it as essentially a firm that sells the service of cartelizing an industry.[39] The union's advocacy of the present organization of transportation is only one manifestation of this behavior.

In the same fashion, the railroad brotherhoods benefit from the noncompetitive organization of railroading. The locomotive engineers, who are in a crucial position to bring an industry of heavy fixed capital to a halt with a strike, were probably the most successful union in the economy in the early years of the century, with a monopoly gain thought to be of the order of 15 to 25 percent. The decline of the industry, plus the advent of the Diesel locomotive, which permits longer trains and demands a lower skill level, has reduced their strength; unsurprisingly, the airline pilots are now thought to outdistance them in monopoly gain by a wide margin. The remaining strength of the locomotive engineers probably stems more from the processes of the Railway Labor Act than from continued generation of monopoly gain for the railroads on which their union can draw.

---

[38] Thomas G. Moore, "The Feasibility of Deregulating Surface Freight Transportation," paper presented at a conference on antitrust in the regulated industries, the Brookings Institution, Washington, D.C., November 1971. The estimates are tentative, subject to change before publication.

[39] Milton Friedman, "Capitalism and Freedom" (Chicago: University of Chicago Press, 1962), p. 125.

Barge operators are beneficiaries of the present organization of the industry, not in receiving a monopoly gain directly, but rather in having their traffic protected from rate cutting by railroads and trucks. This industry receives a major direct subsidy from the toll-free character of the rivers on which they operate. There is little question that both the absence of tolls and the impediments to rate reduction by rival carriers cause barge traffic to be greater than it would be in a competitive organization of the industry with appropriate user charges. This, however, merely attracts generally unspecialized resources to the industry, rather than generating monopoly gain.

Formerly, it might have been said that railroad passengers received an important subsidy from the cartelization of the industry. The minority of travelers who preferred this to rival forms of intercity passenger transport were beneficiaries of the principal uneconomic service being provided in the cartelized industry. Since this service is now provided out of general tax revenues in the Amtrak system, the example is historical. Even while the example was current, it would be difficult to argue that the subsidy served any real purpose, since adequate alternatives existed for all such trips. It is more accurate to look on provision of rail passenger service simply as waste.

Similarly, shippers in small communities or on branch lines may be thought to be receiving a subsidy from the survival of rail freight operations to their sidings, since this service is typically produced at a loss. Again, however, the service could be provided in alternative fashions, and in a competitive framework would probably be provided by containers on trucks at considerably less cost.

The other group apparently benefiting from the present organization of the industry is the set of commissioners, employees of the ICC, lawyers who specialize in ICC practice, traffic men whose professional talent is mainly a thorough familiarity with ICC regulation, and miscellaneous practitioners of the law and institutions of the present system. These are men and women who have chosen to specialize in the present organization of transportation simply because that organization exists; in its absence they would have chosen some other specialization. Here again, their services are essentially a form a waste, rather than a source of enrichment.

One cannot avoid the conclusion that the present organization of the transportation industry is in the nature of a major tax on the economy which results mainly in waste, rather than in a subsidy which has major benefits for society or for many individuals. The present practice of giving away portions of the broadcast spectrum through the processes of the Federal Communications Commission results in enrichment of holders of franchises for major television and radio stations. The organization of transportation under the ICC produces similar results only to a very minor degree in generating monopoly gain for major truckers and for the Brotherhood of Teamsters and the railroad unions. Mainly, the cartelization attracts unspecialized resources from other activities and wastes them in idleness, underutilization and inappropriate use. Professor Moore estimates that about a fourth of the $27 billion income generated in transportation in 1968 may be simply waste.

The economic loss from the cartelization of the transportation industry is probably the largest from the inappropriate organization of any industry, with the probable exception of the agricultural price support program. Further, it is an organization of the industry which produces negligible benefits to anyone in return for its cost to the economy. As I have argued earlier in this paper, the costs follow directly from the nature of the statutory authority of the Interstate Commerce Commission, and cannot be greatly changed by minor modification in the Commission's authority. The industry can readily be reorganized competitively by abolition of the ICC, and subjection of common carriers to the Sherman Act's usual prohibition of collusive pricing, predatory practices and efforts to monopolize. The industry, as stated earlier, would presumably consist of a number of integrated transportation companies, based on a drastically atrophied network of rail lines, but providing service by any mode with a containerized technology, plus an infinite number of independent truck and barge operators, all with complete freedom of entry and exit. Any efforts of the integrated transportation companies to exert monopoly power would result in the expansion of the economic range of trucking. Freedom of entry into trucking would essentially provide complete protection against the possibility of monopoly problems in a competitively organized transportation industry. A movement to such an organization would inevitably entail the transitional adjustments involved in the decartelization of any industry, but the consequence would be saving the economy several billions per year, with sacrifice of little other than pure waste from the present system.

THE IMPACT OF REGULATION ON THE LOCAL SERVICE AIRLINE SUBSIDY

By GEORGE EADS*

SUMMARY AND CONCLUSIONS

Soon after the end of the Second World War, the Civil Aeronautics Board authorized a group of "feeder" or "local service" carriers to provide scheduled air service to the nation's smaller and more isolated communities. In the succeeding twenty-five years the federal government provided to these carriers $1 billion in direct cash payments and substantial amounts of indirect aid in order to accomplish this purpose. While the local service carriers have established themselves as an important part of the nation's air transport network, it is appropriate to ask whether the original goal of the program has been achieved. This question is particularly timely because subsidy payments, after moving downward throughout the mid- and late 1960s, have turned sharply upward again, reaching $65 million in fiscal 1972.

Performance of the feeder and local service carriers has fallen far short of the goal established by the Civil Aeronautics Board. Much of the blame for this failure lies in faulty government regulation with the primary result that twenty-five years of regulation and subsidization of these carriers has been to create a group of "junior trunklines" that supplement the service already being provided by the larger trunklines. The quality and quantity of airline service provided to the smaller communities that depend solely on the local service carriers has deteriorated over the last ten years, while the per passenger cost to the federal government of providing this service has not fallen concurrently—and indeed may have increased sharply.

The Government has four options in dealing with the problem: (1) end the local service subsidy altogether; (2) pay the local service carriers subsidy sufficient to compensate them for the service they provide to smaller communities using whatever aircraft they choose and accept the much higher subsidy bill that inevitably will result; (3) encourage local service carriers to subcontract certain of their routes to air taxis; or (4) permit the CAB to try a new scheme of subsidization involving competitive bidding for the right to provide stated quantities of service. The fourth option would be more likely to result in superior service at substantially lower cost to the Government, but there are several pitfalls that may prevent such a scheme from working in practice.

---

*This paper is drawn from the author's book *The Local Service Airline Experiment* published by the Brookings Institution. The paper itself appeared in a slightly different form in the winter 1972 issue of *The Journal of Air Law and Commerce* published by the Southern Methodist University School of Law. The author is an associate professor of economics at George Washington University.

Introduction

In a decision dated July 11, 1944, the Civil Aeronautics Board (CAB), the agency charged with the economic regulation of the U.S. air transport industry, announced that it was initiating an "experiment" to expand air service to the smaller and more isolated communities of the country in spite of the fact that "* * * the traffic potential at small cities is not encouraging."[1] It further stated that it proposed to accomplish this expansion not through the use of the 16 certificated air carriers then in existence but by creating a new group of "feeder" or "local service" carriers that would specialize in providing short-haul, low-density air service. The first of these carriers was Essair (later called Pioneer Air Lines), which began operations on August 1, 1945, flying a single round trip per day over a route linking Houston and Amarillo, Tex., with intermediate stops at Austin, San Angelo, Abilene, and Lubbock. Essair used the nine-passenger Lockheed L–10 Electra, an aircraft designed specifically for short-haul, low-density feeder-type operations. By the end of 1945 Essair had carried 4,452 revenue passengers over this route. Twenty-five years later, in 1970, the nine local service carriers as a group served 453 cities and carried 27 million passengers using aircraft having an average seating capacity of 70. The smallest aircraft in general use among them by the end of 1970 was the 40-passenger turboprop-powered Fairchild F–27. Concerning this quarter century of growth, *Flight* magazine, an industry trade publication, editorialized:

> Any way you cut the picture for analysis you come up with the final conclusion that the "experiment" to expand our scheduled air transport services into the smaller communities of the Nation 25 years ago has been a monumental success—a classic case of enlightened Federal policy in partnership with typical U.S. businessmen operating under the most productive free enterprise system in the world.[2]

It is the thesis of this paper that the primary "success" of the "local service experiment" has been not the provision of efficient short-haul, low-density air service but instead the creation of nine relatively weak trunkline carriers. This "success" has cost the U.S. taxpayer approximately $1 billion in direct cash subsidy payments, yet the creation of additional trunklines, if that is a worthwhile goal, could have been accomplished at little or no cost to the taxpayer merely by relaxation of the Civil Aeronautics Board's prohibition on direct entry into the trunkline ranks which has allowed no entry since the passage of the Civil Aeronautics Act in 1938. We will argue that the service provided to the smaller and more isolated communities of the Nation has been more costly and of even lower quality than was necessary and that this is in large measure the result of the regulatory policies of the Civil Aeronautics Board. This analysis leads to the proposal that subsidy to the local service carriers be phased out over a short period and that the local carriers be allowed to drop service to any points they desire. In the relatively few cases in which Federal subsidy for local air service could be justified because of the geographic isolation of some small communities, service could be provided either by air taxis under subcontract with local service carriers or by carriers that contract directly with the Federal Government to perform specified services in return for lump-sum subsidies.

---

[1] 6 CAB 1, p. 2.
[2] "Needed: Jet Age Decisions," editorial, Flight magazine, vol. 58, June 1969, p. 21.

Adoption of these proposals should substantially reduce the total amount of local service subsidy while improving the quality of air service to smaller communities. It would end the CAB's economically inefficient (and as yet unworkable) policy aimed at internalizing the local service subsidy by using profits generated on longer haul routes to cover losses incurred on shorter, lower density routes. This would eliminate one of the major reasons for continued control over entry into the airline industry and would remove some of the pressure that is building for regulation of the now unregulated scheduled air taxis.

The Beginnings of the "Local Service Experiment"

When the CAB decided in 1944 to undertake a significant expansion of the nation's air transport network it faced the choice of how this expansion was to be accomplished. At the time there were 16 air carriers that had been certified under the "grandfather" provisions of the Civil Aeronautics Act of 1938. There were also on file several hundred applications for certification of new "feeder" air carriers, carriers which would engage primarily in the provision of short-haul, low-density air service. The Board's examiners cited five factors that seemed to favor the use of existing rather than new carriers to provide the new services:

(*a*) The additional overhead expense involved in extending the routes of existing carriers would be less than the overhead expenses incurred by a separate enterprise;

(*b*) The existing carriers, at least in some instances, would be able to operate a local route which might be unprofitable in itself by absorbing such losses with profit from long-haul services. In this respect it was pointed out that the revenue from a passenger pickup at a "local" point and continuing beyond a terminal of a local route would be available for the entire journey to the existing carrier, whereas only that part for the local transportation would be available to a local operator;

(*c*) Greater utilization of equipment would be possible;

(*d*) The experience of existing carriers would be available for the air transportation needs of the small cities;

(*e*) The quality of service in general would be higher if exsiting air carriers provide it. In this connection specific reference was usually made to the larger and more comfortable equipment that would be used, and the fact that day and night, all-weather service would be provided, as contrasted with the proposals of some new carriers to use smaller equipment and, at least at the outset, to limit operations to a contact basis.[3]

In spite of these apparent advantages of using existing carriers, the examiners recommended (and the Board concurred in the recommendation) that a new class of specialist "feeder" carriers be created. In examining the potential for air service at smaller communities, they had investigated the extent of patronage at small cities already certified to receive air service. At the time of the September 1940 Air Traffic Survey, 88 cities of less than 50,000 population had been served. The 18 of these cities with less than 10,000 population averaged only 4.0 arriving and departing passengers per day; the 31 cities in the 10,000 to 20,000 population bracket averaged 5.7 such passengers per day, and the 39 cities with population between 20,000 and 50,000 averaged 13.4 "in and out" passengers per day.[4] It was obvious that if patronage was to be so low, an extremely high level of Government subsidy would be required to make service to such cities viable unless

[3] 6 CAB 1, pp. 29–30. Service on a "contact basis" was a mail pickup service using a hook attached to the aircraft so that an actual landing was not required.

[4] 6 CAB 1, pp. 13–14.

the carriers providing "feeder" services managed to achieve substantial operating cost savings. The Board believed that the best chance for obtaining such savings lay in the use of new, rather than existing carriers. It stated:

> Most of the presently operating air carriers also urge as a reason for putting small cities on existing routes the fact that the service will be provided with the type of equipment used on long-haul routes * * *. While some of the existing carriers indicated an intention to utilize different types of flying equipment, presumably smaller in size for some services, progress toward the fullest expansion (of air service) will be quicker if more emphasis is placed on adding a large number of small cities and developing equipment suitable for rendering service, rather than placing emphasis on the addition of points that can be given service with large equipment * * *. The various proposals described in that part of this report relating to the proposals of new carriers * * * have the common characteristic of emphasizing economy and less luxurious standards of service. This characteristic must be constantly emphasized, and the more progress that is made in this direction the more prospects for air service will be created. Any substantial economy of operation will have to result from departures from the existing type of service. It is reasonable to assume that necessarily different standards of operation can best be developed by new carriers, organized for such a purpose." [5]

In the cases in which feeder routes were established, the Board stuck closely to this policy in spite of claims by trunk carriers that they too could achieve cost savings in the operation of feeder-type services.[6]

Methods of Subsidy Payment and Their Effects

The Board created a separate group of feeder air carriers in the hope of minimizing the cost of feeder services. However, in its regulation and subsidization of the carriers it had created, it acted to insure that this would not be the case. When the time came to decide how subsidy should be paid to the feeder carriers, the Board was faced with a dilemma. The initial months of operation produced wildly fluctuating financial results which appeared to provide no basis for judging subsidy need. Yet the Board was also unwilling to measure the performance of the feeder carriers using trunkline experience as a yardstick, believing that this, too, would lead to misleading results. Therefore it adopted an "open" subsidy rate. Each carrier was allowed to draw only enough subsidy to cover its operating costs and to pay interest on its debt. When the carrier and the Board thought that enough experience had been accumulated to give an accurate picture of operations, the two were to negotiate a "final" rate that would apply until either the Board or the carrier decided to reopen the negotiations. At the time of settlement, the Board was to scrutinize the costs incurred by the carrier while operating under the "open" rate and disallow any not meeting the test of "honest, economic, and efficient management." At that time the Board would also pay the carrier a 7 percent rate of return on its investment for the time it had been operating under the "open" rate.

This method of subsidy payment led to several unfortunate results. First, the use of "open" subsidy rates resulted in a virtual "cost-plus" method of subsidy payment, which the Board itself admitted

---

[5] 6 CAB 1, pp. 52–53.

[6] For example, in the *Florida* case (6 CAB 765) National Airlines proposed to affect such reductions by eliminating all ground station personnel at certain points and having the copilot sell tickets and load luggage. The Board refused to be swayed by National's proposal and instead awarded the Florida feeder routes to Florida Airways, a new "feeder" carrier.

was unsatisfactory, stating "* * * a method of mail rate determination patterned upon a 'cost plus' system would tend to destroy a carrier's incentive to maintain costs at a reasonable level * * *."[7]

In theory, the knowledge that the Board would later have the opportunity to scrutinize a carrier's books and disallow costs that it felt were not consistent with standards of "honest, economic, and efficient management" should have tended to offset such adverse incentives. In practice, however, the Board's disallowal powers proved to be annoying to the carriers but nothing that they had to fear greatly. As Kimball has observed, once a carrier undertook to expand its schedules or acquire a new fleet or aircraft, it incurred the costs associated with that decision; if the Board several years later were to demand a refund of subsidy paid to cover such costs it would force the carrier into insolvency.[8] This the Board naturally was reluctant to do.[9]

Therefore, while ex post disallowals did affect the profits a carrier would earn and were of concern to the carriers, the Board was effectively powerless to enforce cost consciousness upon the local service carriers with any great degree of severity if it wished to keep them in business.

Another feature of the method of subsidy payment tended to distort further the economic incentives facing the local service carriers. A local service carrier on an "open" subsidy rate reported its net earnings and rate of return on investment on the basis of subsidy actually received from the Government. However, this amount did not include provision for a rate of return element. It was also subject to the ex post adjustment process previously described. A carrier could list subsidy it considered due to it (including that portion represented by the 7-percent rate of return on investment guaranteed by the Government) as an account receivable. At the same time, however, it had to inform stockholders and other potential investors of the fact that this figure was subject to substantial uncertainty pending the outcome of negotiations between the carrier and the CAB.

Vaughn has documented the difficulties that this method of subsidy payment created for one carrier—North Central Airlines.[10] Except for a period of a very few months during 1950, North Central operated under an "open" rate from the date of its founding in early 1948 until the end of 1954. In November of 1956 North Central went back onto an open rate and stayed there until the end of 1960.[11] Persons investigating North Central as a potential investment had little idea as to the level of

---

[7] 6 CAB 687, p. 690.

[8] Frederic P. Kimball, "For Locals, Inefficiency Can Pay Off," American Aviation, Aug. 11, 1958, pp. 54–58.

[9] The only case where the Board took and held a firm position against the acquisition of excessively large equipment occurred in the *Pioneer Air Lines Mail Rate* case (17 CAB 508, adopted Mar. 13, 1953). Pioneer had acquired a fleet of Martin 202's to replace its DC–3's, primarily to attain equipment parity with the trunklines with which it competed. It was acknowledged that the use of the aircraft would result in a substantial increase in Pioneer's subsidy need, at least in the short run. The Board refused to approve the necessary subsidy increase and Pioneer was forced to dispose of its Martin 202's and reacquire its DC–3's. Soon thereafter Pioneer merged with Continental, a trunkline and one ot its competitors.

The Board came under strong industry and congressional criticism for its actions in the *Pioneer* case and in following cases approved subsidy increases resulting from the acquisition of larger aircraft. See: William V. Henzey, "Locals to Get Aid in Buying New Fleets," American Aviation, Feb. 13, 1956, pp. 92–93.

[10] Richard H. Vaughn, "A Financial Assessment of the Class Mail Rate Subsidy Formula for the Local Service Airlines," unpublished thesis, Stonier Graduate School of Banking, Rutgers University, 1963, pp. 51–52.

[11] North Central spent a higher proportion of its corporate life on an open rate than did any other local service carrier.

return they could expect. The fact that North Central's return once settlement was made with the Government was substantially higher (though still low) and more stable than actual year to year figures revealed was of small comfort. Lending institutions in particular were worried by the large portion of North Central's assets composed of subsidy that the company felt was due it but which it could offer no assurance of collecting. Given this uncertainty, there is little wonder that North Central found it difficult to raise capital and had to ration its capital resources carefully. This was reflected in the carrier's choice of flight equipment.

Thus the method of subsidy payment tended both to lower the degree of cost consciousness of the local carriers and to make capital costs dear relative to operating costs. As would be expected, this induced carriers to undertake actions that raised operating costs but to refrain from actions which required major capital investment. The carriers' choice of aircraft during the period when this subsidy system was in effect serves to illustrate this point. The first feeder carrier, Essair, did begin its operations with an aircraft especially designed for short-haul, feeder-type operations. However, within one year it sold its Lockheed L–10 Electras and acquired 24-passenger DC–3's.

As table 1 shows, these aircraft were considerably more expensive to operate than the Electras, but they were acquired in part because Pioneer was having to deny service to some passengers at certain times of the day on certain routes [12] and in part because Pioneer's route structure allowed it to compete with trunk carriers which used DC–3's. Pioneer applied to the Board to increase its subsidy sufficiently to allow it to operate its DC–3's. The Board, while declaring that the DC–3 was "inherently uneconomical for local air service," nevertheless approved the increase, citing estimates provided by Pioneer of the cost savings it planned to achieve by the use of the aircraft. The Board chose not to look too closely at these proposed economies, stating "we believe that more can be accomplished by leaving the details [of economies to be affected] to the ingenuity of the operators" [13]

TABLE 1.—ESTIMATED DIRECT OPERATING COSTS, EXCLUDING AND INCLUDING DEPRECIATION, FOR DC–3 AND L–10B, BASED UPON 1936 TRUNKLINE EXPERIENCE

[In cents per aircraft-mile, 1954 dollars]

Aircraft	Seats	Cost per mile at stage lengths shown		
		100 miles	200 miles	300 mile
L–10B:				
Excluding depreciation	10	35.4	29.6	27.7
Including depreciation		47.0	41.2	39.3
DC–3:				
Excluding depreciation	21	63.8	53.1	50.0
Including depreciation		82.1	71.4	68.3

Source: Derived from table 6–2, p. 95, and table 6–6, p. 99 Almarin Phillips. Technology and Market Structure: A Study of the Aircraft Industry. (Heath-Lexington, 1971.)

[12] No rational transportation company seeks to have capacity sufficient to meet all peak levels of demand on all its routes, as this would require it to operate with considerable excess capacity at most times. What provision to make for peak demand depends upon a balancing of the revenue lost by failing to meet certain levels of the peak against the costs incurred from operating the capacity necessary to provide a given probability of being able to offer service to the peak customer. Government subsidy tended to distort this calculation.

[13] 8 CAB 175, p. 192.

The result of this decision to subsidize operating costs of excessively large equipment was that by 1949 the great majority of the local service fleet consisted of DC–3's.[14] With the DC–3's came the other amenities familiar to trunkline travelers. As one Board member wrote in a renewal case dissent in 1951, "As of today, the original experiment is unrecognizable. Most of the local carriers now in operation perform services identical to those of the trunklines. They operate DC–3 equipment, provide stewardess service and all of the 'trimmings.' The emphasis on economy in operations has been lost sight of * * *." [15]

In the years that followed, there was much talk among the local carriers and by the CAB of the need for a DC–3 replacement. Many designs were proposed by foreign and domestic manufacturers. Some were built and marketed. Yet it was not until 1965 that a true DC–3 replacement was placed in service by a local service carrier and then only in limited numbers.[16] The local service carrier managements blamed aircraft manufacturers for not being able to produce efficient short-haul aircraft, but the fact is that under the system of subsidization in effect during the 1940's and 1950's, there was virtually no incentive for a carrier to raise capital at a substantial cost merely to lower operating costs and, in turn, subsidy.[17]

There was an incentive, however, for the local carriers to equip themselves with aircraft that would be comparable in size, speed, and comfort with those of the trunklines. This enhanced their competitive position where competition was possible and provided a hedge against the possibility that the Government might end the local service subsidy. If the Government stood willing to subsidize this sort of equipment purchase through increased subsidy, so much the better.

The aircraft that were acquired to replace the DC–3 were, in most part, used piston engine aircraft of 36- to 50-seat capacity. Sobotka and Schnabel have shown that the price of a used commercial aircraft is approximately equal to the present value of its future stream of net earnings.[18] In other words, if two aircraft are of equal passenger capacity and have roughly equal passenger appeal, the one with the higher operating costs will sell for less on the used aircraft market. The local carriers, strapped for capital funds because of their low and unstable rate of return, and having no incentive to economize on operating costs, looked with favor upon the larger piston engine aircraft primarily because of their low initial price.[19] They had the option at the time of purchasing turboprop aircraft of approximately the same capacity as the larger piston aircraft or of converting the larger piston aircraft to turboprop power by retrofitting them with turboprop engines. This would have lowered operating costs substantially, but a turboprop aircraft either new or converted cost substantially more to purchase than a used piston aircraft of equivalent capacity. Since

---

[14] During 1949 the local service revenue load factor was 28.2 percent based upon an average seating capacity of 20 seats. That is, the average revenue passenger load was 5.64.

[15] 12 CAB 606, p. 627.

[16] The aircraft was the French-built Nord 262. Ten of them were purchased by Lake Central and used to replace its DC–3's. In 1968 Allegheny acquired Lake Central and in 1969 phased its Nords out of service.

[17] That the aircraft manufacturers were not to blame was proved by their response to the demand by the unsubsidized air taxi operators for efficient, short-haul equipment. Once there was an indication that orders would be forthcoming, many designs appeared within a very short time and without the Government aid the local carriers had claimed was needed to finance prototype development.

[18] Stephen P. Sobotka and Constance Schnabel, "Linear Programing as a Device for Predicting Market Value: The Prices of Used Commercial Aircraft," Journal of Business, January 1961, pp. 10–30.

[19] Robert E. Peach, president, Mohawk Airlines, "Convairs for Mohawk," Flight magazine, June 1955, p. 33, and "Transport Transition," Flight magazine, June 1952, pp. 23, 40.

operating cost savings had little utility to the carriers but capital cost savings were of great value, most carriers replaced their DC–3's with secondhand large piston aircraft.[20]

The Board itself realized that the method of subsidy compensation it established in 1946 was unsatisfactory and induced inferior performance on the part of the local carriers.[21] Yet it was not until March of 1961 that it established a new method of subsidization, the class rate. The class rate embodied the assumption that the local service carriers were essentially homogeneous and that a simple relationship could be found between subsidy need and a measure of carrier activity.[22] A set of subsidy rates based upon this measure of activity was established. If a carrier could lower its operating costs relative to the average, it could keep the additional profits that resulted within the limits established by the class rate's profit sharing provisions.[23] The authority of the Board to scrutinize and disallow costs was done away with. Thus, under the class rate a carrier could know in advance within rather narrow limits the amount of subsidy it would receive; there no longer was any need to wait for years before finding this out.

The class rate eliminated many of the distortions to incentives that had been embodied in the previous system of subsidy compensation. It provided for the first time a significant incentive to reduce operating costs. Of perhaps equal importance was the stability introduced into subsidy payments. This, together with the higher allowed rates of return established by the Board at about the same time,[24] substantially improved the financial position of the local service carriers and thereby lowered the cost of obtaining capital funds.[25]

The impact on aircraft selection was what one might hope. Now that they had a positive incentive to reduce operating costs and could raise funds more easily, the local carriers began to show a renewed interest in turboprop aircraft. As of the end of 1960 the local carriers operated only 35 turboprop aircraft compared with 59 large piston aircraft.[26] In November of 1963 Frontier placed the first firm order for

---

[20] Those few carriers that did buy turboprops used them on their longer routes where their higher speed provided enhanced passenger attracting ability. Most of these turboprop aircraft were financed by Government guaranteed loans, since the carriers were unable to raise the funds to purchase them at free market rates lying within their ability to pay.

[21] 34 CAB 416, pp. 432, 433.

[22] Originally revenue plane miles per station per day was the measure employed. This was later changed to weighted departures per station per day.

[23] If the rate of return on investment actually earned was greater than the "fair and reasonable differentiated rate of return" (see footnote 24) but less than 15 percent, the carrier was to refund 50 percent of the excess. If it was greater than 15 percent, 75 percent of the excess was to be refunded.

[24] In 1960 the Board decided that the "fair and reasonable" rate of return for the local carriers was to be 5.5 percent on debt and 21.35 percent on equity applied to the carriers' actual capital structure. This rate was not to fall below 9 percent on total investment nor to exceed 12.75 percent on total investment. Previously the rate of return allowed had been 7 percent while on an "open rate" and an individually negotiated rate, usually around 8 percent, while on a "final" or "closed" rate. In later years the particular rates of return allowed on the various elements of a carrier's capital structure were altered to reflect what were perceived as changes in the carriers' cost of capital.

[25] See Richard H. Vaughn, "A Financial Assessment of the Class Mail Rate Subsidy Formula for the Local Service Airlines," unpublished thesis, Stonier Graduate School of Banking, Rutgers University, 1963.

Between 1961 and 1966 the local service carriers averaged a 16.97 after tax rate of return on stockholder equity and a 9.94 percent rate of return on total investment (after tax but before interest payments). (Note: Both figures reflect adjustments to include the effect of income tax credits.) In addition both of these rates were much more stable during this period than they had been in previous periods.

[26] We have estimated that the increased operating costs of a conventional Convair over a Convair with Allison turboprop engines amounted to approximately $188,000 per year. The cost of conversion was approximately $500,000 per aircraft. At one point the local carriers were operating 200 large piston aircraft.

Convair 580 turboprop conversions.[27] By the end of 1968 all Convairs had been converted to turboprop power and the locals were operating 244 turboprop aircraft.[28]

If the adoption of the class rate method of subsidy payment combined with a higher allowable rate of return tended to correct the distortion in the value placed by the local carriers on operating costs relative to capital costs,[29] it failed to provide any significant incentive to acquire smaller rather than larger aircraft. In fact, as noted above, class rate I, in effect from 1961 to 1963, actually contained a provision that rewarded the operator of excessively large aircraft with higher subsidy.[30] In 1963 subsidy rates were adjusted so as to make them essentially "neutral" between the DC–3 and larger aircraft.[31] But in establishing class rate III in late 1964 the Board refused to accept Lake Central's request to establish a subsidy rate that would have made Nord 262 operations more attractive.[32] Only in class rate IV adopted in 1967 did the Board begin to attempt to provide any financial incentive for the local service carriers to use smaller aircraft.[33] Even this was offset to a degree by the provision that where aircraft of different capacities were used to serve a subsidy-eligible route, subsidy payments were to be computed on the basis of the capacity of the largest aircraft employed.

The continuing need of the local carriers for a true DC–3 replacement was highlighted by a study performed in 1964 for the FAA by the Systems Analysis and Research Corp.[34] SARC projected local service traffic growth through 1975 and simulated operations at these traffic levels in order to determine the size of aircraft which maximized profits or minimized losses on the low-density routes. The report concluded that even in 1975 more use should be made of smaller—less than 40-seat—aircraft than was then (1963) being made of the DC–3. It concluded that there would be a need for between 300 and 500 20-seat aircraft depending upon airline speed, utilization, and load factor targets.[35]

In spite of the findings contained in the SARC report, the phaseout of the DC–3 continued. In 1960, DC–3's flew two-thirds of all local

---

[27] Four of the 35 turboprops in the local service fleet in 1960 were Napier Eland Convair conversions owned by Allegheny. This conversion proved unsuccessful when problems with the engine prevented time between overhaul from exceeding 600 hours. "Allison Turboprops To Be Installed on Four Frontier Airlines Convairs," Aviation Week, Nov. 25, 1963, p. 39.

[28] The 2-year delay between the establishment of the class rate and the first orders for conversion can be explained by three factors. First, it took some time before the investment community realized the impact of the class rate upon the local service rate of return. Second, during the 1961–63 period a quirk in class rate I made it profitable for carriers to acquire large aircraft. For a given amount of money a carrier could acquire more large piston aircraft than turboprops. This quirk was removed when class rate II was established in 1963. Between 1960 and the end of 1963 more than 120 large piston aircraft were acquired. Finally during the late 1950's and early 1960's the Board was very busy handing out new routes to local carriers. To acquire the aircraft required to operate these routes put a severe strain on the financial resources of the local carriers. It was estimated in connection with one case that the equipment required to operate the routes Central Airlines was applying for would cost $5.1 million if DC–3's and piston-powered Convairs were acquired and $9.3 million if DC–3's and F–27's were acquired. At the time Central's total assets were $2.4 million, of which $850,000 represented accounts receivable—primarily subsidy due but not yet collected. ("Central Loses Bid for Recess in Southwestern Case," Aviation Daily, Nov. 4, 1960, p. 26.) Once the improved financial condition of the locals became apparent, the distortion in class rate I was removed, and the routes awarded by the CAB digested, turboprop acquisition and conversion proceeded at a rapid pace.

[29] It might be argued that the correction tended to be too great and that a bias of the opposite sort was introduced. See, Harvey Averch and Leland Johnson, "Behavior of the Firm under Regulatory Constraint," American Economic Review, December 1962, pp. 1052–1069.

[30] 39 CAB 65, p. 72.

[31] 39 CAB 54, p. 77.

[32] 41 CAB 138, p. 145.

[33] "Board Shifts Policy on Subsidies." Aviation Week, Apr. 10, 1967, pp. 36–37.

[34] Systems Analysis and Research Corp., "Economic Analysis of the Short Haul Transport," Cambridge, Mar. 15, 1964.

[35] The Beech 99, a 15-seat aircraft purchased in large numbers by the air taxis, is said to have been designed according to the specifications developed by the FAA on the basis of the SARC study.

service revenue miles. By 1963, DC–3 miles had fallen to 36 percent of the total. And in 1969 the aircraft was eliminated from the local service fleets. Retired also in 1969 was the only DC–3 replacement ever purchased by the local service carriers, the Nord 262. During 1969, 61 percent of the local service seat-miles were flown by jets. Remarking on the growth of local service carrier jet operations, Flight magazine commented:

> For years the [local service] industry sought a DC–3 replacement. All sorts of proposals were made and analyzed. Arguments flew hot and heavy as to the proper specifications for the airplane to fit the peculiar short-haul routes of the locals: but no universal replacement airplane was ever developed. That is, until the DC–9 series came along.[36]

The smallest DC–9 seats 69 passengers, while the DC–9–30, the jet aircraft in largest use by the local carriers, seats 100 passengers.

In 1954 when the local service fleet consisted almost entirely of DC–3's and averaged 22.4 seats per aircraft, there were 197 points served that generated fewer than 7,300 passengers per year (20 per day). In 1969, with 45 percent of the local service aircraft miles being flown by jets and the average number of seats per aircraft at 64.9, almost three times the 1954 level, there were still 165 points served by the local carriers that generated fewer than 7,300 passengers per year. In the light of these facts, the consistent failure of Board subsidy policy to create economically meaningful incentives for local carriers to use smaller aircraft and the Board's continued support, after little more than verbal protests, of the use of larger aircraft constitute perhaps the most important reason for the failure of the "local service experiment."

Route Policies and Their Effects

Another factor explaining the pattern of growth of the local carriers has been the evolution of the Board's route policy. When the local carriers were established, it was recognized that in many cases their routes would originate and/or terminate at points already served by trunk lines, though the locals would also be serving intermediate points. For example, in the West Coast case, feeder service was established between Los Angeles and San Francisco. Trunkline service already existed between these two terminals and at two intermediate points—Monterey and Santa Barbara. The Board authorized Southwest Airways to serve these cities and six other intermediate stops—Oxnard/Ventura, Santa Maria, San Luis Obispo, Coalinga, Santa Cruz, and San Jose.

The Board recognized that the feeder carriers would have an incentive to neglect the new stations, which were expected to be poor traffic generators, and concentrate on winning a share of the trunkline traffic between the larger cities.[37] To prevent this and to insure that the new carriers concentrated upon serving the markets they had been created to serve, it required that feeder carriers stop at all intermediate points on their routes on every flight regardless of the traffic generated by the intermediate points. The examiners, although recognizing some need to restrict feeder operations if the smaller communities indeed

---

[36] Flight magazine, June 1969, p. 21.

[37] The Los Angeles-San Francisco market, for example, was the Nation's second largest in terms of passengers and sixth largest in terms of passenger miles as of September 1947. Frederic W. Gill and Gilbert L. Bates Airline Competition, Division of Research, Graduate School of Business Administration, Harvard University, Boston, 1949, p. 349.

were to be served, nevertheless argued against the sort of restriction established by the Board on the grounds that it "would place a serious handicap on the operator in cultivating the business of the traveler who wants to get from a small town to a large town with a minimum of delay." [38] The examiners had proposed a number of alternative types of restrictions that would have preserved feeder flexibility yet prevented the feeders from competing with the trunks and abandoning their smaller stations, but the Board ignored their recommendations.

It was not long before the Board itself recognized that its "every stop-every flight" restriction prevented the feeder carriers from achieving their full traffic potential, but when it chose to make modifications, it acted in a way to encourage direct trunk-feeder competition rather than to encourage the feeder carriers to provide adequate service to small towns. In late 1946 the Board granted Pioneer the right to offer unrestricted shuttle service between any two points named consecutively in its certificate. At that time, the route Pioneer served included several segments where it could operate in direct competition with trunklines. These points, however, were listed as intermediate and not terminal points in Pioneer's certificate. This had meant that any flight Pioneer might operate between such competitive points had to originate at a designated terminal point and continue to another such point. The effect of the Board's action was to free Pioneer to offer as many flights as it wanted to on the competitive segments.

The schizophrenic attitude of the Board toward direct trunkline-local carrier competition emerged perhaps most clearly in the series of cases in which the local carriers initial 3-year operating certificates came up for renewal. The first case to be settled was that of Florida Airways. This carrier flew eight-passenger Beech-18 aircraft and offered two round trips per day to nine cities in Florida. Six of these cities relied upon Florida for their only service and in March of 1948, approximately 1 year after Florida began operations, generated 577 arriving or departing passengers, 63 percent of Florida's traffic for the month.[39] During this month Florida received $28,871 in mail pay or $50.05 for every passenger traveling either to or from an exclusively served city. During the full year of 1948 Florida received $6.33 in mail pay for every dollar collected from a passenger or shipper of air freight.[40]

The Board decided on March 9, 1949, not to renew Florida's certificate, citing this high ratio of mail pay to commercial revenues and stating "The conclusion is inescapable that route No. 75 [Florida's route] is an uneconomical route, that no substantial increase in nonmail revenues can be expected in the reasonably foreseeable future and that further expenditure of public funds will not avail to develop it into a route that can be operated at a reasonable cost to the Government commensurate with the service rendered." [41]

The polar recertification case involved Pioneer. In 1948 mail pay had constituted more than 85 percent of Florida's total revenues. During 1949, the year prior to the Pioneer recertification decision,

---

[38] 6 CAB 1, p. 55.
[39] Civil Aeronautics Board, "March 1948 Airline Traffic Survey," vol. 1.
[40] Subsidy was not reported separately from mail pay on carriers' accounts until 1954. Most revenue reported as "mail pay" during the pre-1954 period was subsidy.
[41] 10 CAB 93, p. 97.

almost half of Pioneer's revenue came from nonmail sources. The Board renewed Pioneer's certificate for 4 additional years stating:

> In this particular proceeding the record indicates a substantial and increasing acceptance of Pioneer's service. Moreover Pioneer's ratio of mail pay to commercial revenues is the most favorable of any existing local carrier. While the total cost to the Government for Pioneer's service remains considerable, the record conclusively shows that this carrier is making encouraging progress toward commercial self-sufficiency.[42]

Thus the Board clearly established in these two cases that a carriers' ratio of mail pay to commercial revenues would form the primary basis of the decision for recertification. This criterion continued to be applied in subsequent renewal proceedings.

A further examination of Pioneer's operating results demonstrates that such a standard was a completely inappropriate one against which to judge the worth of continuing the "local service experiment." We have already noted that in spite of the Board restrictions limiting local service—trunkline competition, Pioneer was able to compete with the trunklines. In the Pioneer renewal case the Board took note of this fact. The March 1948 air traffic survey revealed that Pioneer carried 6,251 passengers during the month, almost seven times as many as Florida. Yet only 1012 of these passengers, 16 percent, traveled either to or from a city receiving its only air service from Pioneer. And during March 1948, Pioneer received $100,255 in mail pay, or $99.07 for every passenger generated by a point served exclusively by Pioneer, twice the level required by Florida during the same month.[43] As Board Member Jones argued in his dissent in the Trans Texas renewal case,[44] it was this criterion—the cost to the Government of providing service to persons who otherwise would be denied air service—rather than the ratio of mail pay to nonmail pay that should have been looked at in deciding whether or not recertification was in the public interest. Judged on such grounds, Pioneer, which was basically a trunkline carrier serving a few small cities, less deserved recertification than did Florida, a carrier attempting within the severe restrictions laid down by the Board to offer the type of service that the Board had envisioned when it decided to initiate the "local service experiment" in 1944. Perhaps neither carrier deserved recertification and the proper course for the Board was to have terminated the "local service experiment." This course was not taken, and it is a fact that no feeder carrier that operated DC–3's and offered service comparable to that offered by the trunklines was denied recertification. No carrier that did not operate DC–3's was recertified.

The Board had begun to loosen its restrictions on direct local service-trunkline competition as early as 1946. It continued loosening them throughout the decade of the 1950's and into the 1960's. But until 1966, except in rare cases, it prohibited a local carrier from offering nonstop service over a segment also served by a trunk carrier. In that year, however, this last restriction was abandoned.

---

[42] 12 CAB 1, p. 5 (decided Sept. 1, 1950). In the same case the Board suspended the authority of two trunklines at two points where Pioneer also offered service in order to "strengthen" Pioneer's routes.

[43] In March 1949 Pioneer's mail pay per passenger traveling to or from an exclusively served city was $113.61.

[44] 12 CAB 606, p. 637.

A second form of "route strengthening" the Board undertook was the transfer of points from trunklines to local carriers and the suspension of trunks where joint service was offered. At first the trunks fought such suspensions, chiefly in the courts, challenging the Board's legal right to make them.[45] As time passed, however, the advantages of abandoning smaller cities appeared more and more attractive to the trunks. At one time it even was alleged that the Board had solicited a list from the trunks of points they would like to drop.[46] Between 1949 and 1964, 78 points were transformed from trunks to locals, trunks were suspended at 51 points where joint service had been offered, and 24 additional stations saw trunks suspended and/or replaced by locals though joint trunk-local service remained.

The one form of "route strengthening" the Board dragged its feet on was the elimination of marginal stations. During the late 1950's and early 1960's in a new series of cases many new marginal points were added, contributing greatly to the increase in subsidy that occured during that period. For example, in the first of these cases, the Seven States investigation,[47] 16 points were added to Frontier's routes. By 1965, 10 of these 16 points had been dropped for failing to generate even an average of five passengers per day. In 1965 the remaining six stations generated a total of 28,241 passengers for Frontier, of which 13,991, almost half, came from one, Rapid City, S. Dak. The other five stations generated an average of 7.8 passengers per day, not substantially above the "use-it-or-lose-it" standard. In short, of the 17 points added, only one could be called a success. The use-it-or-lose-it standard just referred to was established in the seven States investigation but the Board was slow to apply it and the standard itself was much too low to be realistic. Even as late as 1969, 34 stations receiving a full year's service failed to meet this minimum.

The probable reason for this slow response was that both the Board and the carriers realized the necessity of not dropping smaller cities if they were to retain the congressional support on which subsidies depended. The carriers, therefore, continued to serve the marginal cities although they cut service frequencies and used aircraft that were larger and more costly to operate than they would have used if their interest had in fact been to serve these cities efficiently. They received subsidies to cover their operating costs and used the high and stable rates of return received after 1961 to establish the credit position that enabled them by the end of 1969 to purchase six Boeing 737's, 17 Boeing 727's, 95 DC–9's, and 20 BAC 111's, hardly aircraft suited to provide better service to the smaller communities they served.

The Board's route strengthening policy had a substantial impact on the routes of the local service carriers. For example, between 1954 and 1965 the proportion of local service carriers traffic generated on competitive routes rose from 19 to 33 percent even though the latter year was the year before the Board began to promote direct trunkline-local service carrier competition.[48] In 1966 the Board did away with its long-standing general policy of prohibiting nonstop flights by local

---

[45] *Western Air Lines* v. *CAB*, 196 F. 2d 933; *United Air Lines* v. *CAB*, 198 F. 2d 100.

[46] Aviation Daily, Dec. 14, 1960, p. 262.

[47] 28 CAB 680 (decided Dec. 8, 1958).

[48] United Research, Inc., "Federal Regulation of the Domestic Air Transport Industry" (1959), table B–19. Civil Aeronautics Board, "Competition Among Domestic Air Carriers, 1965," vol. VI–5, table 6. A route is defined as "competitive" if no single air carrier carried more than 90 percent of the traffic on that route.

service carriers in markets also served by trunklines. It hoped that if it allowed the locals to serve such routes they would earn sufficient profits to "internalize" the local service subsidy.[49] Although this policy has failed to work so far, it has increased substantially the importance of competitive routes to the local carriers.[50]

The transfer of stations from trunklines had a particularly important impact on the strength of the routes of the local service carriers. Although such stations made up only about one-third of the exclusively served stations in 1964, they provided nearly half of the passenger originations at the exclusively served cities. When these stations are included average passengers per station at the exclusively served cities grew 383 percent over the 1949–64 period.[51] However, average passengers per station at the stations never served by trunklines grew by only 269 percent during the same period.

In order to concentrate their energies and equipment on providing service where the traffic is—at the jointly served cities—the locals have reduced the level of service they offer at the smaller communities, most of which are exclusively served stations. This reduction in service has been aided by the CAB policy of reducing required intermediate stops and by the Board's reduction since 1961 of the number of daily flights it was prepared to subsidize.[52]

The local carriers refuse to admit to any decline of interest in service to their smaller points. They have always taken great pains to stress their commitment to serve the smaller communities of the Nation, and as recently as April 1969 in a document titled "Public Benefits Provided by the Local Airline Industry" they declared:

> In keeping with their primary mission of providing the best and most efficient service to the smaller communities, the local airlines have constantly improved and expanded their service to those communities. Analysis of the airports served reveals that the local service carriers continue to give the smaller cities the highest priority.[53]

Table 2, compiled from data contained in the report just cited, reveals a different story. It shows that service as measured by the average number of departures per station per day has been relatively stagnant at the cities under 500,000 while it has increased significantly at the larger cities. Furthermore, these data conceal much of what has been happening at those stations depending upon the local carriers for their only certificated air service.[54] Table 3 is a tabulation of city population by passenger originations for all 287 such cities receiving

---

[49] The "route strengthening" policy prior to 1966 also had as its goal subsidy internalization, but the 1966 change in Board policy made this goal explicit.

[50] Watkins estimates that the locals as a group lost approximately $20 million on their new competitive services in 1969, though results may improve with time. He states that today about 70 percent of Allegheny's revenues come from its competitive routes and that "they represent the fastest growing part of its system." The 28 city pairs over which Mohawk competes just with American Airlines produce 65 percent of Mohawk's revenues. Harold D. Watkins, "Locals Expand With Mixed Results." Aviation Week, July 6, 1970, p. 25. See also: Harold D. Watkins, "Locals, Trunks Vie for Short-Haul Traffic, Aviation Week, July 13, 1970, pp. 33–39.

[51] Estimated from Civil Aeronautics Board, "Airline Traffic-Survey, March 1949"; Flight magazine, vol. 54 (June 1965), pp. 94–97, 100, 102. During the same period average passengers per station at the jointly served stations grew 770 percent.

[52] Civil Aeronautics Board, "Report to the President on Airline Subsidy Reduction Program Pursuant to Transportation Message of 1962," Washington, June 1963, pp. 4, 14–20.

[53] Systems Analysis and Research Corp., "Public Benefits Provided by the Local Airline Industry, Report No. 6," prepared for the Association of Local Transport Airlines, Washington, D.C., April 1969, p. 10.

[54] Some of these cities are served by uncertificated air taxis, however.

service throughout 1969. It shows that only 15 of these cities were above 100,000 in population.[55]

TABLE 2.—NUMBER OF AIRPORTS SERVED BY LOCAL SERVICE AIR CARRIERS AND FLIGHT DEPARTURES PER STATION PER DAY, BY POPULATION OF CITIES SERVED, 1958 AND 1968

Population of cities served	Number of airports served		Total annual departures (thousands)		Departures per station per day		
	1958	1968	1958	1968	1958	1968	Increase
100,000 or less	224	233	312	428	3.8	5.0	1.2
100,000 to 500,000	118	150	326	525	7.6	9.6	2.0
500,000 to 1,000,000	28	33	79	192	7.7	15.9	8.2
Over 1,000,000	31	44	144	456	12.7	28.4	15.7
All airports	401	460	861	1,601	5.9	9.5	3.6

Note.—The departure table in the source was mislabeled 1956 and 1966. A check of Civil Aeronautics Board data shows that the data are for 1958 and 1968.

Source: Systems Analysis and Research Corporation, "Public Benefits Provided by the Local Airline Industry, Report No. 6," prepared for the Association of Local Transport Airlines, 1969, processed, p. 10.

TABLE 3.—NUMBER OF CITIES SERVED EXCLUSIVELY BY LOCAL SERVICE AIR CARRIERS, BY NUMBER OF PASSENGER ORIGINATIONS AND CITY POPULATION, 1969

City population	1969 passenger originations per station						
	Under 7,300	7,300 to 12,499	12,500 to 24,999	25,000 to 49,999	50,000 to 99,999	100,000 or greater	Total
Under 6,250	17	0	3	2	0	0	22
6,250 to 12,499	35	9	4	0	2	0	50
12,500 to 24,999	35	11	23	2	1	0	72
25,000 to 49,999	32	15	20	15	4	0	86
50,000 to 99,999	7	5	9	11	10	0	42
100,000 or greater	4	2	2	2	3	2	15
Total	130	42	61	32	20	2	287

Sources: Flight magazine, June 1970; Rand McNally Road Atlas, 1970.

Many of these smaller cities make very intensive use of their air service. In 1969, 33 of the 144 exclusively served cities with a population of less than 25,000 originated more passengers than their listed population. Obviously some of these points were resort areas and military posts where the listed population underestimates the traffic potential. Nevertheless, this is an impressive figure. Equally impressive is the fact that 49 percent of the cities under 25,000 generated a level of traffic greater than half of their listed population.[56]

The relatively intensive use of air service by the smaller cities is not reflected in the level of flight frequency provided them. Table 4 shows that in 1969, 34 percent of the exclusively served stations of

[55] Population figures are taken from the Rand McNally Road Atlas, 1970 edition. The populations listed there are "from the 1960 census and latest available estimates." In those cases in which an airport was listed as serving more than one city, the combined populations of the designated cities was used. The largest city served exclusively by the local carriers in 1969 was Anderson/New Castle/Muncie, Ind., with a combined population of 159,869.

[56] On the other hand, 42 percent of the 57 cities of greater than 50,000 population served exclusively by local carriers generated a level of traffic equivalent to less than 25 percent of their population, and 79 percent of these cities generated traffic equivalent to less than 10 percent of their population. This low level of traffic generation relative to population at these larger cities reflects the existence of superior transportation alternatives. In most instances this superior alternative is an interstate highway. Of the 18 cities of 50,000 or greater population generating fewer than 12,500 passengers in 1969, all but two lay within approximately an hour's driving time of a large city having a superior level of air service. In other cases an air taxi has entered the picture sensing that such cities are not generating their share of air traffic because of the poor service they are receiving from the local carriers. Of the 18 cities referred to above, 10 were served by air taxis or intrastate air carriers in 1969. This includes the two cases where cities lay more than 1 hour's driving time from a large city.

less than 25,000 population received fewer than three departures per day. Eighty-three percent of such cities received fewer than six departures per day.

TABLE 4.—NUMBER OF CITIES SERVED EXCLUSIVELY BY LOCAL SERVICE AIR CARRIERS, BY NUMBER OF FLIGHT DEPARTURES PER DAY, AND BY CITY POPULATION, 1969

City population	Departures per station per day							
	Under 3	3 to 5.99	6 to 8.99	9 to 11.99	12 to 17.99	18 to 23.99	24 or more	Total
Under 6,250	10	10	2	0	0	0	0	22
6,250 to 12,499	19	29	0	1	1	0	0	50
12,500 to 24,999	19	33	17	2	1	0	0	72
25,000 to 49,999	11	42	23	5	4	0	1	86
50,000 to 99,999	4	13	10	4	8	2	1	42
100,000 or more	1	4	3	2	3	1	1	15
Total	64	131	55	14	17	3	3	287

Sources: Flight magazine, June 1970; Rand McNally Road Atlas, 1970.

To see if smaller exclusively served cities indeed receive fewer departures than they are "entitled" to we constructed the following simple model to explain airline scheduling. An airline was assumed to look at two factors in deciding how many flights to offer a point, the amount of traffic it was expected to generate and its population. As a proxy for expected traffic we used the actual number of passengers originated by the station during the previous year. The data used were those for the 287 stations exclusively served by local carriers in 1969. The equation was estimated in logarithmic form.

The results obtained were as follows. (The figures in parentheses below the regression coefficients are t-ratios. All variables are significant at the 1-percent level as is the equation as a whole.)

(1) ln (flight departures per station per year, 1969):

$$= 2.742 + \underset{(24.32)}{0.45} \ln (\text{passenger originations per year, 1968}) + \underset{(4.27)}{0.086} \ln (\text{population of city served})$$

Number of observations = 287

$R^2 = 0.74$

$F = 400.69$

While the proxy for expected traffic proves to have the strongest effect, as would be expected, the population variable is also significant at the 1-percent level. The positive sign on this variable indicates that of two cities generating equal amounts of traffic in 1969, the more populous one systematically was offered more aircraft departures. A comparison of two towns in Colorado, Durango and Pueblo, will serve to illustrate this. In 1969 both cities originated approximately 14,000 passengers for Frontier, about 40 passengers per day. Durango has a population of 10,530 and is located in a geographically isolated section of southwestern Colorado. Driving time to Denver from Durango is estimated at almost 10 hours.[57] In other words, air travel provides the only convenient way of getting to or from Durango, and consequently, in 1969 Durango originated 1.4 airline passengers per capita.

[57] Rand McNally Road Atlas, 1970 ed. Denver is 285 air-miles and 338 road-miles from Durango.

Pueblo is a city of 102,000 population lying 40 miles south of Colorado Springs and 110 miles south of Denver. Both Denver and Colorado Springs possess trunkline air service. Interstate 25 connects Pueblo with both, and the driving time to Denver is estimated at 2¼ hours. In 1969 Pueblo originated 0.14 passenger per capita. During that year it received 2,370 departures, 6.4 per day, while Durango received 2,064 departures, 5.7 per day.

Other pairs of cities that in 1969 generated roughly equal amounts of traffic but where the smaller city received fewer departures include Clovis, N. Mex. (population 2,800), and Anderson/New Castle/Muncie, Ind. (population 159,869); Crescent City, Calif. (population 2,958) and Trenton, N.J. (population 102,000); and Crossville, Tenn. (population 4,668), and Tacoma, Wash. (population 152,000). Admittedly, the population variable does not have a very great impact—the larger cities generally receive at most only a few hundred departures per year more than the smaller cities, but such behavior is not what we would expect from a group of airlines who claim that "their primary mission [is] providing the best and most efficient service to the smaller communities." [58]

Neither is it true that "the local carriers continue to give the smaller cities the highest priority".[59] To illustrate let us examine what has happened to service over the last 10 years at the communities represented by our sample, those communities that in 1969 received their only certificated air service from a local service carrier. One hundred ninety-seven of these 287 cities were also served by the local carriers in 1959, though during the earlier period some also were served also by trunklines. The remaining 90 cities have been added to the routes of the local carriers since 1959 either through the extension of air service to cities not previously receiving it or through the suspension of trunklines and their replacement by local carriers.

Table 5 shows a tabulation of change in average daily departures by city size for the 197 points served during both 1959 and 1969. Average daily departures declined at 56 percent of these 197 stations. They declined at 61 percent of the cities with populations below 25,000 and at 81 percent of the cities with populations under 50,000.[60]

TABLE 5.—CITIES SERVED EXCLUSIVELY BY LOCAL SERVICE AIR CARRIERS IN 1969 AND ALSO SERVED IN 1959, CLASSIFIED BY CHANGE IN AVERAGE NUMBER OF DEPARTURES PER DAY AND BY CITY POPULATION, 1959–69

Population	Greater than −6	−6 to −3.01	−3 to −0.01	0 to +2.99	+3 to +5.99	+6 to +8.99	+9 to +11.99	+12 or more	Total
Less than 6,250	0	0	9	1	0	0	0	0	10
6,250 to 12,499	0	0	19	11	2	0	0	0	32
12,500 to 24,999	2	2	21	17	1	1	1	0	45
25,000 to 49,999	1	8	27	20	3	1	1	1	62
50,000 to 99,999	2	6	10	7	2	5	3	1	36
100,000 or more	1	0	2	7	1	1	0	0	12
Total	6	16	88	63	9	8	5	2	197

Sources: Flight magazine, June 1970, June 1960; Rand McNally Road Atlas, 1970.

[58] Systems Analysis and Research Corp., "Public Benefits," 1969, p. 10.
[59] Systems Analysis and Research Corp., "Public Benefits," 1969, p. 10.
[60] Average departures per station did increase slightly over the 1959–69 period at these 197 stations. The average increase was 54 departures per year, about 0.15 per day. This means that in 1969 this group of stations together received about 10,500 more departures than they did in 1959. Between 1959 and 1969 total local service departures increased by 604,000 from 986,000 to 1,594,000. The bulk of this increase went to stations jointly served with trunklines. At only 5 of the 87 cities of less than 25,000 population did departures rise by more than 3 per day. Departures increased by more than three per day at only 11 of the 149 cities of under 50,000 population.

Furthermore, at many of the stations where departures were cut back, the scheduling of the remaining departures was altered so that the attractiveness of the service was reduced more than in proportion to the decline in departures. The local carriers did this to be able to provide flights at the most attractive times to those stations where the traffic response was likely to be greatest—the larger cities that they served jointly with the trunklines.

The Cost to the Government of Providing Local Air Service

The local service carriers cite subsidy per passenger carried as the cost to the Government of supporting local air service.[61] They point with some degree of pride to the decrease in this figure, from $10.27 in 1954 to $1.54 in 1969. We have seen however, that most of the local carriers' traffic growth has occurred at points receiving service from both trunklines and local service carriers. Such cities would not lose air service if local service subsidy were to be discontinued. We suggested in connection with our examination of the Board's policy toward recertification of local service carriers that a much more revealing measure of the extent of subsidization is per passenger subsidy cost at those points depending solely upon local carriers for their certificated air service.

Table 6 represents an attempt to allocate the $36 million 1969 local service subsidy, an amount which the Board has now admitted did not fully cover the carriers' costs of providing service to the smaller communities, to those stations that might indeed have been without service had it been discontinued and who, hence, were the beneficiaries of the subsidy. The column labeled "total trips" was constructed by assuming that all trips out of an exclusively served city were round trips and that no trips occurred between exclusively served cities. This assumption clearly is violated, and to the extent it is, total trips are overestimated, leading to an underestimate of the subsidy cost per trip.[62] As the table 6 shows, only 4.8 of the 23.4 million passengers carried by the local carriers were generated at the 287 exclusively served stations. Based upon the above assumptions, the subsidy per trip in 1969 was $3.79 for each trip to or from an exclusively served city. Of course, not all exclusively served cities require subsidization and would not necessarily be dropped if subsidy ceased. Cities generating over 25,000 passengers per year certainly would continue to be served. The 54 exclusively served cities in this class generated almost 60 percent of the passengers generated at all exclusively served stations. The remaining rows of table 6 show subsidy per trip on the assumption that cities generating less than the amount of traffic shown in each case would be dropped if subsidy were eliminated. For example, if all cities generating more than 7,300 passengers per year (20 per day) would be retained in the absence of subsidy, then the subsidy required per trip in 1969 to provide air service for those which otherwise would be without air service was $39.98. If the cutoff point were 10,000 passengers per year, subsidy per trip amounted to $26.07.

---

[61] Systems Analysis and Research Corp., "Public Benefits," 1969, p. 14. The local carriers prefer to use the term "public service payments" rather than "subsidy."

[62] This assumption becomes more valid as one moves down the table to points generating less traffic. In 1949 less than 10 percent of total trips for a single carrier on average were between that carrier's exclusively served stations. An undetermined percentage of trips also occurred between exclusively served points of different local service carriers. No estimate of this bias could be obtained for 1969 traffic.

TABLE 6.—TRAFFIC BY STATION GROUP AND SUBSIDY PER TRIP, 1969

Class of station	Number	Total originations (million)	Total trips (million)	Subsidy [1] per trip
All exclusively served stations	287	4.75	9.50	$3.79
Exclusively served stations originating fewer than 25,000 passengers per year	233	1.92	3.84	9.37
Exclusively served stations originating fewer than 15,000 passengers per year	189	1.08	2.16	16.66
Exclusively served stations originating fewer than 10,000 passengers per year	158	.69	1.38	26.07
Exclusively served stations originating fewer than 7,300 passengers per year	130	.44	.90	39.98

[1] Total subsidy paid in 1969 was $35,981,100.

Note.—Local service air carrier traffic at exclusively served cities grouped by number of originating passengers and subsidy per trip, 1969.

Source: Compiled from Flight magazine, June 1970.

Table 7, constructed using the same set of assumptions, shows similar information for 1954, 15 years earlier. Both fares and costs have increased since 1954, however, so the definition of a "marginal" station may have changed. A study performed by United Research in 1959 determined that the minimum avoidable cost of serving an on-line intermediate station with a frequency of two round trips per day was $65,000 if a DC–3 was used and $115,000 if a Convair 340/440 was used.[63]

Let us assume that all service to marginal airports in 1954 was provided using DC–3's. Making the further assumption that the average passenger at such an airport paid the average local service fare of $13.25 allows us to calculate that such a station would have needed to generate at least 5,000 passengers per year in order to make a positive contribution to a local carrier's profits.[64]

TABLE 7.—LOCAL SERVICE AIR CARRIER TRAFFIC AT EXCLUSIVELY SERVED CITIES GROUPED BY NUMBER OF ORIGINATING PASSENGERS AND SUBSIDY PER TRIP, 1954

Class of station	Number	Total originations (million)	Total trips (million)	Subsidy [1] per trip
All exclusively served stations	216	0.63	1.27	$18.70
Fewer than 25,000 passengers per year	215	.61	1.22	19.50
Fewer than 15,000 passengers per year	212	.54	1.09	21.80
Fewer than 10,000 passengers per year	204	.45	.89	26.70
Fewer than 7,300 passengers per year	197	.39	.77	30.90
Fewer than 5,000 passengers per year	181	.29	.58	41.00

[1] Subsidy earned in 1954 (after adjustments) amounted to $23,807,000.

Sources: Flight magazine, June 1955; CAB Handbook of Airline Statistics, 1965 edition.

An updating of this study using results of Taneja and Simpson [65] plus 1968–69 operating cost figures for the local service airlines [66] and

[63] United Research, Inc., "Federal Regulation of the Domestic Air Transport Industry," Cambridge, Mass., Nov. 30, 1959, pp. 56–59 and tables B–25 thru B–28.

[64] The same United Research Study estimated that if subsidy had been ended in 1958, approximatey half of the 530 stations then receiving scheduled air service would have lost that service. During 1958 the 265th ranking city in terms of passenger originations was Columbus, Miss., with 6,915 originations. United Research, "Federal Regulation * * *," p. 111.

[65] N. K. Taneja and R. W. Simpson, "A Multiregression Analysis of Airline Indirect Operating Costs," MIT Flight Transportation Laboratory, June 1968, p. 52.

[66] Civil Aeronautics Board, "Local Service Carriers' Unit Costs, Year Ended Mar. 31, 1969," pp. 1–2.

1968 average fare levels leads to the conclusion that in the late 1960's a station would have to generate 7,700 passengers per year to cover the minimum avoidable costs of providing it with two round trips per day using an F–27. If a Convair 580 were used, the station would have been required to generate approximately 9,000 passengers. If we are willing to accept these figures and compare table 6 with table 7, we are drawn to the conclusion that the cost to the Government of providing air service to those points that otherwise would be without air service may not have declined—and may even have increased—over the last 15 years.[67] This conclusion is strengthened by the fact that by fiscal 1972 the local service subsidy had been increased to $65 million, a figure that the CAB has admitted reflects much more closely the true costs to the local service carriers of providing service to the marginal routes than did the 1969 subsidy of $35 million. It is quite likely, therefore, that the figures shown in table 6 are only half of what they would have been had an adequate subsidy been paid in 1969. Moreover, the cost to the Government of providing service to those cities that otherwise would be without scheduled air service offered by a certificated air carrier has indeed increased dramatically—and may have doubled—since 1954.

Why are subsidy costs on a per passenger basis so high? One reason is the relative stagnation of traffic at many of the points served exclusively by local service carriers. Between 1959 and 1969, while total local service passenger originations were rising from 5.2 million to 24.5 million, originations declined or stayed constant at 17 percent at the 197 cities served exclusively by the local service carriers in 1969 and also served by them in 1959.

But unquestionably, the major reason for the continued high subsidy requirements has been the failure by the local service carriers to use aircraft properly suited to provide service at their marginal stations. Table 8 shows an estimate of the total 1969 operating costs—including an allowance to cover rate of return on investment—for three aircraft, the Convair 580, the Nord 262, and the DHC Twin Otter. The Convair is typical of the aircraft the local carriers are using to serve their low density routes now that the DC–3 has been eliminated from their fleets. The Nord is the modern DC–3 replacement used for a time by Lake Central and by its successor, Allegheny. The Twin Otter is an aircraft in wide use by air taxis. We do not claim that local service carriers could achieve the cost levels shown for the Twin Otter but include them as an indication of the minimum possible costs of operating a no-frills efficient, short-haul air service. Table 8 shows that subsidy need was increased in 1969 by 60 cents per mile for every mile operated using a Convair 580 where an aircraft the size of a Nord could have handled the traffic; and by $1.26 per mile over what would have been required to provide an efficiently run short-haul air service using Twin Otters.

---

[67] A recent study commissioned by the local service airlines themselves employed a somewhat different method of distributing subsidy. Any point failing to generate revenues sufficient to cover the costs allocated to that station was assigned a share of the subsidy. Thus $245,000 of Ozark Air Lines' calendar year 1968 subsidy of $3.5 million was assigned to Moline/Davenport/Rock Island, a station originating over 70,000 passengers for Ozark during that year and served also by United. Over $230,000 of the subsidy was attributed to Peoria, Ill., a city served exclusively by Ozark that originated 125,000 passengers in 1969 and received 19 departures per day. A total of $1.9 million of Ozark's 1968 subsidy was attributed to 11 cities each of which originated more than 25,000 passengers in 1968. Systems Analysis and Research Corp., "Public Benefits * * *," pp. 12, 13, 64.

TABLE 8.—ESTIMATED TOTAL OPERATING COSTS PER MILE

[Including rate of return on investment for a route structure with 90-mile average stage length, Convair 580, Nord 262, DHC Twin Otter [1]]

	Convair 580	Nord 262	De Havilland Twin Otter
Maximum seating capacity	53	28	20
Direct operating costs (dollars per mile)	$1.27	$0.99	$0.60
Indirect operating costs	.95	.74	.45
Return on investment	.33	.22	.24
Total	2.55	1.95	1.25

[1] The Convair 580 direct operating costs are those actually experienced by operators of this aircraft in 1958 according to the CAB "Aircraft Operating Cost and Performance Report," August 1969, issue. These costs were adjusted for a 90-mile average stage length using information contained in Senate Aviation Subcommittee, "Review of the Local Air Carrier Industry" (89th Cong. 2d sess., Feb. 28, Mar. 1, 3, and 4, 1966), pp. 136 and 159. Indirect costs were assumed to be 75 percent of direct costs following SARC, "Economic Analysis of the Short Haul Transport." Total investment required per aircraft for the Convair and Nord were taken from Civil Aeronautics Board, "Local Service Carriers' Unit Costs," year ended Mar. 31, 1969, attachment C, pt. 3, p. 1. Total equipped cost of the Twin Otter was assumed to be the price being quoted by the manufacturer in mid-1968 for the Twin Otter, series 300. This figure was multiplied by 1.5 in order to arrive at average investment per aircraft. This procedure was in keeping with the one followed in the CAB document just referred to. It was assumed that a 10 percent rate of return on investment would be allowed. Rate of return per mile was computed by dividing this annual return figure by the number of miles each aircraft was assumed to fly in a year. For the Convair this was 500,000 miles, for the Nord, 400,000 miles, and for the Twin Otter, 270,000 miles. These figures were all within the range of actual figures achieved by operators of these aircraft taking the 90-mile average stage length into account.

In order to estimate the total increase in 1969 subsidy requirements due to the use of larger aircraft it is necessary to estimate the number of aircraft miles that could have been flown using smaller aircraft. The SARC study that investigated this question determined that the optimal size of smaller aircraft for the local carriers was one of 20 seat capacity and that in 1975 such aircraft should be flown 48 million miles by the local carriers.[68] In 1963, the year from which the data in the SARC report were drawn, the local carriers flew 44 million aircraft miles using DC–3's. It would therefore seem reasonable to assume that in 1969 the local carriers should have flown approximately 41 million more miles with smaller aircraft than in fact they did.[69] The increase in 1969 subsidy need due to the use of larger aircraft ranged, therefore, from a minimum of $25 million if Nords had been used to a maximum of $52 million if the cost levels experienced by air taxis using Twin Otters could have been achieved. This latter sum exceeds the actual 1969 subsidy of $36 million, but it should be recalled that the subsidy actually paid in 1969 was not sufficient to compensate the local service carriers for the free cost of operating their marginal routes.

The Future of the Local Service Carriers

We have shown that the original goal of the "local service experiment," the establishment of a low cost air service to link the smaller and more isolated communities of the Nation with each other and with their trading centers, did not long survive and that the local carriers today differ little except in the strength of their routes from the larger trunkline carriers. We have seen that this transition from specialist feeder carrier to "junior trunkline" carrier and the decline of local service carrier interest in serving their smaller stations was aided and encouraged by CAB route policy and the method of subsidization employed by the Board. Finally, we have demonstrated that the impact on costs and on subsidy requirements of using aircraft larger than

[68] Systems Analysis and Research Corp., "Economic Analysis of the Short-Haul Aircraft," pp. 56–61.
[69] In 1969, the local service carriers flew approximately 3 million aircraft miles using smaller aircraft.

justified by existing route density is substantial. What, then, should future Government policy be toward local air service in general and toward the local service carriers? Several options appear open to the Government. First, the local service subsidy could be phased out over a short period (e.g., 1 to 5 years) and the local carriers could be allowed to abandon any routes they wished. They would then be treated as trunklines for regulatory purposes. The extent of abandonment would depend upon the level of unsubsidized service the local carriers chose to offer.

If cities generating more than 7,300 passengers per year indeed cover the marginal cost of their service, then only 130 cities receiving their only certificated scheduled air service from a local service carrier (based upon 1969 data) would be dropped. If 10,000 passengers per year were required, then 158 cities would lose service. If stations not generating at least 25,000 passengers per year were dropped, 233 cities would lose service. This latter traffic figure, 25,000 passengers per year (or about 70 per day), appears to be the level of traffic required to support service with small jets of the sort recently acquired in large numbers by the local carriers. In this case all but seven of the 144 exclusively served cities of under 25,000 population would lose their service. Offsetting this loss to some degree would be the entry of air taxis which, although unsubsidized, can, with their lower level of costs, profitably serve cities of lower traffic generating potential than can the local carriers. The extent to which such replacement would occur is unknown, however.

A second possibility would be for the Government to subsidize the local carriers to the extent necessary to allow them to continue to offer service of the type they presently offer to the cities they now serve. While the substantial losses recently incurred by the industry are the result in large part of nonrecurring costs associated both with newly acquired aircraft and competitive routes recently awarded to the local carriers in the Board's mistaken attempt to internalize the local service subsidy, there is no doubt that adoption of this option would require a substantial immediate increase of the local service subsidy. Furthermore, little or no reduction could be anticipated in the future. We have shown the substantial impact on costs of the move from smaller aircraft such as the Nord to 52-seat aircraft such as the Convair 580. Even now some of the local carriers are beginning to talk about phasing out their turboprops and converting to all jet equipment.[70] There is no doubt that this would have another substantial impact upon subsidy.[71]

A third course of action open to the Government would be to encourage local carriers to subcontract with air taxis to take over their services at smaller stations. This approach was pioneered by Allegheny, which in October 1967 turned over its service at Hagerstown, Md., to Henson Aviation. Under the terms of Allegheny's contract with the air taxi operator, Henson is guaranteed a breakeven financial result during the first 2 years of the contract based upon a standard cost allocation. Allegheny provides reservation and customer service at the terminal point and requires Henson to meet "Allegheny's standards of customer service". The contract runs for 10 years, and Allegheny

---

70 "Frontier's Reversing the Adverse," Flight magazine, June 1970, pp. 45.

71 Operating costs per mile (including rate of return element) for the DC-9-10 are approximately 39 percent greater than for a Convair 580.

guarantees to resume flights with at least the same level of service in effect to the contract if the agreement is terminated.

Allegheny considers its experiment to have been a success. The improved frequency of service offered by Henson has stimulated traffic and the carrier claims to be at least breaking even on its Hagerstown services. The claimed savings to the Government in subsidy reduction at Hagerstown is $84,921 per year. As of April 1970, Allegheny had transferred 13 of its stations to air taxi operators under such agreements, and the carrier is known to be negotiating additional agreements. Ten stations had been transferred by Frontier, and eight points by other local carriers.[72] Such a plan of local carrier transfers to air taxis was endorsed in a recent speech by Board member Adams,[73] though he was careful to state that his remarks did not imply Board endorsement of such a general transfer policy. Adams estimated that approximately 120 points, those generating fewer than 15 passengers per day in 1969, were "suitable" candidates for such a transfer. He proposed that local carriers receive a fee for "administration" of the contracts.

An alternative plan of obtaining the efficiencies afforded by the use of small turboprop feeder aircraft would be for the Government itself to contract directly with air taxis to provide those feeder services whose continuation was deemed in the public interest.[74] Local service carriers could be asked to list cities which they proposed to drop. Where continuation of service appeared desirable—either economically or politically—the Government could announce that it was accepting bids for the annual lump sum subsidy required to operate a specified frequency of service from designated points to the city in question. The winner would be awarded a long-term contract to provide this service. The large number of air taxi operators should assure that such a scheme would not yield the winner exorbitant profits. In fact, the problem might be just the reverse. Air taxi operators, overoptimistic as to traffic and costs, might be tempted to bid too low. In some cases bidders, taking their cue from the early air mail contract bids or from the experience of defense contractors, might purposely bid low to "buy into" the program expecting the Government to be willing to "recontract" later. The Government would have to be prepared to allow an overoptimistic bidder to go broke. The supply of potential entrants is large enough to assure that another operator would be prepared to take his place at a slightly higher level of subsidy.

From a strictly economic point of view this plan has many advantages. Foremost is its maximum incentive for efficiency. Any cost savings the air taxi operator could obtain would be translated directly into increased profits. A second advantage is that the Government would not need to worry about the type of aircraft used by the contractor as long as he met the terms of the contract concerning frequency and reliability of service. If the operator wished to use a Boeing 747 on a 50-mile flight between a small community and a

---

[72] Since 1964, trunklines have turned over 23 points to air taxis. Aviation Week, June 29, 1970, p. 35.

[73] Remarks of John G. Adams, member, Civil Aeronautics Board, before the Association of Local Transport Airlines, spring quarterly regional meeting, New Orleans, La., May 1, 1970.

[74] This proposal is similar to that advanced by Howard R. Swaine in his article, "A Proposal for Control of Local Service Subsidies," Journal of Air Law and Commerce, vol. 31, 1965, pp. 181–197.

larger city he would be free to do so. The gain or loss incurred would accrue entirely to him. In this regard it should be observed that bidding for such contracts should in fact not be limited to air taxi operators. If a trunk or local service carrier felt that it could serve the point on a leg of one of its regular flights at lower cost than an air taxi using smaller equipment, then it should be allowed to submit a bid.

The third advantage of this scheme is that it prevents the continuation of the illusion, possible under the subcontracting scheme, that the local carriers are still in fact serving the smaller cities they were created to serve. Furthermore, since no "administration fee" is paid to the locals, there is no possibility that a disguised subsidy could be continued to them to finance their large aircraft purchases. This is not to say that the air taxi contractors under the direct contracting scheme would not use trunkline and local carrier reservations services and ground facilities, as under the subcontracting proposal but merely that arrangements for the use of such facilities could be made directly between these carriers and the air taxi contractors with the price charged covering the cost of providing the facilities plus a reasonable profit.

The final advantage of this scheme is that it would eliminate one reason for economic regulation of the airline industry. The major cause of regulation today is the need to control entry in order to preserve profits on denser routes for use in subsidizing thinner routes. Under the scheme being proposed, this need would cease, since losses would be directly borne by the Government. The costs of providing air service to smaller communities would be apparent to all. This is a feature of all four options.

It must be reiterated that the direct contracting proposal depends crucially upon the Government being willing to require the contractors to adhere to the terms of the contract. As the recent experience with the defense contractors and the earlier experience with air mail contracts demonstrates, the possibility of "recontracting" after a contract has been awarded encourages bidders to "buy into" programs with unrealistically low bids.[75] The relationship of the CAB vis-a-vis the local carriers over the last 25 years provides little grounds for hope that it could be expected to exercise the required degree of toughness with winning bidders. It is impossible to study the regulation of this industry without being struck by the degree to which the Board's major concern has been with the financial health of the carriers it created and not with the cost and quality of the service they have provided to the communities they were created to serve. For this reason, we believe the direct bidding scheme might prove to be unworkable in practice in spite of its substantial apparent advantages. Nevertheless we strongly support the proposal made by CAB earlier this year to experiment with such a scheme on a limited basis. Only by conducting such a test is it possible to determine if the theorectical advantages of such a proposal can be achieved in practice. The Board's proposal would be limited in duration to 3 years and in cost to $2 million per year. As our analysis and the analysis of the Board's staff clearly

---

[75] See Richard E. Caves, "Air Transport and Its Regulators," Cambridge, 1962, p. 124, and "LOH Hearing May Spur Tighter Bidding Rules," Aviation Week, Mar. 13, 1967, p. 87.

shows,[76] the potential payoff in terms of savings to the Government *and* improved service to smaller communities is well worth this limited investment.

The plan of having local carriers subcontract with air taxis would represent a second-best type of solution. This scheme transfers to the contracting local carrier the responsibility for enforcing cost consciousness upon the air taxi subcontractor. Yet even here some degree of firmness on the part of the Government is necessary if savings in subsidy are to persist. The air taxis operate low-cost services today because they must cut costs in order to have any chance of surviving. Once assured of survival through subcontracts with local carriers they may be expected to become less cost conscious. Copilots who today fuel aircraft and handle luggage—as West Coast's copilots did in the late 1940's—may be expected to demand treatment equal to that afforded by the regular carriers. In this they are certain to have the support of the Air Line Pilots' Association which already has managed to thwart at least one attempt by a local service carrier to use small aircraft.[77] Only by adopting a method of regulation and subsidization that takes advantage of the fact that the number of people who want to own their own airline is virtually limitless can the sort of efficiencies envisioned by the Board in 1944 be obtained and retained. The performance of the CAB vis-a-vis the local service carriers over the last 25 years offers little grounds for hope that it would be firm enough with the carriers that submitted winning bids in a competition to provide short-haul, low-density air service. We remain open to persuasion on this point, however.

Criteria for Choice

The case for a complete end to the "local service experiment" appears to be a strong one. No convincing evidence has been discovered that any substantial benefits accrue to the nation at large from the continued expenditure of federal funds to support local air service. Furthermore, the fact that total passenger originations either remained constant or declined between 1968 and 1969 at 67 percent of the points served exclusively by the local service carriers indicates that even the prime beneficiaries of the subsidy—the travelers who fly for considerably less than cost—believe that the value of the service provided is declining. Traffic was static or declined at 71 percent of the exclusively served cities of less than 25,000 population. Even prior to the establishment of the local service carriers and the post-war expansion of the trunklines, air service was with-in easy reach of a substantial proportion of the population. As early as 1938, the average population of cities that were not served was only 11,595, and the average distance from the nearest city with air service was only thirty-five miles.[78] When account is taken of the probable entry

---

[76] Civil Aeronautics Board, "Service to Small Communities: A Staff Study of the Bureau of Operating Rights," March 1972. This study, performed completely independently of our study, identifies the same problems with the current method of subsidization as we did and makes the same recommendations concerning their solution. We disagree with the Board's staff on only minor details of the competitive bidding scheme.

[77] E. H. Pickering, "Five Regionals Using Small Twins," Flight magazine, March 1970, p. 42. See also "Where Others Get in Pilot's Seat," Business Week, Mar. 1, 1969, p. 92.

[78] The 260 points added to trunkline or local service carrier routes between 1938 and 1959 had an average population of 25,370 and were, on an average, sixty-six miles from the nearest point having air service. United Research Incorporated, "Federal Regulatien of the Domestic Air Transport Industry," Prepared for the U.S. Department of Commerce (Cambridge, Mass.: United Research, 1959; processed), Table B-7.

of unsubsidized air taxis at many points if the local service carriers suspended service to them, it is quite conceivable that 97 percent of the metropolitan population, that proportion that the local service carriers claimed to be serving in 1969, would still have easy access to scheduled air service even if the local service subsidy were ended. Advocates of continued federal support for local air service point out that a significant, though declining, proportion of the population does not live in metropolitan areas.[79] They say that it is well recognized that the federal government has undertaken a commitment to provide certain essential services to all its citizens, regardless of their location, and contend that access to scheduled air service should be included among these services. This point of view was set forth by John F. Floberg, Chairman of the Conference of Local Airlines (the predecessor of the Association of Local Transport Lines), who, in arguing for permanent certification for the local service carriers in 1955, said:

"There are some things that neither the Civil Aeronautics Board nor the Congress of the United States can change, and included in those things are the geography and the population distribution of the United States. There is nothing that this committee or the Congress or the CAB can do to make the population of Gunnison, Colo., the same as that of Syracuse, N.Y., or the population of Tonopah, Nev., the same as that of Johnstown, Pa., or the population of Enid, Okla., the same as that of Norfolk, Va.

"But, I would like to know who there is to say that the people of Gunnison, or Tonopah, or Enid, are not just as much entitled to air-mail service as the people of Syracuse, Johnstown, or Norfolk, or at least who would have the temerity to say that they should be penalized merely because they happen to be in relatively sparsely populated areas." [80]

Floberg's statement serves the useful purposes of pointing up the political nature of the decision to expand air service beyond the level that the market will support. Yet, carried to its conclusion, it obviously is impractical, since its acceptance would lead to the expansion of scheduled air service to every hamlet with an airstrip long enough to accommodate an airline and the construction of such airstrips where they do not now exist.

Even if Congress should decide, for political or other reasons, to continue the local service subsidy, it is clear that better standards are needed to allow the Board to judge which cities benefit from local air service and which would suffer little or no loss if it were discontinued. The first step in drawing up such standards is to inventory the transportation alternatives open to cities that might lose service if the local service subsidy were ended.

One possible rule of thumb would be to deny subsidy for air service to any city lying within a two-hour drive of a larger city that does have air service. There is no reason to expect the government to subsidize

---

[79] See Systems Analysis and Research Corporation, "Public Benefits Provided by the Local Airline Industry: A Report on the Nation's Fast-Growing Local Airline Industry," Report No. 6, prepared for the Association of Local Transport Airlines (Cambridge, Mass.: SARC, 1969; processed), p. 4.

In 1950, 64 percent of the total U.S. population lived in urban areas (towns of over 2,500 population), and some 60 percent lived in Standard Metropolitan Statistical Areas (SMSAs). According to 1970 census figures, almost 75 percent of the population now lives in urban areas, and about 70 percent lives in SMSAs. U.S. Bureau of the Census, *Statistical Abstract of the United States, 1971* (1971), p. 16.

[80] "Statement of John F. Floberg," in *Permanent Certificates for Local Service Air Carriers*, Hearings before he House Committee on Interstate and Foreign Commerce, 84 Cong. 1 sess. (1955), pp. 15–16.

a high enough frequency of service that, on an average, it is quicker to fly than it is to drive for two hours.[81]

Cities that pass that test should be required to meet additional criteria in order to continue to receive federal subsidy. At present a city must generate only five passengers a day to retain air service once it has been authorized. This standard is unrealistically low and should be doubled at least. Furthermore, as the costs of serving smaller communities increase over time, this standard should also be increased so that a city bears at least a constant share of the cost to the federal government of providing it with scheduled air service. It has been argued here that if a city of 25,000 generates only ten passengers a day, this is because its air service offers little or no improvement over other transportation alternatives. On the other hand, a small town may generate only ten passengers a day merely because its total traffic-generating potential is low. Some minimum level of passenger originations per capita should also be required of cities seeking to retain subsidized air service. The number of stations that were served exclusively by local carriers in 1969 and that would be made ineligible for subsidy even if they were required to maintain a traffic level of only 0.25 originations per capita per year are shown below: [82]

1. Total number of exclusively served cities	287
2. Exclusively served cities that originated fewer than 3,650 passengers a year	77
3. Exclusively served cities that originated fewer than 0.25 passengers per capita population [83]	98
4. Exclusively served cities falling in *either* (2) or (3)	117

Cities failing to meet these tests would be either too small to justify even the lowest level of air service or so well endowed with transportation alternatives that a federally supported air service would be of little value to them.

Of the 158 cities that in 1969 generated fewer than 10,000 passengers, 51 pass the two tests shown above. What type of service should the government agree to support at such cities?

It was estimated above that the cost of using excessively larger aircraft is between $0.60 and $1.26 per route-mile, depending on the aircraft used. Primarily what the government pays for with the additional subsidy needed to cover these higher costs is more passenger comfort.[84] The three aircraft whose costs were presented in table 8—the Convair 580, the Nord 262, and the De Havilland Twin Otter—are all equally capable of safe, reliable operation. All are turbine-powered; all are flown by two pilots. In fact, the mechanical simplicity and the short takeoff and landing characteristics of the Twin Otter make this aircraft, if anything, potentially safer and more reliable than are the other two. There are differences among these aircraft other than those of capacity. The Twin Otter is unpressurized and lacks washroom facilities. Also there are no facilities for serving food and beverages to passengers, since the aircraft is not designed to carry a stewardess.

---

[81] This is similar to the "isolation index" proposed by Board's Staff in the study referred to in Footnote 76 above. See Part III, Appendix B.

[82] From data in the appendix.

[83] Includes ten that originated more than 10,000 passengers a year.

[84] Subsidizing a larger aircraft than is warranted by average anticipated traffic levels also allows a carrier to achieve a higher probability of meeting peaks in traffic demand. However, the additional capacity required to yield significant improvements in this element of the quality of service (and the increased subsidy cost associated with providing this peaking capacity) is likely to be quite large. See George Eads, "Competition in the Domestic Trunk Airline Industry: Excessive or Insufficient" (1971; processed), pp. 11–28.

The seats do not recline, and they are narrower than standard airline seats. In short, the plane is designed to transport up to 20 passengers for short distances, with a minimum of frills. The Nord 262 is a standard airline aircraft with all the associated features. It is both pressurized and air conditioned. It has a small galley and is designed to carry a stewardess. Although its maximum passenger capacity is only 28, as against the Twin Otter's maximum of 20, the usable cabin space is twice that of the Twin Otter. While some of the estimated 66-cents-a-mile difference in operating costs between these two aircraft is due to the lower input costs faced by air taxi operators, a significant part is due to the cost of these additional features that add to the initial price of the aircraft, increase its mechanical complexity and maintenance costs, and add weight that must be carried regardless of the passenger load.[85] The Convair 580 has no comfort features that are not found on the Nord 262. Its increased operating costs are traceable solely to its larger size and greater mechanical complexity.[86]

It is obvious that a passenger faced with equal frequencies and fares would prefer to fly on a Convair 580 rather than on a Twin Otter. However, the experience of the air taxis in attracting traffic on aircraft like Twin Otters shows that a large portion of potential local service customers do not consider the extra features essential. It is reasonable to argue that if the federal government is going to subsidize air service at all, it should be willing to pay the additional subsidy to provide a pressurized aircraft. This is true particularly for services operated in the mountainous areas of the West. The same may be true of air conditioning. It cannot be argued, however, that the government should pay the costs of stewardesses and of passenger food and beverage service on such short flights. Furthermore, no case can be made for the government's subsidizing the additional passenger comfort that results from the use of a larger aircraft, such as the Convair 580, when a smaller aircraft like the Nord 262, which has all the necessary features to provide safe, dependable air transportation (and in addition some features that are not strictly necessary but perhaps desirable) offers enough capacity to take care of the expected traffic. The costs incurred through the use of large aircraft must be borne either by the passengers traveling on a route or by the airline using the aircraft.[87]

The supporters of continued federal subsidization of local air service should be required to demonstrate that either the current level of service or the type of service they want provides a substantial improvement in transportation alternatives open to the cities they believe to be "isolated." In doing this they must compare a relatively low-frequency air service with a highway system that has been substantial improvement since the end of the Second World War, with much of this improvement being concentrated in the areas previously considered to be isolated. To the extent that the service they envision

---

[85] The original version of the Nord was available either as a pressurized or unpressurized aircraft. The unpressurized aircraft was priced at $350,000 and the pressurized version at $390,000, in both cases fully equipped. Anthony Vandyk, "Nord Goal, 300 Super Broussards," *Airlift, World Air Transportation*, Vol. 25 (February 1962), pp. 25–26.

[86] For example, the larger turboprop aircraft, such as the Convair 580, have auxiliary power units (APUs). that provide internal power and operate the air conditioning system when the aircraft is on the ground These APUs are small gas turbine-powered generators, whose turbine section is not much smaller than the engines that power the Twin Otter.

[87] Another possibility would be for the community served to pay the additional cost of using larger aircraft.

makes use of smaller, more economical aircraft, their task will be made easier. While a case can be made for federal support of a minimum level of air service at a number of relatively isolated cities, we believe that the number of cities where service is subsidized should be reduced substantially and that advantage should be taken of the economies of operation made possible through the use of smaller equipment, more efficient ground operations, and a reduced level of passenger amenities.

FEDERAL AIDS TO THE MARITIME INDUSTRIES

By GERALD R. JANTSCHER*

SUMMARY AND CONCLUSIONS

Four of the most important aids that the Federal Government gives the U.S. maritime industries are described in this paper. The most costly of these has been operating-differential subsidy, which the Government has been paying to selected U.S.-flag steamship companies since 1936. By the end of 1970 past costs of the subsidy totaled nearly $3 billion, more than half this amount having been spent since 1962. The cost of the subsidy has recently hovered around $200 million a year, but appears now to be rising again, and will probably soon exceed $250 million a year.

The operating-differential subsidy is given to offset the difference between the high costs that are paid by U.S.-flag operators and the lower costs of their foreign competitors. Most of the difference is attributable to the higher wages received by crews aboard U.S. vessels, and so most of the subsidy is paid in respect of wages. In 1969 the Federal Government paid about 67 cents of every dollar of wages aboard U.S. cargo vessels in subsidized service. Subsidy payments covered nearly a quarter of the operating expenses of all such vessels, and provided operators with nearly a fifth of their revenues.

The second important aid to the maritime industries is construction-differential subsidy. Unlike the operating subsidy, the construction subsidy is primarily a form of assistance to shipbuilders rather than shipowners. The subsidy is given to lower the price of a vessel that is built in a U.S. shipyard to the price that the buyer would pay for a similar vessel from a foreign shipyard. During most of the postwar years the prices of ships built in this country have been nearly double, and sometimes more than double, the prices of ships built abroad. The construction-differential subsidy has constantly amounted to about 50 percent of the domestic cost, meaning that the Government has invested as much money in the new vessels as the buyers themselves.

Between 1936, when the construction-differential subsidy was established, and the end of 1970, subsidy payments totaled nearly $1.4 billion. Most of this sum has been paid since 1957, when a major construction program began. With the establishment of a new construction program in 1970, the announced goal of which is to add 300 new vessels to the U.S. merchant fleet by the early 1980's, construction subsidy costs during the next decade threaten to exceed $3 billion.

Less familiar to most persons than the operating-differential and construction-differential subsidies are the cabotage laws of the United States and the advantage they afford to the U.S. maritime industries.

---

*Research Associate, The Brookings Institution. The conclusions reported within this paper are the author's own, and are not necessarily the opinions of the rest of the staff, the officers, or the trustees of the Brookings Institution.

Even though these laws confer no subsidies in the conventional sense on any party, nor are accompanied by any disbursements from the public treasury, they nevertheless are of considerable benefit to the maritime industries, and belong in any account of the public aids these industries receive.

The cabotage laws restrict the carriage of goods in the Nation's domestic oceanborne commerce to vessels built and registered in the United States. The costs of this protection are sizable. We estimate that between 1950 and 1970 private shipowners were forced to pay nearly $1 billion more for the vessels they needed in the domestic trades than they would have paid for similar vessels from foreign shipyards. More costly still has been the requirement that vessels in the domestic trades must sail under the U.S. flag. Between 1950 and 1970 this added about $2 billion to shipping costs. Precisely who has paid these $3 billion of costs is difficult to say, but it has probably been the consumers of the goods that are carried in these ships.

The fourth subsidy described in this paper is administered through the Federal tax system. The tax subsidies that are given to the maritime industries constitute an extraordinary form of public assistance, available to no other industry. The program functions much like a loan program, with the Federal Government granting qualified shipowners the use of tax money to purchase ships and equipment from U.S. producers. The owners pay no interest for their use of the money, and no time limit is set when repayment is due. Under certain conditions the subsidy is substantially equivalent to an exemption from income tax of a part of shipowners' earnings.

Before 1950 the value of the tax subsidies was greater even than the payments to shipowners of operating subsidy. Recently, however, their value has fallen. We estimate that between 1936 and the end of 1970 the maritime tax subsidies cost the Federal Government about $350 million. During the past several years their annual cost can hardly have exceeded $10 million. Legislation in 1970 greatly broadened the conditions under which the subsidy can be claimed. Within the next few years the annual cost should increase appreciably, possibly to more than $50 million.

The principal omission from this account is that of any mention of the cargo preference laws. These important provisions confer a sizable subsidy on the U.S. merchant fleet through their requirement that at least half of all Government-impelled cargoes must be carried in American vessels. It was not possible in the time available to include a thorough analysis of this assistance here. A preliminary analysis indicates that the public cost of these laws has been far higher than anyone has supposed, possibly running more than $200 million a year at present and totaling more than $5 billion since 1950. The cargo preference system will be examined in detail in a forthcoming book on Federal maritime aids by this writer.

Introduction

The U.S. maritime industries are the recipients of a variety of aids from the Federal Government. The aids are given in a multiplicity of forms, constituting an assistance program of unrivaled diversity. No other Federal program exemplifies so many distinct forms of subsidy. Some are given directly, such as the operating-differential and

construction-differential subsidies; others are given indirectly, in payments the Government makes for the services it buys; others are administered through the tax system; still others are given through the erection of barriers against competition. The aggregate value of all this assistance is sizable and apparently growing larger.

The purpose of this paper is to introduce the reader to the most important of these aids. It must be stated at the outset that this is not a comprehensive survey of all maritime aids. Such a survey would exceed all reasonable bounds on the length of this paper. Instead we have picked out four important forms of assistance for description here. In every case, estimates are offered of the cost of these subsidies.

Purpose of the Subsidies

The maritime aids are the subject of much controversy. Critics assert that the hundreds of millions of dollars they cost every year is money unwisely spent, and that the public benefits they yield are not commensurate with their cost. Their supporters reply that Government assistance is vital to these industries, and that this assistance serves important public objectives. It is no part of the plan of this paper to appraise these arguments. To do so would be a major undertaking. Nevertheless, before entering on a discussion of these subsidies, something should be said of the purposes they serve. This account will be short, because their purposes have never been well articulated. The declaration of policy in the Merchant Marine Act of 1936, which established most of the subsidies, is of little help, saying only that:

> It is necessary for the national defense and development of its foreign and domestic commerce that the United States shall have a merchant marine [of certain characteristics] supplemented by efficient facilities for shipbuilding and ship repair.

Commercial Advantages

It was once customary to emphasize the commercial advantages that accrued to the Nation from having its own domestic fleet. Such a fleet, it was argued, would serve the commercial interests of the Nation more faithfully than foreign ships. This attitude is illustrated in a report of the U.S. Maritime Commission in 1937, which stated that "an American merchant marine is of material value in the development of our foreign commerce." [1] The Commission found no evidence that shipping rates were lower than they otherwise would be if the carriage of the Nation's commerce were left to foreign vessels, or that foreign steamship lines had discriminated against U.S. goods. It did conclude that the participation of American lines had improved the quality of shipping services available to U.S. shippers. Above all, however, the Commission decided that "the principal advantage which accrues to our foreign commerce from the possession of a domestic-flag marine is that it provides a measure of insurance against possible interruption of service." The Commission had in mind the experience during World War I when few U.S. ships served the foreign trade and U.S. shippers depended for shipping services on foreign lines. Upon the outbreak of war, many foreign ships were withdrawn from service elsewhere in the world and put in service between the United States and Europe, to the detriment, it is said, of U.S. trade with other nations.

---

[1] U.S. Maritime Commission, "Economic Survey of the American Merchant Marine" (Washington, 1937) p. 5, quoted in Samuel A. Lawrence, "United States Merchant Shipping Policies and Politics" (Washington, 1966), pp. 23-24.

These conclusions were reached more than 30 years ago. Since then circumstances have changed, and few people today are likely to emphasize the commercial importance of the U.S. merchant fleet as much as the Maritime Commission did. The proliferation of national fleets has lessened the risk that events overseas might cause a sudden withdrawal of foreign-flag services from the U.S. trades. The liner trades are relatively less important today than they once were, and the bulk trades are more important. Many ships engaged in the bulk trades are owned by industrial concerns and employed hauling raw materials that their owners need. Whatever their registration, these carriers are less likely than the old national fleets to serve as instruments of policy of foreign governments.

As a result, little is heard today about the commercial need for a U.S. merchant marine. A study published 11 years ago by the Transportation Center at Northwestern University concluded that "there appears to be little net economic contribution to the United States by the subsidized liner firms or deriving from the subsidy program." [2] A recent study for the Committee of American Steamship Lines by the firm of Harbridge House, Inc. found that the benefits from the subsidy program greatly outweighed the costs of the program (see, however, the comment below under Balance of Payments); but in measuring those benefits, nothing was included for the fleet's commercial value.[3]

National Security

More commonly today the maritime subsidies are defended on the ground that national security demands a strong U.S. merchant fleet. This argument has always been made in support of the subsidy system. For example, the Maritime Commission in its 1937 report affirmed that "the relationship that exists between merchant vessels and national defense" is one of "only two sound considerations that justify the expenditure of public funds to maintain a foreign-going fleet by the United States" (the other consideration being the commercial one mentioned before). Lately the national security argument has taken pride of place among justifications for the current program of subsidies. This argument is obviously a very difficult one to evaluate and so far no convincing statement, or refutation, of it has appeared.

Balance of Payments

Another argument frequently offered in support of the maritime subsidies is the balance-of-payments argument, which emphasizes the favorable effect of the U.S. merchant marine on the U.S. balance of payments. By maintaining a U.S. merchant fleet, the Federal Government insures that fewer dollars than otherwise are paid to foreigners for shipping services, which diminishes the deficit, or increases the surplus, in the balance-of-payments account. Furthermore, foreigners will buy some shipping services from Americans, contributing further to a more favorable U.S. balance of payments.

Like the national security argument, this is a difficult one to evaluate. The argument itself is sound; the difficulty comes in measur-

---

[2] Allen R. Ferguson et al., "The Economic Value of the U.S. Merchant Marine" (Evanston, Ill., 1961), p. 470.

[3] James R. Barker and Robert Brandwein, "The United States Merchant Marine in National Perspective" (Lexington, Mass., 1970).

ing the benefits. It is important to distinguish between the benefits of the program and its balance-of-payments impact. The impact is simply the number of dollars that are paid each year to American shipowners instead of to foreigners, or are received from foreigners, in return for shipping services. A study by Harbridge House, Inc., estimates that the impact of the program was $2.2 billion during the 3 years 1964 through 1966.[4] That is, the deficit in the U.S. balance of payments during these years was $2.2 billion less than it would have been had the shipping services that were purchased from Americans been purchased instead from foreigners. But this figure is no measure of the benefits of the program. To know what the benefits were, we must determine what it was worth to the Nation to decrease its balance-of-payments deficit by $2.2 billion during those years. It is scarcely credible that the Nation would have been willing to expend $2.2 billion of real resources to decrease its deficit on foreign account by an equal amount; or to put it another way, that the Nation would have been willing to spend $1 to save $1 of foreign exchange. There is no way of telling how much it would have been willing to spend, but very probably the amount was far less than $2.2 billion, perhaps less even than $1 billion.

So the balance-of-payments argument must be handled more dexterously than it has been. The error that we are warning against here was committed in a recent book in which the balance-of-payments impact of the American merchant marine is identified with its balance-of-payments benefit.[5] The impact has been far greater than the cost, leading the authors to conclude that by a standard benefit-cost test the expenditures on the subsidy program have been justified. They *may* have been justified; but it will take a more expert analysis than is offered in that book to demonstrate the fact.

Operating-Differential and Construction-Differential Subsidies

The two principal aids that are given to our maritime industries are operating-differential subsidy and construction-differential subsidy. Both were established by the Merchant Marine Act of 1936. The more costly of the two has been the operating subsidy.

Operating-Differential Subsidy

The authors of the 1936 act entertained two conceptions that strongly affected the legislation they wrote: The first, that there are certain shipping routes in U.S. foreign commerce that it was essential American vessels should serve; and the second, that the subsidies provided to ship operators should be just sufficient to offset the cost advantages of foreign competitors.[6] The act established a U.S.

---

[4] Harbridge House, Inc., "The Balance of Payments and the U.S. Merchant Marine," included as appendix C in Barker and Brandwein, "U.S. Merchant Marine."

[5] Barker and Brandwein, "U.S. Merchant Marine."

[6] Neither idea was novel. The first had been anticipated in the Merchant Marine Act of 1920, which directed the U.S. Shipping Board to determine what steamship lines should be established from ports of this country to world markets that the Board thought were "desirable for the promotion, development, expansion, and maintenance of the foreign * * * trade of the United States." Practically the same language was used in the 1936 act, "essential" however being substituted for "desirable," and the reference being to routes rather than markets.

The policy of tailoring the size of the subsidy to the difference in costs between U.S. and foreign operators was followed in the award of ocean-mail contracts under the ill-fated Merchant Marine Act of 1928, after early revelations of waste and mismanagement. See Lawrence, "U.S. Merchant Shipping," p. 44.

Maritime Commission (superseded in 1950 by the U.S. Maritime Administration in the Department of Commerce) and assigned it a long list of duties, one of which was to identify essential trade routes in U.S. foreign commerce. Once that was done, the act directed the Commission to enter into contracts with U.S. citizens for the payment of operating-differential subsidy for service on those routes. The service must, of course, be provided with U.S.-flag vessels. The vessels must also have been built in the United States.

The Maritime Administration enjoys wide latitude in determining what services are essential in U.S. foreign commerce. The language of the act provides little guidance in making this determination, although it enjoins the Administration, in so many words, not to be extravagant. In practice every route on which a substantial volume of foreign commerce moves to or from this country has been identified as an "essential" route.

Today there are 27 trade routes, five trade areas, two round-the-world services, and a tricontinent service that are deemed by the Maritime Administration to be essential for U.S. foreign commerce within the meaning of the 1936 act.[7] Of these 35 routes (as for convenience's sake we may call them), 27 are served by U.S.-flag lines on regular schedules, many by more than one line. Subsidies are provided to 11 operators for provision of service on 24 routes. It seems that in planning its administration of the subsidy program soon after the 1936 act was passed, the Maritime Commission envisioned that only one operator on any route would be subsidized.[8] Today 11 trade routes are served by two or more operators receiving subsidy payments. Five routes are served by three or more.

The Merchant Marine Act of 1970 made an important change in the way operating-differential subsidy is calculated. It has added considerably to the complexity of the calculations, and may even be said to have altered the character of the subsidy as a "differential" subsidy. Still, much in the law remains as before, and it is probably easier to describe first the subsidy as it was, and then explain what changes were made in 1970, than to begin by describing the current subsidy.

Principle of the Subsidy

The word "differential" contained in its name expresses exactly the principle of this subsidy. The payments that are made to U.S. operators are intended to exactly offset the difference between the high costs they must pay to operate U.S.-flag vessels and the lower costs of their foreign competitors. This is sometimes referred to as the "parity principle": the principle that the payment of subsidy should establish parity of costs among foreign and domestic operators. Even with the best will in the world, however, it would be impossible in practice to do better than approximate this ideal, owing to the extreme difficulty of discovering what costs are paid by the operators of foreign-flag ships.

---

[7] U.S. Department of Commerce, Maritime Administration, "Essential United States Foreign Trade Routes," December 1969, pp. 4–10.

[8] See Lawrence, "U.S. Merchant Shipping," p. 71.

Until 1970, the Merchant Marine Act of 1936 explicitly recognized five items of operating expense that were likely to cost the operators of U.S.-flag vessels more than they cost the operators' foreign competitors. They were (1) insurance, (2) maintenance, (3) repairs not compensated by insurance, and (4) wages and (5) subsistence of officers and crew. The part of the act that declares how much subsidy each contractor may receive is too wordy to repeat verbatim, but its substance is this: the contractor shall be paid an amount not greater than the excess of the "fair and reasonable cost" of these five items over the estimated cost of the same items if the contractor's vessels were operated under the flag of a "substantial" foreign competitor. And that is all—nothing to indicate what costs are fair and reasonable, how a competitor's costs are to be estimated, or what is substantial competition. In addition, the act authorizes the Maritime Administration to pay a differential subsidy on any other items of expense whose higher cost puts the contractor at a substantial disadvantage with its foreign competitor, and to grant an additional subsidy whenever necessary to offset government aid to foreign competitors; but no payments have ever been made under either provision.

Operating-differential subsidies are computed separately for each trade route. In every case the Maritime Administration determines as best it can the operating costs of the contractor's principal foreign competitors, limiting its attention to those items of expense that may be subsidized. An effort is made to compare like with like, by making this determination only for a vessel that is approximately comparable to the contractor's own vessels. If none are comparable, the expenses are calculated for a hypothetical vessel that is. For each item of expense the same procedure is followed. The difference is calculated between each competitor's cost and the contractor's cost; a weighted average is computed of the differences, with weights that reflect the importance of the competitors; and the difference is expressed as a fraction of the contractor's own expense. This then determines the subsidy rate.[9]

Once the subsidy rate is found, the amount of subsidy that is due the operator is calculated as the product of the rate and the operator's expenses. The calculation is repeated for each subsidizable item of expense.

Size of Subsidizable Expenses

Much the most important subsidizable expense, and the one that accounts for the lion's share of subsidy expenditures on all trade routes, is the wages of officers and crew. Table 1 illustrates the importance of this item in operators' accounts. The table records the voyage expenses of all cargo ships in subsidized service during 1969. Payments of wages amounted to 30.2 percent of total voyage expenses. Insurance, maintenance and repairs (which are always lumped together in subsidy calculations), and subsistence were much less costly, adding up to just 13.6 percent of total expenses. These are average figures; the proportions vary by type of ship and trade route sailed.

---

[9] A more detailed description of this procedure, with examples, is given in Ferguson et al., "Economic Value," pp. 45–49.

TABLE 1.—CARGO SHIPS IN SUBSIDIZED SERVICE, 1969: TOTAL VOYAGE EXPENSES, SUBSIDY RATES, AND TOTAL SUBSIDY ACCRUALS

Item of expense	Total voyage expenses		Subsidy rate (percent)	Total subsidy accruals	
	Amount (thousands)	Percent of total		Amount (thousands)	Percent of total
	(1)	(2)	(3)	(4)	(5)
Vessel operating expenses:					
Wages:					
Straight time	$80,063	12.0			
Overtime	42,013	6.3			
Other (payroll taxes, pension and welfare fund payments, etc.)	79,757	11.9			
Total wages	201,833	30.2	67.3	$135,843	84.6
Subsistence	9,576	1.4	18.1	1,734	1.1
Stores, supplies, and equipment	12,003	1.8			
Repairs and other maintenance expenses	36,787	5.5	27.6	10,147	6.3
Fuel	34,999	5.2			
Insurance:					
Hull and machinery	16,686	2.5	28.7	12,825	8.0
Protection and indemnity	27,968	4.2			
Other	662	.1			
Total insurance	45,317	6.8			
Other vessel expenses	3,899	.6			
Port expenses (pilotage, wharfage, mooring fees, etc.)	61,862	9.3			
Cargo expenses (lighterage, stevedoring charges, etc.)	231,115	34.6			
Brokerage expenses	6,631	1.0			
Other voyage expenses	24,227	3.6			
Totals	$668,249	100.0		$160,550	100.0

Note.—Figures in this table relate only to operations of cargo ships. Operators also accrued $45,928,000 in subsidies for operation of 4 combination cargo-passenger ships and 9 passenger ships during 1969.

Source: Cols. 1 and 4: Unpublished tables, Office of Subsidy Administration, U.S. Maritime Administration. Col. 3: Col. 4 ÷ col. 1.

The total amounts expended in subsidy depend not only on the size of each item in an operator's account but on the subsidy rate as well. The average rate of subsidy for cargo ships on all trade routes in 1969, by item of expense, was: insurance, 28.7 percent; maintenance and repairs, 27.6 percent; subsistence, 18.1 percent; and wages, 67.3 percent.[10] Again wages rank first, this time in an ordering by subsidy rate. Of every dollar of wages paid aboard cargo ships in subsidized service during 1969, about 67 cents was paid by the Federal Government. The combination of a high subsidy rate and large expenditures by contractors means that the bulk of subsidy accruals is in respect of wages—84.6 percent in 1969. Column 4 in table 1 presents the dollar amounts of operating subsidy that were accrued by contractors for the operation of cargo ships in 1969, by item of expense. The accruals are tentative, being subject to final determination of the subsidy rates and to final audit of the contractors' accounts. If payments are made in the amount of the accruals, they will cover 24.0 percent of voyage expenses, and account for 19.6 percent of operators' revenues.

Subsidies for Bulk Services

Between 1936 and 1970 the only cargo ships that were eligible for operating subsidies were liners offering regular service on established

[10] These figures are provisional and may be adjusted slightly before the last subsidy payments are made to operators for voyages completed in 1969.

trade routes. The Merchant Marine Act of 1970 amended the 1936 act to allow subsidies to be given to U.S. vessels in bulk cargo carrying services.

Bulk carriers offer a very different service from that of cargo liners. Liners act as common carriers, sailing along fixed routes on regular schedules, and accepting cargoes from many different shippers for delivery at ports along the liner's route. Ships engaged in the bulk trades sail wherever business takes them. Typically they are chartered for one or more voyages to carry a single cargo occupying much of their capacity, such as a shipload of ore, oil, or grain. Nowadays many new bulk vessels, including tankers, are chartered for periods of years by a single shipper, such as an oil company, even before the vessel's keel is laid. Indeed, without the assurance of such a charter many shipowners would refuse to risk their capital in a large new ship.

Because of these differences, it was necessary to strike many of the references to trade routes from the 1936 act and replace them with the words "essential services," in order to bring bulk cargo carrying services within the compass of the act.

The Maritime Administration has moved slowly in establishing a subsidy program for bulk carriers. By June 30, 1972 five contracts had been signed, four of them for the subsidized operation of 13 bulk vessels. None of the vessels has been built yet, and none will begin service much before 1974. All will be built with the aid of construction-differential subsidies.

Subsidized service under the fifth contract has already begun. The contractor operates vessels on the Great Lakes, and will receive an operating-differential subsidy for service in the bulk trades between the United States and Canada. The service will be on a small scale; the contract is limited to two years; and both parties apparently regard the arrangement as something of an experiment to discover what problems arise in the course of this novel program.

Apparently none of the contracts that have already been concluded spells out exactly what amounts of subsidy will be paid to the operators. The Maritime Administration has had no experience subsidizing irregular operations. It admitted to Congress in 1970 that it could suggest no statutory language for regulating subsidies to bulk operators that would be as particular as the language already in the act that specifies what operating expenses of cargo liners may be subsidized and how those subsidies shall be determined. It therefore favored language that would afford it maximum freedom to devise a proper subsidy program. Congress obliged, and the law now gives the Maritime Administration discretion to pay whatever subsidy is needed "to make the cost of operating [a vessel in an essential bulk cargo carrying service] competitive with the cost of operating similar vessels under the registry of a foreign country."

The opening of the subsidy program to ships in the bulk trades must stem in part from the common practice of representing U.S.-flag participation in the Nation's foreign trade in terms of weight of cargoes carried rather than their value. We are constantly reminded how small a share of cargoes that move in U.S. foreign commerce is carried in U.S. vessels. Invariably the supporting statistics are organized by weight rather than by value. Table 2 shows that by either measure U.S. vessels now carry a much smaller share of the Nation's exports

and imports than they did in 1956, the first year for which both figures are available, a share that continues to decline year after year. But the decline appears more precipitous, and thus perhaps more worrisome, and the level of U.S. participation is lower, if the U.S. share is expressed by weight of cargoes carried than by value. The cause of the more rapid decline in the statistics by weight is the considerable growth that has occurred in U.S. imports of oil and dry bulk commodities in the postwar period, nearly all of which are transported in foreign vessels. On the other hand, the value of these bulk commodities is still much smaller than the value of goods carried in the liner trades, in which U.S. participation is higher.[11]

TABLE 2.—SHARE OF ALL COMMERCIAL CARGOES IN U.S. OCEANBORNE FOREIGN COMMERCE CARRIED BY U.S. VESSELS

[In percent]

	1947	1951	1956	1961	1966	1970 [1]
By value	(2)	(2)	33.8	25.6	22.5	20.6
By weight	57.6	39.8	20.7	9.7	6.7	5.6

[1] Provisional figures.
[2] Not available.

Source: U.S. Maritime Administration, annual report, 1971, pp. 75–76.

It should be stressed that the choice is purely arbitrary whether one represents U.S.-flag participation in the foreign trades by weight or by value. Neither measure is wholly satisfactory. Expressing U.S. participation by weight of cargoes carried emphasizes the tiny share of bulk cargoes that moves in U.S. vessels. Expressing U.S. participation by value of cargoes carried emphasizes the larger share of liner cargoes that moves in U.S. vessels. Both measures really are needed if all the facts are to be presented. All too frequently only one statistic is cited, the one that better serves the interests of the speaker. While Congress deliberated the new maritime program in 1970, advocates of the program used cargo statistics expressed in weight to illustrate their argument that a major expansion of the Nation's merchant marine was needed. It was seldom made clear that the low level of U.S.-flag participation they were citing stemmed from the small share of bulk cargoes that U.S. vessels carried. Had this been explained, it might have prompted others to ask how necessary it is that U.S. vessels should participate to an equal degree in all three services—the oil trades, dry bulk trades, and liner trades—and whether the national interest might not be better served by improving performance in the one or two services deemed most vital.

As it happened, these questions were never raised, at least not in public, and the goal was set of building a merchant fleet capable of carrying 30 percent of the Nation's foreign trade—by weight. This goal dictates an extension of the aid program to vessels in the bulk trades; for even if U.S. vessels carried *all* cargoes moving in the liner trades, the U.S. share of cargo movements in all trades in 1970 would have increased only from 5.6 percent to 14.6 percent, well short of the established target.

[11] 28.7 percent by value, 21.4 percent by weight, in 1970.

Wage Subsidies

The most important change in the operating subsidy program that was made by the 1970 legislation affected the method of calculating the wage subsidy. The amount of subsidy to be paid to an operator had previously been determined in accordance with the "parity principle," the rule that the subsidy should be just large enough to lower the costs of the contractor to the level that its foreign competitor would face if the competitor operated the same vessel. As applied to wage costs, this principle meant that the Government must pay the operator of a U.S.-flag vessel the difference between the high wages that the operator paid its U.S. officers and crew, provided that the wages were "fair and reasonable," and the lower wages that were paid by its foreign competitor. It also meant that when new wage agreements were negotiated between maritime unions and operators, any increase in wages was borne by the Federal Government.

This arrangement was unsatisfactory for several reasons. It was plain to everyone what little incentive operators had to assume a tough posture in their wage bargaining with maritime unions. Operators would bear the cost of a strike, if a strike came; but the additional cost of a more generous settlement that might avert a strike, or end one, would be borne in full by the Federal Government. This lack of symmetry was a deep flaw in the subsidy program, which became more and more noxious as wage costs, and wage subsidies, soared in the 1960's.

In theory, the Government's interests might have been protected by measuring all wage claims against the "fair and reasonable" standard and disallowing those that incorporated exorbitant wage increases. In practice, it would be folly to suppose that the Maritime Administration could have dictated its notions of fairness and reasonableness to the shipping industry. For years it did not even try. Early in the postwar period, when the wages of shipboard labor were thought to have fallen below those paid in comparable shoreside employment, the Maritime Administration acquiesced in the wage increases negotiated by the maritime unions and refrained from finding any wage payments to be in excess of what was "fair and reasonable." In 1955 Congress admonished the Maritime Administration to pay more heed to the standard and scrutinize operators' wage claims more critically. Ten years later the Maritime Subsidy Board, which must pass on such matters, disallowed a part of the wage claims filed by the operators on the grounds that the wage increases they had agreed to in contracts with the maritime unions were excessive, and that the wages they were paying contravened the standard.

The Secretary of Commerce overruled the Board's decision, but served notice that in the future, wages established in collective-bargaining agreements would be tested by the "fair and reasonable" standard more rigorously than they had been. At this point, the Maritime Administration began looking for a criterion that might replace the "fair and reasonable" test, a search that led to development of the wage index system.

In 1971 the Maritime Administration began paying operators the difference between an amount called their "subsidizable wage costs" and the estimated wage costs of their foreign competitors. Ini-

tially each operator's subsidizable wage costs were set equal to its true wage costs, less any expenses that the Maritime Administration disallowed. Each year thereafter subsidizable wage costs are to be adjusted in phase with changes in a newly created index of wage rates for workers in other industries. If seamen's wages increase faster than the wage index, operators must pay the difference themselves. If they increase less rapidly than the wage index, operators may keep the difference. Several constraints were included in the plan to limit the losses that operators might suffer or the profits they might gain; thus in no year may subsidizable wage costs fall short of 90 percent or exceed 110 percent of an operator's true wage costs. Every few years the subsidizable wage costs will be readjusted if they have strayed too far from the operator's actual costs and be brought back to within a specified few percentage points of the true costs.

Construction-Differential Subsidy

The second important subsidy established by the 1936 act provides financial aid to shipowners for the purchase of new vessels. Several other construction aids are provided by the act, but none has been as costly to the Government, or worth as much to owners, as the construction-differential subsidy. The word "differential" has the same meaning here as it has in the title of the program of operating subsidies. The construction subsidy is intended to lower the cost of a new merchant vessel built in a U.S. shipyard to the cost of the vessel if built abroad. It is the differential between the two costs, in other words, that is paid by the subsidy.

All parties to the maritime program seem to agree that, unlike the operating-differential subsidy, the construction-differential subsidy is a benefit to shipbuilders rather than shipowners. Owners insist that they obtain no advantage from the subsidy, because it only lowers the price of a new vessel to what they would otherwise pay if they ordered the vessel from a foreign shipyard. Only the arbitrary requirement of Federal law that restricts maritime aids to vessels built in this country persuades these shipowners to patronize domestic shipyards, whose prices are so much higher than prices abroad. The subsidy does no more than compensate purchasers of ships for the costs they must bear to help maintain U.S. shipbuilding capability.

As in the case of the operating subsidies, the 1970 Merchant Marine Act made a number of changes, large and small, in the construction subsidy program, without altering its essential character. It seems easiest to proceed as before, describing the program as it existed until 1970, then noting what changes were made in it by the maritime legislation that year.

The 1936 act authorizes the Maritime Administration to accept applications from U.S. citizens "for a construction-differential subsidy to aid in the construction of a new vessel to be used in the foreign commerce of the United States." Until 1970 only the proposed ship purchaser could submit an application, but legislation that year extended the privilege to shipyards as well. The act recites several general criteria that must be satisfied before the Maritime Administration may approve an application, criteria having to do with the need for the vessel in our foreign commerce and the applicant's capability

of operating the vessel. Applications may also be accepted, and subsidies awarded, for the reconstruction of existing vessels; but the act instructs the Administration to give preference to awards for new construction, and that in fact is what has been done.

The act provides two methods of contracting for and building vessels with construction subsidy. In practice, only one of them is used. Omitting some details, the procedure followed is this. After the Maritime Administration approves an application for subsidy, it solicits competitive bids from U.S. shipbuilders for the vessel's construction. The contract is customarily awarded to the lowest bidder. In the meantime the Maritime Administration has calculated the cost of building the same vessel "in a foreign shipbuilding center." The difference between the foreign cost and the lowest domestic bid is termed the construction-differential subsidy. Provided that the price net of subsidy is acceptable to the buyer, contracts will be drawn up between the parties. The applicant contracts with the shipbuilder for construction of the vessel, and agrees to pay the builder a price equal to the vessel's foreign cost; and the Maritime Administration contracts to pay the shipbuilder the construction-differential subsidy.[12]

Limits on Size of Construction Subsidies

Since its enactment in 1936, the Merchant Marine Act has limited the amount of construction subsidy that may be paid for a single vessel. The limit is expressed as a fraction of the vessel's total domestic cost. At first the act declared that the construction subsidy could not exceed 33⅓ percent of the construction cost. Later the limit was raised as the difference between U.S. and foreign construction costs widened. Between 1960 and 1970 the act allowed the Maritime Administration to award subsidies of up to 55 percent of the vessel's construction cost.[13] During this interval construction subsidies constantly amounted to about 50 percent of construction costs, and in several cases reached the limit of 55 percent. Thus the U.S. Government was investing as much money in the new vessels as the private owners themselves. Not that the owners were always content with the subsidy. Many apparently felt that U.S. shipbuilding costs were well over twice as high as foreign costs, and that despite the subsidy they were still having to pay more for their vessels than they would if the vessels had been built abroad.

The maritime legislation in 1970 enacted a declining schedule of upper limits on the amount of construction subsidy that might be awarded on a single vessel between 1970 and 1976. The limit had reverted automatically to 50 percent on June 30, 1970, and there it technically remains. But in testimony before Congress, representatives of the administration stressed that other reforms contained in the

---

[12] The other method of contracting for the vessel calls for the Maritime Administration to purchase the vessel from the shipbuilder at the domestic price, then resell it to the applicant at the lower foreign cost. After the transactions, all parties are left in the same economic position as they would be if they followed the method described in the text. But there is this difference: the Maritime Administration must initially pay the full domestic price from its own account, instead of the smaller construction subsidy, and must therefore ask for larger budgetary appropriations from Congress. The Government is no poorer, of course, because it later receives from the ultimate purchaser the difference between the subsidy and the full price. Nevertheless, this payment is not credited to the Maritime Administration's account but is made directly to the Treasury. Hence the Maritime Administration finds itself in the disagreeable position of appearing to be spending more money than it is, an appearance it prefers to avoid by contracting for vessels by the other method.

[13] And of up to 60 percent, from 1962 to 1970, of the cost of reconditioning passenger vessels.

legislation would enable U.S. shipyards to produce vessels more cheaply, and so would reduce the difference between shipbuilding costs in this country and abroad. Hence the cost of the subsidy should fall too. Beginning in fiscal 1971 the administration expects subsidy awards to be less than 45 percent of the U.S. cost of vessels, in fiscal 1972 less than 43 percent, and so forth in decrements of 2 percent annually until a target of 35 percent is reached in fiscal 1976. Although these numbers have been written into the act, they are not legal limits on the size of awards. That limit remains 50 percent. They are more like productivity goals. In the event that the lowest competitive bid received from a shipyard in any of these years requires payment of a subsidy that is higher than the goal, the Maritime Administration is authorized to negotiate a lower price with any of the bidders; and if it awards a contract that exceeds the goal for that year, it is to notify the Commission on American Shipbuilding of the fact.[14]

In design, the construction subsidy and operating subsidy programs are independent of each other; no provision in the law restricts the award of construction subsidies to persons holding operating subsidy contracts. In practice, however, the Maritime Administration has awarded construction subsidies during the postwar years only to subsidized operators, to aid them in replacing their ships. These operators are obliged by the terms of their contracts to conduct subsidized operations with ships that are not more than 25 years old. Funds have been scarce throughout this period, and no doubt the replacement program has seemed more urgent to the Maritime Administration than the provision of ships to the unsubsidized fleet.

Costs of Operating and Construction Subsidies

The amounts of money that have been spent in the past for operating-differential and construction-differential subsidies are a matter of public record; hence there is no special difficulty in identifying the costs of these aids.[15] Figures published by the Maritime Administration show that from 1936 through 1970 nearly $4.4 billion were paid out in subsidies; $2.9 billion, or 68.1 percent of the total, were paid as operating-differential subsidies; the balance of $1.4 billion was paid as construction-differential subsidies (including subsidies for the reconstruction of vessels).[16]

Most of these expenditures were made recently. All expenditures before 1955, for example, totaled just $472 million—not one-eighth as much as has been spent since then. The low level of earlier expenditures reflects, of course, the impact of World War II: the suspension of operating subsidy contracts during the war, the recapture of much of the operating subsidies paid after the war when shipping profits were high, and the fact that the large number of ships built during the war and sold to private owners afterward made another construction

---

[14] The Commission on American Shipbuilding, which was established by the 1970 legislation, is directed to study the American shipbuilding industry, to ascertain whether that industry can raise its efficiency enough to enable the subsidy rate to be reduced to 35 percent by 1976, and to submit a report of its findings and recommendations to the President and Congress before the end of 1973. But if in the meantime the Maritime Administration awards a construction contract that requires payment of a construction-differential subsidy in excess of the goal for that year, the Commission must submit its report within 6 months of being informed of the award. This requirement contains an implied threat that the Commission may recommend discontinuance of the Administration's new ship construction program.

[15] In its annual report the Maritime Administration publishes a record of annual subsidy payments made in recent years, as well as total expenditures since the programs were established in 1936.

[16] U.S. Maritime Administration, "Annual Report, 1970," p. 22.

program unnecessary for several years thereafter. By the mid-1950's, however, annual expenditures for operating and construction subsidies regularly exceeded $100 million. They grew rapidly between 1957 and 1962. In 1960 operating and construction subsidies exceeded $200 million for the first time; in 1962, $300 million. Thereafter their growth was arrested. Nevertheless more than half of all that has been spent on these subsidy programs was spent after 1962.

A great expansion in the amount of these subsidies is now underway, in fulfillment of President Nixon's pledge to rebuild and revitalize the U.S. merchant marine. Much the larger part of the increase will be for construction subsidies. The administration's new maritime program calls for the addition of 300 vessels to the U.S. merchant marine, all of which are to be built in U.S. shipyards with the aid of construction-differential subsidies. It was planned at first to build up gradually to a rate of construction of 30 vessels a year by fiscal 1973, by awarding contracts for 19 new vessels in fiscal 1971 and 22 vessels in fiscal 1972. Construction would continue at a rate of 30 vessels a year until 300 were finished. These plans apparently have been disappointed. Just 12 contracts were let in fiscal 1971 instead of 19. Some of the shortfall apparently was made up in fiscal year 1972, but not all of it. Only 15 new vessels will be contracted for in fiscal 1973, plus two conversions, instead of the 30 once planned. A sentence in the 1973 budget explains that a construction rate of 30 vessels a year will now be reached in 1974; but under the circumstances this information should be taken with a pinch of salt.

Despite the slower pace of construction than was originally envisaged, construction subsidy expenditures are growing rapidly. Between 1968 and 1970, annual payments of construction subsidies averaged just under $100 million. Much larger sums were appropriated for ship construction for fiscal years 1971 and 1972—$187.5 million and $229.7 million respectively—and a still larger sum of $250 million has been asked for fiscal 1973. Expenditures lag behind appropriations, of course; but unless markedly smaller sums are requested of Congress next year and the year following, the amounts being expended for construction subsidies will soon be in the neighborhood of a quarter-billion dollars a year.

Operating subsidy expenditures have increased much less. Between 1968 and 1970 they averaged $200 million a year. At first Congress appropriated $193 million for operating subsidies for fiscal 1971, but later it increased the amount to $273 million. The additional $80 million were intended to finance certain nonrecurring expenditures, and will be disregarded here.[17] It now appears that the Government will obligate nearly $220 million in operating subsidies during fiscal 1972, and an estimated $240 million in fiscal 1973. Notwithstanding this growth, payments of operating subsidy will account for a smaller fraction of all subsidy expenditures than they did between 1968 and 1970, when they were twice as large as payments of construction subsidy. For at least the next few years, subsidy payments under the two programs will be approximately the same.

---

[17] Half the supplement was intended to discharge the Government's liability to contractors for operations completed several years before, the final payments for which had been delayed when contractors and the Government disagreed over the proper rates of subsidy to use. The other half financed an acceleration of subsidy payments as provided under the Merchant Marine Act of 1970.

And so, within the space of 20 years, Federal subsidies for the construction and operation of commercial ships will have increased from $121 million a year in 1955 to more than $500 million a year by the middle of the 1970's. Is it possible to predict how much larger they will grow? Probably not, since so much depends on how vigorously the administration presses its new construction program. If the administration really does intend to ask for funds to build 30 new vessels in fiscal 1974, it will have to ask Congress for far more than the $250 million it is seeking for ship construction in fiscal 1973. The 15 new vessels in the 1973 construction program are expected to cost about $247 million in construction subsidies, or an average of $16.5 million apiece. The cost per ship ranges from $8 million for one kind of vessel to more than $25 million for another. If the administration proposes to build the same ships in 1974, but in twice the numbers, it will undoubtedly have to seek budget authority of about $500 million. This it seems unlikely to do. Instead the administration will probably plan a different and less expensive mix of vessels, or will plan on ordering fewer than 30, or both.

(Since these lines were written early in 1972, the funds available for construction subsidy have increased dramatically. Congress eventually appropriated $425 million for obligation in 1973, instead of the $250 million that the administration requested. Unless the Office of Management and Budget impounds a part of these funds, the current costs of the construction program will be much higher than forecast here.)

As for operating subsidies, these are not apt to grow dramatically during the next few years. There seems to be little temper within the Maritime Administration to seek large increases in operating subsidies; on the contrary, officials in that agency have stressed that at least some of the new vessels to be built with construction subsidies should require *no* operating-differential subsidy. Hope has been expressed that the new wage-index system of computing wage subsidies will arrest their growth.

There is no way of telling how much the administration's ship construction program will cost by the time it is finished, still more how much the entire maritime program will cost in subsidies and forgone tax receipts. It reflects no credit on any of the parties connected with the program that no public estimates of its cost were ever demanded or volunteered as it moved toward enactment—apart from an obviously fallacious estimate of $1 billion offered by the Secretary of Commerce to the House Committee on Merchant Marine and Fisheries.[18] Newspaper accounts published when President Nixon signed the Merchant Marine Act of 1970 contained estimates of the program's cost that ranged from $2.7 billion to $6 billion over a 10-year period, the bulk of which would presumably be in the form of construction subsidies.

One reason why the future costs of the construction program are so difficult to estimate is the uncertainty surrounding the number of vessels that will eventually be built. Officials of the Maritime Administration have lately begun speaking of building 300 new vessels "or their productive equivalent." One large vessel may be the productive equivalent of two smaller vessels if their sizes and speeds stand in the

---

[18] U.S. Congress, House, Committee on Merchant Marine and Fisheries, Subcommittee on Merchant Marine, "President's Maritime Program, Part I: Hearings on a Report of the Secretary of Commerce and the Maritime Administrator," 91st Cong., first sess., 1969, pp. 22–23.

right relation. When the Maritime Administration sketched the outlines of its original construction program and determined that the U.S. merchant fleet needed 300 new vessels, it apparently considered building smaller vessels than are commonly being built today. Now it appears that such vessels would be too small to compete with the larger, more productive vessels being built elsewhere. Accordingly construction plans are being revised to build larger vessels. The Maritime Administrator has stated that if larger ships are built fewer will be needed, hence the original figure of 300 new ships may be reduced.

One of the effects of the decision to build larger ships is visible in the budget estimates for 1973. Four 250,000-ton supertankers are planned, each one of which will cost the Government more than $25 million. No vessel in the 1972 ship construction program was estimated to cost the Government more than half as much.

So it is clearly risky to use the 1973 estimates to forecast the costs of the entire construction program. It would be better to use the 1972 estimates, when somewhat smaller ships were still being planned, meanwhile bearing in mind that if smaller numbers of larger ships are built instead, the costs of the program may be somewhat lower. We assume that the rate of construction subsidy can be lowered to 35 percent by fiscal 1976, that shipbuilding costs will increase by 5 percent a year, as they did during the 1960's, and that roughly the same kinds of vessels will be built throughout the program as were planned for 1972, and in the same proportions. Then using the cost estimates that appeared in the 1972 budget, we can calculate that the Government's share of construction costs will exceed $3.4 billion by the time the last of 300 ships moves down the ways.

The importance of lowering the subsidy rate to 35 percent is illustrated by the fact that if the rate cannot be reduced below 45 percent, the Government will have to contribute more than $4.1 billion to complete the construction program. To date, however, subsidy rates on new construction have been below 45 percent, and within the limits established by the 1970 legislation.

In conclusion, it bears pointing out that the large naval shipbuilding program that is prefigured in the 1973 defense budget may threaten the success of the much smaller commercial ship construction program. If the shipyards accept all the Navy business they can handle, the Maritime Administration will be hard put to find the capacity it needs to step up construction to 30 ships a year. Moreover, fewer bids are likely to be filed for each commercial contract, and prices will rise. If prices rise much, they will drive subsidy rates above the limits that were enacted in 1970, and provoke a reconsideration of the entire shipbuilding program.

Cabotage Laws

From its original meaning of "navigation along the coast," the word *cabotage* has come to denote as well the widespread practice of reserving the trade along a nation's coast to ships of the national fleet.[19] Coasting trade is often used synonymously with cabotage in its first sense, and the laws that reserve the trade to national ships are called *coasting laws* or *cabotage laws* In U.S. usage, coasting trade includes not only commerce along the Atlantic and Pacific coasts, but also that

---

[19] *Cabotage* apparently stems from the Spanish *cabo*, cape or promontory. According to one authority, it once meant only navigation along a protected stretch of shore between two capes, whence its meaning grew to include longer coastal voyages that required passage on the open sea.

between the coasts, plus trade between the mainland and Alaska, Hawaii, Puerto Rico, and U.S. territories and possessions.

For centuries international law has recognized the sovereign right of every nation to reserve its coasting trade to nationals. Most maritime nations have exercised this right, none of them more watchfully than the United States. Cabotage is one of the oldest forms of public assistance to national maritime industries, as well as the most common one among nations. It is the oldest extant form in the United States, and for most of our history was the most important one also. Today its importance has lessened. The decline of the domestic trades in the postwar period has diminishcd the advantage the maritime industries gain from cabotage compared with what they receive in other forms of government assistance. Nevertheless the costs of cabotage are still large and no account of maritime aids should slight them.

Evolution of U.S. Cabotage Laws

With few exceptions, limited in time and usually to particular trades, the United States has effectually barred foreign ships from participating in the U.S. coasting trade since the Federal Government was founded. At first foreign vessels were excluded through a system of discriminatory tonnage duties. In 1817 this method of exclusion was supplanted by an express prohibition on the movement of goods between U.S. ports in foreign vessels. An exception allowed such vessels to sail from port to port for the purpose of unloading goods transported from abroad and loading goods bound abroad. This statute was the Nation's first true cabotage law, and its substance has prevailed to this day.

The cabotage laws of the United States, both past and present, have always reserved the coasting trade to vessels not only documented under U.S. laws but also built in the United States. Originally the first reservation implied the second. Between 1789, when the first registry law was passed, and 1912, the privilege of U.S. registry was restricted to vessels of domestic construction. The Panama Canal Act of 1912 extended this privilege to foreign-built vessels, as long as they engaged in the foreign trades only. Foreign-built vessels were expressly prohibited from engaging in the coasting trade—the first such prohibition that had ever appeared in U.S. law. This provision has never been repealed, and is a part of the U.S. cabotage laws today.

The cabotage laws were briefly suspended following American entrance into World War I. Section 27 of the Merchant Marine Act of 1920, which restored the cabotage laws, is familiarly known as the Jones Act, a name that has gained currency as a synonym for all the cabotage laws.[20] Its use in this context is apt to be misleading. The name refers not to an act but to a section of an act; the section did not establish the coastal monopoly, but merely reestablished it without essential change after a brief hiatus; the section is still in force, but is only one, though perhaps the most important one, of several statutes that comprise the U.S. cabotage laws. To add to the confusion, another section of the same Merchant Marine Act that gave seamen additional rights for the recovery of damages for personal injury caused by the negligence of employers or fellow crew members also bears the name of the Jones Act.

---

[20] The name commemorates Wesley L. Jones, U.S. Senator from Washington between 1909 and 1932, who effectively represented maritime interests.

Cabotage Laws Today

The current cabotage laws of the United States are scattered about title 46 of the United States Code. Their dispersal among seven sections reflects their piecemeal development, not a tidy arrangement by subject matter. The most explicit reservation of the coasting trade to vessels built in the United States and documented under the U.S. flag derives from the Merchant Marine Act of 1920.[21] The reservation of the trade to vessels of domestic construction is repeated elsewhere in the title.[22]

A third section extends the coasting laws to the nation's territories and possessions.[23] Another section reserves the transport of passengers between ports of the United States to U.S. vessels.[24] This section has been held to be no bar to voyages on foreign vessels that begin and end at the same U.S. port; hence U.S. vessels have no monopoly of the cruising trade. The most recent addition of significance to the cabotage laws is a ban on the landing by foreign vessels of their catch of fish in U.S. ports.[25] Foreign-built dredges are forbidden to dredge in U.S. waters, unless documented as U.S. vessels.[26] Foreign tugs may not tow U.S. vessels or foreign salvors engage in salvaging operations in U.S. waters.[27]

Costs of Cabotage

It is useless to pretend that the full costs of cabotage can ever be determined. In particular, the indirect costs are impossible to reckon. These are the costs that shippers must bear who are forced by the high costs of domestic shipping to send their goods by other transport. The cost of cabotage in this instance is the extra expense of sending the goods by truck or rail or even air over what it would cost to ship them by sea if the cabotage laws had never existed. Of course, it is not shippers alone who must pay these costs. Their customers share them, by paying higher prices for the goods they buy. Because prices are higher, customers buy less of the goods than they otherwise would, substituting cheaper goods for dearer ones. In extreme cases entire markets may be lost to certain products. Whether consumers merely curtail their purchases of the dearer goods, or shun the goods entirely, they suffer what we call a "welfare loss" when their consumption opportunities are abridged in this way.

There is little we can do to measure this loss. Perhaps we could estimate the loss associated with a particular product, but there is simply no practical way of measuring the aggregate loss throughout the economy. That is no reason, however, for overlooking these indirect costs, or for imagining them to be small; they may not be. Nevertheless, in the rest of this discussion we shall do as we must and ignore all indirect costs.

---

[21] 46 U.S.C. 883.
[22] 46 U.S.C. 11.
[23] 46 U.S.C. 877. The Act of April 16, 1936, ch. 288, 49 Stat. 1207, made an exception for the Virgin Islands. Until the President proclaims otherwise—none has done so yet—trade among the Islands and between the Islands and other U.S. ports remains open to foreign vessels.
Another exception had been made 2 years before for American Samoa.
[24] 46 U.S.C. 289.
[25] 46 U.S.C. 251; from Act of September 2, 1950, ch. 842, 64 Stat. 577.
[26] 46 U.S.C. 292.
[27] 46 U.S.C. 316.

The direct costs of cabotage are also incapable of exact measurement; but at least a rough idea can be formed of their magnitude. By direct costs we mean the additional costs attributable to the cabotage laws of operating vessels in the U.S. domestic trades. As explained above, the cabotage laws affect a great many maritime activities, from fishing and salving to the operation of tanker fleets along the U.S. coast. We shall focus here solely on the effects of these laws on domestic oceanborne commerce, both because these are the effects most readily measured, and because they are likely to be of greatest importance.

Two features of the U.S. cabotage laws must be distinguished: (1) the condition that only vessels built in the United States may engage in the domestic trades (called here the building restriction); and (2) the reservation of domestic commerce to U.S.-flag vessels, with all the attendant expenses that entails (called here the operating restriction). Since they are quite different restrictions, their costs must be estimated differently. But in addition, they are of separate interest, since one can imagine a system of protection containing just one of these features; hence we desire to know their separate costs.

Costs of the Building Restriction

Despite obvious differences in form, the building restriction and the program of construction-differential subsidies are essentially similar methods of assisting the shipbuilding industry. Both function alike, by increasing the demand for the products of U.S. shipyards. The building restriction increases demand by barring access to foreign markets: whoever wishes to operate ships in the domestic trades must build his ships in domestic yards. Construction subsidies increase demand by lowering the price of the domestic product. The two forms of assistance are administered through different parties: the building restriction affects demand by operators in the domestic trades; the construction subsidies affect demand by operators in the foreign trades

The building restriction has greatly increased the cost of acquiring new vessels for the U.S. domestic fleet. We estimate that between 1950 and 1970 U.S. customers of American shipyards paid between $0.9 and $1.0 billion more for the construction of new vessels and conversion of old ones than they would have paid for the same work abroad. This sum is not very much less than the $1.13 billion of aid given directly to the shipbuilding industry since 1954 as construction subsidies.

In recent years construction subsidies have been of substantially greater benefit to shipbuilders than the building restriction. Relatively few large vessels were ordered for private account from U.S. shipyards between 1960 and 1965 without the aid of construction subsidy. Unsubsidized orders picked up during the second half of the decade; but for all 11 years from 1960 through 1970 just over $1 billion was spent as construction subsidies, compared with costs of $0.6 billion over foreign prices that we estimate U.S. shipowners paid for unsubsidized new construction and conversions in domestic shipyards.

Something must be said about how these costs have been estimated. We confined our attention to the period 1950–70. We began by assuming that during this period no U.S. shipowner would have built its

vessels in the United States, or performed conversions here after July 1956,[28] without benefit of construction subsidy, if the building restriction had not made it do so. Knowing the estimated value of unsubsidized new construction and conversions performed in U.S. shipyards, we next estimated how much the work would have cost abroad. The difference, modified as described below, is the amount offered above as an estimate of the cost of the building restriction.

The assumption, unflattering to U.S. shipbuilders, that U.S. shipowners patronized domestic yards only because they had to is certainly extreme, and in fact was modified in the course of our work. During the 1950's a few vessels were built here for foreign registry. The cabotage laws played no role in securing this work for U.S. shipyards. The business must have come here because the price was right or delivery was quick, or for other reasons. This suggests that U.S. shipyards were occasionally able to compete with foreign builders, and that at least some U.S. shipowners would have built their vessels here regardless of the building restriction. This must have been especially true immediately after the Suez Canal was closed in 1956, an event that precipitated a flood of orders everywhere for new tonnage. With the world's shipyards working at capacity, a number of vessels were ordered from U.S. yards for foreign registry. Under the circumstances, it is hardly conceivable that all, or perhaps even most, of the unsubsidized vessels built in the United States for U.S. registry in 1958 and 1959 would have been built abroad in the absence of the building restriction. Accordingly, we amended our assumption and lowered our estimate of the cost of the building restriction between 1950 and 1959 by an arbitrary one-third.

No such adjustment seems necessary for later years. No ships were built for foreign registry in U.S. shipyards during the 1960's, presumably because the domestic product was priced roughly twice as high as the foreign product. It is plausible to suppose that no private shipowner would deliberately have bought so costly a vessel, and that those shipowners who did build in this country did so only because of the cabotage laws.

We used the published rates of construction-differential subsidy to compute the cost of comparable foreign-built vessels. For vessels ordered in 1961, for example, we used the average rate of construction subsidy on all subsidized contracts awarded in 1961, a figure available from the Maritime Administration. For years before 1957, when the most recent subsidized construction program began, we assumed that the subsidy rate would have been 45 percent. In most cases we adjusted these rates before using them. Until a few years ago nearly all subsidized construction in this country had been of break-bulk cargo vessels, whereas nearly all recent unsubsidized construction has been of tankers. The extra cost of building a tanker in this country over the cost of building it abroad, expressed as a fraction of the domestic cost, is ordinarily less than the corresponding increment for a break-bulk vessel. Hence we lowered the subsidy rate by one-tenth (from, say, 45 percent to 40.5 percent) to compute the foreign costs of tankers.

---

[28] It was not until July 14, 1956, that the cabotage laws were amended to exclude from the domestic trades vessels that were built in the United States but subsequently rebuilt abroad.

Costs of the Operating Restriction

The costs of the operating restriction are more difficult to estimate. If the cabotage laws were ever repealed, foreign operators presumably would enter U.S. domestic service, compete against each other and against U.S. operators, and by their competition drive shipping prices lower. We cannot be certain how low prices would fall; but we expect they would fall by roughly the difference between the costs of U.S. operators and the lower costs of foreign operators.[29] Hence, the problem of determining what the costs are of the operating restriction becomes one of determining how much lower the costs would be of foreign operators in U.S. domestic service than the current costs of U.S. operators.

Pursuing this approach, we calculate that the costs of the operating restriction must currently total between $100 million and $150 million a year, and that since 1950 they have probably exceeded $2 billion. Both of these figures are lower than the costs of the operating-differential subsidy. The domestic oceangoing fleet has shrunk by nearly half since 1950, but the annual costs of the operating restriction have probably increased in the meantime, owing to the widening difference between the operating costs of U.S. and foreign vessels.

The reader should beware of attributing to these estimates more accuracy than they possess. Although prepared with care, they are based on a number of assumptions and numerical estimates that are themselves somewhat uncertain. These numbers should be regarded only as approximations to the true costs of the operating restriction, numbers that despite their faults suffice to indicate that the costs are sizable, even in comparison with the costs of the operating-differential subsidy.

The costs reported here were contrived from estimates of the operating costs of U.S. and foreign vessels. Operating costs were in turn estimated from data collected by the Maritime Administration. None of the data we drew upon were perfectly suited to our purpose. The Maritime Administration collects no cost data from operators in the domestic trades; hence their costs had to be estimated from similar data coming from U.S. operators in the foreign trades. Any errors that spring from this source should be small.

Determining the costs of foreign operators is more troublesome. Of all the world's operators—whose costs vary widely—which ones would enter U.S. domestic service if the cabotage laws were lifted? How would their operating costs change after they entered? Perhaps a painstaking study could answer these questions. Lacking the resources to make such a study, we assumed here that the most successful entrants would come from the principal foreign competitors of U.S. operators on the North Atlantic trade routes, and that it would be the difference between their costs and the costs of U.S. operators that measured the savings U.S. customers would enjoy. The size of this difference was determined with the help of the operating subsidy rates that the Maritime Administration computes for its own unrelated

---

[29] A more sophisticated analysis would recognize that not all U.S. operators have the same costs, nor all foreign operators either, and that under conditions of reasonably free competition prices would fall by the difference between the costs of the current marginal U.S. operator—the one that is just covering costs—and the lower costs of the new marginal operator, U.S. or foreign, after foreign operators had joined the competition. In view of the meager cost data that are available, there is no point in trying to put flesh on this model. It is difficult enough to determine what the costs are of a representative U.S. operator and its potential foreign competitors, without puzzling over the costs of marginal operators.

purposes. Estimated savings were generally rounded downward, in order that if they should err they would err on the low side.

It must be assumed that estimates for recent years are the most reliable. We made use of fragmentary cost information to prepare estimates of savings in earlier years, in order to obtain some idea of the costs of the operating restriction since 1950.

Only operating costs were considered in this work, since no way was apparent of identifying savings from other sources. To the degree that foreign operators have lower administrative costs, for example, than U.S. operators, the costs of the operating restriction presented here are too low.

Tax Subsidies to the Maritime Industries

Another form of financial aid is provided to the U.S. maritime industries through the Federal tax system. It is an extraordinary form of assistance, resembling the tax benefits given to no other industry. By creating funds that are protected from tax and depositing earnings in them, shipowners can compel the Federal Government to share the cost of their investment in new productive assets.

Until recently only subsidized operators were eligible for this privilege. And an exceedingly valuable privilege it was: a Treasury Department report in 1951 estimated that the value of the tax benefits that operators had received between 1938 and 1949 was greater even than the operating-differential subsidies they had been paid.[30] Since then these tax subsidies have declined in importance compared with the operating subsidies. They are still far from negligible, however, and promise to become increasingly important within the next several years as a result of changes written by the 1970 legislation.

The tax subsidies differ in one important respect from the direct maritime subsidies that were described before: their benefits are given in the form of interest-free loans rather than outright expenditures. The program of tax subsidies functions as a loan program, in which the Federal Government forgoes collecting taxes on a part of shipowners' earnings, and grants the owners the use of these taxes on condition that they invest their earnings in new ships and equipment. Eventually the taxes will have to be paid; but no interest is charged for their use in the meantime, a benefit of considerable value to shipowners.

The tax subsidies are more complicated to explain than any of the other aids the Federal Government gives the maritime industries. Accordingly, the description that follows probably makes for more effortful reading than the accounts in this paper of other maritime aids. Readers interested in little else than what these subsidies have cost the public may wish to skip ahead to the section entitled "Costs of Tax Subsidies." Others who wish to know how the subsidies are given and how their costs are measured should read on. As we have done before, we shall explain first how this assistance was given before the law was changed in 1970, followed by an explanation of how it is given today.

---

30 U.S. Treasury Department, "Scope and Effect of Tax Benefits Provided the Maritime Industry," 82d Cong., first sess., 1951, H. Doc. 213. Reprinted in U.S., Congress, House, Committee on Merchant Marine and Fisheries, "Long Range Shipping Bill: Hearings on S. 241," 82d Cong., second sess., 1952, pp. 32-67.

Capital and Special Reserve Funds

Between 1936 and 1970, the law required every subsidized operator to maintain a capital reserve fund and special reserve fund, and to periodically deposit in them portions of earnings and other receipts. The purpose of the capital reserve fund was to insure that an operator accumulated the moneys it would need to replace its aging vessels and renew its fleet. The purpose of the special reserve fund was chiefly to protect the Government's contingent interest in the operator's profits, by insuring that if those profits should exceed 10 percent per annum of the operator's invested capital during a recapture period, money would be available to repay a part of the operating subsidy, as required by the recapture provisions.[31]

A memorandum prepared by the Maritime Administration explains what amounts operators were required to deposit in their funds, for what purposes withdrawals might be made, and the taxable status of the moneys in the funds. The account is so succinct that there is no point in trying to paraphrase it. With the agency's permission, the memorandum is reprinted here nearly in full.

Into the Capital Reserve Fund the contractor must deposit (*a*) depreciation charges computed on the life expectancy of the subsidized vessels (20 years if built before, and 25 years if built on or after January 1, 1946); (*b*) the proceeds from sales or indemnities for losses of the subsidized vessels; and (*c*) such of its profits as the Maritime Administration finds to be necessary to further build up a replacement fund. [Also, current earnings on the assets in both funds.] Into the Special Reserve Fund the contractor must deposit one-half of its profits in excess of 10 percent per year on its capital employed in the business, exclusive of any subsidy payments withheld as recapture due the Government at the end of each 10-year period. Where the need is demonstrated, and with the approval of the Maritime Administrator, voluntary deposits of earnings may be made into either Fund, and transfers of moneys may be made from the Special Reserve Fund to the Capital Reserve Fund.

From the Capital Reserve Fund the contractor may pay the principal on all notes secured by mortgages on the subsidized vessels and may make disbursements for the purchase or reconstruction of vessels to be used on essential foreign trade routes. [Since 1961 the contractor can also draw upon the fund to purchase cargo containers or finance research and development.] From the Special Reserve Fund the contractor may make withdrawals for reimbursement of losses on the operation of the subsidized vessels, and at the end of each 10-year period may withdraw amounts remaining therein in excess of 5 percent of capital employed.

Upon termination of the operating-differential subsidy agreement all balances in the funds, except for amounts due the Government, are the property of the contractor.

Although Section 607(h) of the [1936] Act states that the earnings deposited in the Reserve Funds shall be exempt from all Federal taxes, except those withdrawn for transfer to the contractor's general funds which will be taxable as if earned during the year of withdrawal, a controversy developed on this question after the end of World War II. As a result, the subsidized operators and the Internal Revenue Service agreed upon and executed a form of "Closing Agreement," which all succeeding subsidized operators have been required by the Maritime Administration to execute, and which provides substantially as follows:

1. For all periods prior to 1943, ordinary income and capital gains deposited into the reserve funds are generally tax exempt.

2. For the years 1943 through 1945, during which subsidized operations were suspended, ordinary income deposited into the reserve funds is taxable and capital gains used to purchase ships are permitted to be written off for depreciation purposes but will not be recognized as investment in the ships in determining capital gains in the event of future sale.

---

[31] Recapture is the name of the procedure that was established by the 1936 act for recovering a portion of past operating subsidies whenever a contractor's profits were abnormally high. See Ferguson et al., "Economic Value," pp. 51-54, for a detailed description of how it worked. The recapture provisions were repealed in 1970.

3. For 1946 and subsequent years, ordinary income and capital gains deposited into the reserve funds are tax deferred.

4. Deposits of ordinary income and capital gains which are not invested in ships but which are withdrawn from the funds are considered, for tax purposes, to be earned in the year withdrawn. This is true regardless of whether the amounts withdrawn have a tax-exempt or tax-deferred status.

For income tax purposes, the Internal Revenue Service treats both funds as one, and applies the first-in-first-out principle to determine the tax status of all moneys in the funds. At any given time the funds might include depreciation, which as an item of expense is nontaxable; proceeds from the sale or loss of ships, as to which only the capital gains portions would carry a contingent tax liability; and tax-deferred earnings, the entire amounts of which would carry a contingent tax liability. The possibility that any earnings for years prior to 1946 still remain in the funds is negligible * * *.

The distinction between nontaxable deposits—or tax-paid deposits, as they are customarily called—and tax-deferred deposits that is referred to in the last paragraph of this excerpt is highly important, because only tax-deferred deposits are the source of tax benefits. Tax-paid deposits are deposits of earnings that represent depreciation charges on vessels. These charges were items of expense in the operator's accounts, and were fully deductible in computing taxable income. To call the deposits "tax-paid" is something of a misnomer: in truth, no tax was ever paid on them, or ever will be.[32] No tax is avoided by depositing these moneys in the operator's reserve funds, and no immediate savings are realized by the operator.

Deposits of free earnings are quite another matter. These are earnings on which Federal income tax would have been paid except for their deposit in the operator's reserve funds. Because they are deposited there, they are allowed as deductions in computing the operator's taxable income.

Earnings on deposits already in the funds are treated similarly. They must be kept in the funds; no tax is paid on them; and they have the character thereafter of tax-deferred deposits, no matter what the status is of the deposits that gave rise to them.

We speak of these as tax-deferred deposits because the tax on them has only been postponed, not forgiven. Eventually it will be collected in the following manner. When tax-deferred deposits are withdrawn from a fund and used to purchase a new vessel, the tax base the vessel acquires will be reduced below the purchase price by the amount of the vessel's price that was paid with tax-deferred moneys. If, for example, the operator withdrew $20 million from its capital reserve fund to pay the full price of a new vessel, and if half the $20 million were tax-paid deposits and the other half tax-deferred deposits, the vessel's tax base would be $10 million. In subsequent years the operator could deduct from its earnings depreciation charges totaling just $10 million (less a small residual value, neglected hereafter) over the life of the vessel, not $20 million. The operator's taxable income during this period should therefore be $10 million greater than it would be if the vessel had been bought entirely with tax-paid moneys—greater, that is, by the amount of tax-deferred deposits that the owner spent to buy the vessel. And so, if tax rates remain the same, the Internal Revenue Service should collect the same total of taxes from the operator as it would have done earlier, if the operator's free earnings had not been put in a tax-protected fund.

---

[32] "Tax-exempt" would describe them more accurately, but would cause confusion with the tax-exempt deposits that were placed in the funds before 1943.

In practice, however, the Federal Government may have longer to wait to collect what is due it than this example suggests. For the operator can avoid paying tax on the earnings of the new vessel simply by depositing them in the same reserve fund. Thus in the preceding example it appeared that the Government would belatedly collect its tax through a reduction of the depreciation charges that the operator could claim. But suppose the operator could deposit earnings in its reserve fund in amounts corresponding to depreciation charges computed on the full purchase price of the vessel, regardless of what part of the price had been paid with tax-deferred moneys, instead of on the lower tax base. Referring again to the previous example, suppose the operator could deposit $20 million of earnings in its reserve fund during the life of the vessel, instead of the lesser $10 million that is all the Internal Revenue Service will allow to be written off. Since no tax need be paid on the deposited amounts, the owner succeeds in postponing again the payment of its liability.

This describes exactly what an operator may do. For the purpose of computing what amounts they must deposit in their capital reserve funds, subsidized operators were required by the Maritime Administration to write off the full purchase price of their vessels over the vessels' lives. To be sure, only the depreciation charges recognized by the Internal Revenue Service, totaling $10 million in the previous example, were tax-paid deposits; the rest were tax-deferred deposits, which the operator must one day pay tax upon. But because this procedure can be repeated again and again, the day of reckoning can be postponed indefinitely.

Capital Construction Funds

The Merchant Marine Act of 1970 entirely rewrote section 607 of the 1936 act, which authorized the reserve funds. Subsidized operators are no longer required to maintain special reserve funds, and all provisions relating to these funds have been deleted from the section. In place of two funds, only one may be established—the old capital reserve fund, bearing the new name of capital construction fund. Perhaps the new name was thought to state the purpose of these funds more perfectly. The 1970 act made no change in that purpose. The funds are still instruments for administering a subsidy through the Federal tax system, the purpose of which is to promote new investment in ships built in this country for the U.S. merchant marine.

Substantially everything that was written above concerning tax-paid and tax-deferred deposits in the capital and special reserve funds could be repeated about the new capital construction funds. The terminology has been changed, but the substance is the same. The statute now directs that three accounts should be maintained within each fund: a capital account, capital gain account, and ordinary income account. Using the terms we employed before, these accounts are simply a means of segregating tax-paid deposits, tax-deferred deposits of capital gains, and tax-deferred deposits of ordinary income respectively. As before, the most important distinction is between tax-paid and tax-deferred deposits, since it is only through the latter that a subsidy is given. Also as before, the tax is eventually recovered on tax-deferred deposits by a reduction in the depreciable base of new

vessels bought with these moneys. But the payment of tax can still be put off indefinitely, no less than before, by reinvesting the new vessel's earnings in the owner's capital construction fund.

If the 1970 act made no significant changes in the nature of the funds, it did change many of the conditions affecting their use. As a result, the capital construction funds are likely to become a more important source of benefits to the U.S. maritime industries than the capital and special reserve funds have recently been.

The 1970 act extended the privilege of creating these funds to a more numerous class of shipowners. Hitherto only subsidized operators were eligible to do so. Now any U.S. citizen may create such a fund that owns or leases vessels built and registered in the United States and operated in the U.S. foreign or domestic commerce or in the fisheries of the United States; and it may deposit in its fund the earnings of all such vessels. Formerly only the earnings of subsidized ships might be deposited, which perforce meant the earnings of ships engaged in the foreign trades only. Now the owners of ships engaged in the coastwise trades, such as oil companies that operate fleets of tankers to carry petroleum products from Texas to Middle Atlantic refineries, may put the earnings from their vessels in capital construction funds. So may the owners of vessels operating in the noncontiguous domestic trades, serving Alaska, Hawaii, Puerto Rico, and U.S. territories and possessions. The earnings of ships on the Great Lakes may be deposited in the funds. In short, scarcely any restrictions remain on who may create these funds and what vessels' earnings may be deposited in them. Such liberality is bound to be followed by an increase in their use, and therefore by an increase in the annual cost of the maritime subsidies.

The new section does restrict the kinds of vessels that may be built with moneys from the funds. The restrictions were more severe before 1970, when owners could make withdrawals to buy vessels only for service on essential foreign trade routes, or for cruising services. Now vessels may be bought with moneys from the funds for operation in the U.S. foreign trades, in the U.S. noncontiguous domestic trades, on the Great Lakes, or in the fisheries of the United States. The only ocean trade that is excluded is the coastwise trade. Thus, although the owners of the tanker fleets that operate between Texas and the Middle Atlantic coast can deposit their receipts in capital construction funds, they cannot use those moneys to build new vessels for operation in that trade. But they can use the funds to build vessels for operation between Alaska and the Pacific coast, a noncontiguous trade.

Owners may also draw upon their funds to buy containers and barges that are built in the United States and are to be part of the complement of a vessel in one of the approved trades. They may use their funds to reconstruct such vessels, and the barges and containers of such vessels, provided the work is done in an American yard.

Withdrawals for any other purpose (called nonqualified withdrawals) are penalized by requiring the owner of the fund to include the tax-deferred portion of the withdrawn sum in its taxable income in the year of withdrawal. Interest is charged as if the additional tax had been due in the year the amount was deposited. Presumably safeguards will be erected by regulation to prevent shipowners from

making nonqualified withdrawals in years when they suffer losses, and thereby using these funds to escape paying income tax.

The language of the new section is considerably more specific than the language of the old one when it touches such matters as the taxability of deposits in the fund, the purposes for which withdrawals may be made, and the manner in which taxes will be collected on moneys withdrawn from the fund. But on some important matters the new law is silent where the old one was definite. It gives to the shipowner and the Maritime Administration much discretion to decide what conditions will control deposits into and withdrawals from each capital construction fund. Any qualified shipowner that wishes to establish a capital construction fund may do so upon entering into an agreement with the Maritime Administration. In theory, every fund may be different, reflecting the terms of the particular agreement negotiated by the parties. For example, the Maritime Administration may require different shipowners to deposit different fractions of their earnings in their funds—and the amcunts the Maritime Administration may require are contained within broader limits than they were before.

Furthermore, and more important, it has been left to the agreements, or to the regulations that the Maritime Administration publishes, alone or jointly with the Secretary of the Treasury, to decide what fraction of deposits that an owner puts in its fund is deposits of tax-paid earnings or tax-free earnings. This freedom is possible because the new statute establishes no minimum amount that owners must deposit each year, in contrast to the previous version of the section, which required the annual deposit of all depreciation charges on an owner's vessels. (The statute does fix a maximum amount that owners may deposit, equal to the sum of all depreciation charges on the owner's vessels, all proceeds from the sale and indemnities for the loss of vessels, and an owner's entire taxable income from the operation of the vessels—a very generous maximum that in practice is unlikely to be approached.)

Because the statute requires no minimum annual deposit of depreciation charges, there is no way of deciding what fraction of deposits represents depreciation charges and what fraction represents free earnings. To illustrate, suppose an owner deposits $20 million one year in a capital construction fund. Suppose also that it writes down the value of its vessels by $10 million the same year, and that its taxable income that year is $25 million before subtracting deposits in its fund. How much should the owner subtract from its taxable income? The answer depends on what part of the $20 million deposit represents depreciation charges. At most, such charges might total $10 million of the $20 million deposited in the fund; in that case the balance of $10 million is a deposit of free earnings, and the owner's taxable income is reduced from $25 million to $15 million. Or the entire $20 million deposit may be composed of free earnings, in which case the owner's taxable income is just $5 million. Under the old law, which stipulated that the owner must deposit all $10 million of depreciation charges in a capital reserve fund, the determination was definite: taxable income for the year, in this example, would be $15 million. Under the new law the determination is indefinite.

At the time of this writing, the Maritime Administration and the Treasury Department have still not issued permanent regulations that may decide this matter. The interim agreements that the Maritime Administration has concluded with dozens of shipowners define only two classes of mandatory deposits: earnings on deposits already in the fund, and proceeds from the sale and indemnities for the loss of any of the owner's vessels. These deposits are sure to be small beside deposits of the owner's earnings. About deposits of those earnings, the agreements say nothing to indicate what part of them will be tax-paid and what part tax-deferred. And so it appears that, for the time being at least, the owners themselves will be allowed to make this determination. Since shipowners, like other businessmen, are disposed to maximize their earnings net of tax, and since they can reduce their current tax liabilities by depositing free earnings in their capital construction funds, it will be small wonder if they declare all the earnings they deposit to be free earnings, and none to be earnings that represent depreciation charges. If so, the cost to the Treasury of these tax-deferral privileges will be considerable, notwithstanding that a tax on the deposits will nevertheless have to be paid one day.

It follows from what has been said that the new capital construction funds will probably contain a much larger proportion of tax-deferred deposits than the old capital reserve funds. Hence, other things being equal, the value of these funds to shipowners and their cost to the Treasury will be greater than before.

Tax Deferral and Tax Exemption

The costs of the maritime tax subsidies raise peculiar problems of measurement, stemming from the form in which the benefits are given. The subsidies are administered through a program of tax deferral rather than one of tax exemption, a distinction that implies that it would be strictly erroneous to identify the costs of the program with the immediate tax savings that operators enjoy each time they deposit earnings in tax reserve funds. The true costs are less than this, because the operators' taxes have not been forgiven but only postponed.

The difference in costs between deferral and exemption can be illustrated as follows: Suppose we knew that $10 million of earnings had been deposited this year and would remain in the funds exactly 10 years, and would then be withdrawn and taxed all at once. If the tax on the earnings were $4.8 million, and if we assumed a discount rate of 6 percent per annum, the cost of the deferral could be expressed as $2.1 million (the difference between $4.8 million and the present value of $4.8 million 10 years from now), or $2.7 million less than the cost of tax exemption.

The cost of tax deferral is appreciably less in this example than the cost of tax exemption. It need not be, however: it all depends on the length of time the taxes are deferred and what discount rate we use to calculate present values. The longer the deferral and the higher the discount rate, the closer the cost of deferral approaches that of exemption. If we alter the facts in this example, and assume that the earnings will remain in the funds for 20 years, and assume also that the discount rate is 10 percent per annum, the cost of deferral increases to $4.1 million, or just $0.7 million less than the cost of tax exemption.

These examples illustrate how the costs of the maritime subsidies might in principle be calculated. Every tax-deferred deposit in the operators' reserve funds caused some immediate saving in operators' taxes, but at a cost of taxes to be paid in the future. If we knew when the taxes would eventually be paid, the cost of deferral could be calculated exactly, just as was done in the examples above. In practice, however, we have no idea when the taxes will be paid, and so cannot calculate this cost precisely. We must therefore resort to other ways of measuring the costs of the tax subsidies.

The simplest alternative is to use the cost of tax exemption as an approximation to the cost of tax deferral. This expedient is justified only under certain conditions, these being that the deferral will last a long period of time, and the rate of discount is high. If these conditions are met, as they were in the second example above, the error committed by making this substitution is small.

This is exactly how the costs of the maritime tax subsidies were measured in the 1951 report of the Treasury Department.[33] After recording that operators had deposited $62.9 million of tax-deferred earnings in their reserve funds between 1947 and 1949, the report stated that "this 'deferment' [of taxes on deposits of earnings] is tantamount to tax exemption so long as the subsidy continues," and went on to identify the cost of deferral with the immediate tax savings that operators enjoyed, as if the deposits were tax exempt.[34] The Commerce Department criticized the report for equating deferral with exemption, as the Senate Committee on Interstate and Foreign Commerce had earlier criticized the Comptroller General of the United States for expressing a similar opinion; but time has proved the critics wrong. We see in retrospect that the tax benefits the operators received from the deposits they made between 1947 and 1949 have been virtually those of tax exemption.

To understand why, we must notice that since those first deposits were made more than 20 years ago, the amount of tax-deferred earnings contained in reserve funds or invested in ships and equipment has grown to nearly $650 million today. It is immaterial whether the deposits that were made in 1947 were subsequently invested in new ships, whose tax bases were accordingly reduced, or are still in the reserve funds. If they were invested in ships, the reduction of the ships' bases, and the consequent reduction in operators' depreciation deductions, means that in an accounting sense payment of the deferred taxes has already begun. In an economic sense, however, it has not. The steady growth in accumulated tax-deferred earnings during the past 25 years tells us that for every dollar of deferred taxes that the Government has collected, several additional dollars of taxes have been deferred on new deposits of earnings in operators' reserve funds. Hence, there has been no net payment of taxes—only a continuing increase over the years in the amount of taxes that have been postponed. As long as accumulated tax-deferred earnings continue to grow, the taxes that were deferred between 1947 and 1949 will remain unpaid.

It is now 24 years since the midpoint of the 1947–49 period. Deferral has lasted nearly a quarter-century, and there is no sign yet that the

---

[33] U.S. Treasury Department, "Scope of Tax Benefits," in U.S. Congress, House, Committee on Merchant Marine and Fisheries, "Long Range Shipping Bill."
[34] Ibid., p. 55.

accumulation of tax-deferred earnings will soon diminish. Deferral over as long a period as this is indeed "tantamount to tax exemption," unless the rate of discount is unusually low.

What rate of discount should be used in calculations like these is sometimes difficult to decide. One candidate is the long-term cost of government borrowing, on the grounds that the nonpayment of these taxes may have added to the amount of outstanding Federal debt. On the other hand, it seems to be common practice now to use for this purpose the opportunity cost of Federal investment activities. A recent statement proposing new standards for the planning of Federal water and land resource projects included a discussion of this opportunity cost.[35] The authors concluded that "the appropriate rate for evaluating Government investment decisions is approximately 10 percent, [per annum]," although they went on to propose that a rate of 7 percent per annum should be used in evaluating water resource projects for reasons of no importance here. If we use their rate of 10 percent to calculate the costs of the maritime tax subsidies, we may say that for all intents and purposes the deferral of operators' taxes between 1947 and 1949 has turned out to be about as costly to the Government as full tax exemption.

And what of deposits made since 1949? Here the deferral has not been as long. But even if the privilege of depositing tax-deferred earnings were terminated tomorrow, it would take many years before the last deferred taxes on the current accumulation were paid; for payment is made only as ships are depreciated. The first taxes to be paid—again, in an economic sense—would be those that were deferred on the earliest deposits, then those that were deferred on later deposits, and finally those that were deferred on most recent deposits. Therefore, even the taxes on earnings that were put in the funds during the last several years would wind up being deferred for 20 years or longer. And so, what we concluded about deposits made before 1950 will also be true of later deposits: tax deferral has been nearly as costly to the Government as full tax exemption.

Costs of Tax Subsidies

With this discussion as background, we are ready now to estimate the costs of the maritime tax subsidies. Unpublished data collected by the Maritime Administration disclose that at the end of 1970 $649.3 million of tax-deferred earnings were either contained in operators' reserve funds or invested in ships and equipment. The amount of taxes that these earnings escaped cannot be fixed with precision, because some unknown part of the earnings was of capital gains rather than ordinary corporation income. In 1966, when this fraction was last measured, capital gains composed about a quarter of operators' accumulated tax-deferred earnings, which then totaled $598.0 million. If roughly the same fraction of the current accumulation is capital gains, they totaled about $165 million at the end of 1970.

No record is available telling in what years these earnings were deposited. Marginal rates of corporation income tax varied slightly during this period, which means that the tax that was deferred per

---

[35] U.S. Water Resources Council, "Proposed Principles and Standards for Planning Water and Related Land Resources," in Federal Register, Dec. 21, 1971, pp. 24166–67.

dollar of deposits also varied slightly. It seems sufficiently accurate to use a rate of 50 percent to estimate the taxes that were avoided on deposits of ordinary corporation income after 1949, since in only 1 year thereafter did the tax rate differ from this by more than a few percent (in 1950, when it was 42 percent). For deposits of capital gains, we use a rate of 25 percent. Because we have no information about deposits that were made during the Korean war, we can take no account of the excess profits tax that was in force at that time.

Since $62.8 million of ordinary corporation income was deposited in operators' funds between 1947 and 1949, plus $150,000 of capital gains,[36] we estimate that about $422 million of ordinary income was deposited after 1949, and $165 million of capital gains. The saving in taxes that operators realized immediately was therefore about $252 million. To this figure we must add a tax saving of $23.8 million on operators' deposits between 1947 and 1949, for a total saving of about $276 million.[37] To be sure, operators will eventually have to pay tax upon these earnings—unless the law is changed, or the corporation income tax is replaced by another; but for the reasons explained before, the deferral extends over so long a period that it is practically equivalent to full tax exemption. Accordingly, the cost of the maritime tax subsidies since 1947 has been close to $276 million—say, in round numbers, about $250 million.

The total cost of the tax subsidies since the program began in 1936 is the sum of the costs between 1936 and 1946 and between 1947 and 1970. Costs in the earlier period were estimated to be $99.3 million.[38] Therefore total costs over the past 36 years may be put at approximately $350 million.

The current costs of the tax subsidies can be measured by the value of the deferred taxes on recent deposits in tax reserve funds. From 1966 through 1970 the value of operators' accumulated tax-deferred earnings grew from $559.4 million to $649.3 million, an increase of $89.9 million. Perhaps half of the increase was of capital gains, and the other half of ordinary corporation income; we have no ready way of telling. But if these proportions are roughly correct, operators saved about $44 million on deposits of earnings during the past 5 years.[39] If we assume as before that tax deferral is in this case substantially equivalent to tax exemption, the tax subsidies have recently been costing the Federal Government around $8 million a year.

These figures indicate that past costs of the maritime tax subsidies have been relatively high, but that costs recently have been low. This will change: current costs are bound to increase in the wake of the 1970 legislation. How large they will grow it is impossible to say. Much will depend on conditions that are beyond our power to forecast, such as the state of the shipping business: we expect that in prosperous years owners will make large deposits in their capital construction funds, in lean years smaller deposits. As of this writing, nearly a hundred shipowners, in addition to the currently subsidized operators, have had applications approved by the Maritime Administration to

---

[36] U.S. Treasury Department, "Scope of Tax Benefits," in U.S. Congress, House, Committee on Merchant Marine and Fisheries, "Long Range Shipping Bill," p. 53.

[37] Ibid.

[38] Ibid.

[39] Equal to the product of the corporation income tax rate of 48 percent on one-half of $89.9 million, plus the product of the corporation capital gains tax rate of 25 percent on the balance. There is no point in trying to take account of the various levels of surtax that were in effect during a part of the period, in view of our uncertainty about the capital gains fraction.

create and maintain such funds. To get some idea of what their deposits might cost, suppose 75 owners deposited an average of just $1 million of ordinary corporation income in funds every year. The immediate cost to the Treasury would be $36 million a year. If we put the cost of deferral at as little as three-quarters of this amount, the tax subsidies would increase from $8 million a year to $35 million, assuming that subsidized operators maintained their current level of deposits. This is emphatically not a prediction, only an illustration. On the whole, however, it seems more likely to understate than overstate the increase we may expect in the costs of these subsidies.

Bibliography

Barker, James R., and Brandwein, Robert. *The United States Merchant Marine in National Perspective*. Lexington, Mass.: Heath Lexington Books, 1970.

Clark, Earl W.; Haddock, Hoyt S.; and Volens, Stanley J. *The U.S. Merchant Marine Today: Sunrise or Sunset?* Washington: Labor-Management Maritime Committee, 1970.

Ferguson, Allen R., *et al. The Economic Value of the United States Merchant Marine*. Evanston, Ill.: The Transportation Center at Northwestern University, 1961.

Gorter, Wytze. *United States Shipping Policy*. New York: Harper & Brothers, for the Council on Foreign Relations, 1956.

Goss, R. O. *Studies in Maritime Economics*. Cambridge: Cambridge University Press, 1968.

Lawrence, Samuel A. *United States Merchant Shipping Policies and Politics*. Washington: The Brookings Institution, 1966.

McDowell, Carl E., and Gibbs, Helen M. *Ocean Transportation*. New York: McGraw-Hill Book Company, 1954.

Metaxas, B. N. *The Economics of Tramp Shipping*. London: The Athlone Press, 1971.

O'Loughlin, Carleen. *The Economics of Sea Transport*. Oxford: Pergamon Press, 1967.

U.S. Congress. House. Committee on Merchant Marine and Fisheries. *Long Range Shipping Bill: Hearings on S. 241*, 82nd Cong., 2nd sess., 1952. Washington: Government Printing Office, 1952.

U.S. Congress. House. Committee on Merchant Marine and Fisheries. Subcommittee on Merchant Marine. *Independent Federal Maritime Administration: Hearings on H.R. 159 and 105 identical and similar bills*, 90th Cong., 1st sess., 1967. Washington: Government Printing Office, 1967.

———. *Long-Range Maritime Program: Hearings on Bills to Amend the Merchant Marine Act, 1936*, 90th Cong., 2nd sess., 1968. Washington: Government Printing Office, 1968.

———. *Passenger Vessels: Hearings on H.R. 10577*, 92nd Cong., 1st sess., 1971. Washington: Government Printing Office, 1971.

———. *President's Maritime Program, Part 1: Hearings on a Report of the Secretary of Commerce and the Maritime Administrator*, 91st Cong., 1st sess., 1969. Washington: Government Printing Office, 1970.

———. *President's Maritime Program, Part 2: Hearings on H.R. 15424, H.R. 15425, and H.R. 15640*, 91st Cong., 2nd sess., 1970. Washington: Government Printing Office, 1970.

U.S. Congress. Senate. Committee on Commerce. Merchant Marine Subcommittee. *The Maritime Program: Hearings on S. 3287*, 91st Cong., 2nd sess., 1970. Washington: Government Printing Office, 1970.

U.S. Department of Commerce. Maritime Administration. *Annual Report*. Washington: Government Printing Office, annual.

———. *Essential United States Foreign Trade Routes*. Washington: Government Printing Office, December 1969.

U.S. Maritime Commission. *Economic Survey of the American Merchant Marine*. Washington: Government Printing Office, 1937.

U.S. Treasury Department. *Scope and Effect of Tax Benefits Provided the Maritime Industry*, 82nd Cong., 1st sess., H. Doc. 213. Washington: Government Printing Office, 1951. Reprinted in *Long Range Shipping Bill*, pp. 32–67 (see above under U.S. Congress, House, Committee on Merchant Marine and Fisheries).

Zeis, Paul Maxwell. *American Shipping Policy*. Princeton: Princeton University Press, 1938.

THE CAPITAL GRANT AS A SUBSIDY DEVICE: THE CASE STUDY OF URBAN MASS TRANSPORTATION

By William B. Tye*

I. Conclusions and Recommendations

The Capital Grant as an Instrument of Public Policy

Legislators are frequently persuaded that public policy objectives are best accomplished by the financial support of certain activities of other governments, private citizens, or firms, even though no good or service is supplied directly to the Government in exchange. A common restriction on this "subsidy" is that all funds be disbursed for the purchase of durable facilities rather than current operating expenses. Grants to State and local governments for highway, hospital, education, public housing, and urban mass transportation improvements and to underdeveloped countries and allies for military and economic assistance are common examples. This paper evaluates the wisdom of restricting a subsidy grant to capital expenditures alone and examines the effects of the capital restriction on the efficiency of the subsidy recipient. The analysis deals solely with the U.S. Department of Transportation urban mass transportation capital grant program, but the implications for other programs of a similar nature are obvious. The method of allocating the subsidy, not the more complex issues of the wisdom of subsidizing mass transit and the appropriate level of Federal support, is the issue being raised.

The Mass Transit Capital Grant Program

State and local governments and their instrumentalities (such as transit authorities) wishing to make improvements in urban mass transit facilities may apply to the U.S. Department of Transportation for a Federal grant to assume up to two-thirds of the costs of equipment, buildings, rights-of-way, et cetera, but the Urban Mass Transportation Act of 1964 specifically prohibits use of Federal funds to defray operating expenses. The remaining share of the project cost must be financed by the applicant, but not from transit farebox revenues. Although the grant must be directly to a public agency, private firms may receive support if a State or local agency is willing to act as a conduit in a leasing or other agreement. From 1964 to 1970 approximately $735 million was committed by the Federal Government under this program.

---

*Charles River Associates, Inc.

Note.—This paper pursues the policy implications of the author's Ph.D. thesis, "The Economic Costs of the Urban Mass Transportation Capital Grant Program" (Harvard University Department of Economics, 1969). Details of the mathematical proofs and estimating procedures contained in the thesis are not pursued in this paper. The author wishes to thank John R. Meyer and Mahlon Straszheim for their helpful advice on the thesis and The Joint Center for Urban Studies of M.I.T. and Harvard University for the financial support that made this research possible. The views presented here are the author's and do not represent any organization with which he may have been associated.

The Urban Mass Transportation Assistance Act of 1970 granted the Secretary of Transportation obligational authority of $10 billion over the next 12 years. This vast expansion of the capital grant program makes reexamination of the original program decision to exclude operating expenses particularly compelling at this time.

Arguments for Restricting Mass Transit Aid to Capital Expenses: Summary of the Findings

Proponents of the capital grant mechanism offer arguments which fall in one of four categories. None of them are found to be convincing.

(1) *Local governments are capital poor.*—If prodigal local governments "live from hand to mouth" and fail to provide for their long-term capital needs, a capital grant will provide an incentive to counteract this penchant to undercapitalize transit enterprises. Data on bus operating costs and replacement decisions in Chicago and Cleveland provide no empirical support whatsoever for this hypothesis.

(2) *A capital grant restricts the power of transit unions to dissipate most of the grant through wage gains.*—This hypothesis is exceedingly difficult to test empirically. Examination of the likely employment, wage, fare, and output impacts of a capital subsidy indicates that if the recipient prefers to pass on most of the subsidy benefits to the workers through wage gains and "featherbedding" rather than to the transit user through lower fares and more service, the capital grant mechanism is no impediment. Absurdly enough, the capital grant discourages recipients from indulging in special favors to transit workers only because its extreme inefficiency reduces the benefits that will be available for diversion.

(3) *A capital grant limits the Federal Government's liability.*—A capital subsidy avoids an open-ended pledge such as an operating subsidy support for labor costs. However, the evidence indicates that the capital grant encourages a profligate utilization of capital in the transit industry just as an operating subsidy allegedly discouraged the introduction of labor-saving technology in the maritime industry. Fear of the operating subsidy's incentive to waste labor resulted in the capital grant's incentive to waste capital. The fantastic increase in the scope of the capital grant program confirms that the incentive to waste capital has reached multi-billion-dollar proportions.

(4) *A capital grant is highly visible.*—That durable facilities gratify the benefactor's need for tangible evidence of his generosity cannot be denied. This attribute, however, will usually prove to be very costly because of the previously cited incentive to overcapitalize.

The Inefficiency of a Capital Grant

The optimal motor bus replacement model used in part III to test the hypothesis that transit is capital poor provides an excellent tool to analyze the capital grant's incentive to waste capital and to explain partly the malaise over the inability of the capital grant program to increase demand for urban mass transit. The optimum date to replace

a motor vehicle depends on minimizing the long-run total costs of depreciation, interest, and operating expenses. A significant decrease in the cost of a replacement vehicle, all other things remaining equal, considerably reduces optimal equipment lifetime. In the case of Cleveland and Chicago, the optimal bus lifetime is *halved* by the two-thirds subsidy to capital costs. This distortion of investment decisions results in a tremendous inefficiency, because a two-thirds decrease in the price of a new vehicle costs the Federal Government much more than the recipient benefits from reduced costs. The inefficiency occurs because the recipient has an incentive to incur subsidized capital costs rather than unsubsidized operating expenses, regardless of the unfavorable impact on overall efficiency. For both Cleveland and Chicago, more than 22 percent of Federal appropriations would not be recouped in reduced long-run average costs but would be wasted because the recipient would be motivated to pass on the high of costs premature replacement to maximize the size of his benefits.[1] Further waste will result from inadequate maintenance and the use of technology which is grossly capital-intensive. Dissatisfaction with the capital grant program can be explained in part by the restriction to capital expenses, for the incentives for prodigal use of the funds conflicted with the goal of reversing the decline in patronage.

Policy Recommendations

The analysis indicates that the arguments for restricting direct mass transit aid to capital expenses are without basis. Furthermore, a grant to subsidize capital but not operating expenses encourages wasteful premature replacement, overcapitalized technology, and inadequate maintenance, which are likely to be extremely costly. Rejection of the arguments supporting the limitation of the grant to capital costs considerably enhances the desirability of alternative subsidy techniques that provide an incentive to expand output but not an incentive to overcapitalize. Therefore, it is recommended that, as an alternative to a vast expansion of the capital grant program, Federal grants to transit operations, whether publicly or privately owned, be allocated among States and municipalities on a transportation revenue-sharing basis without a restriction to capital expenses.

II. Origins of the Urban Mass Transportation Capital Grant Program

The Urban Transportation Problem

The decline of the urban mass transit industry in the postwar period has been remarkably precipitous: by 1961 urban mass transit passengers in the United States had declined from an annual level of 23.3 billion in 1945 to only 8.9 billion; the number of transit vehicle-miles declined from 3.3 billion to 2.1 billion over that same period.[2]

---

[1] Let the reader who is still puzzled by this finding consider the effect of a two-thirds subsidy to the purchase price of a new auto. The result would be an incentive to replace vehicles even when a repair to an older vehicle could be accomplished at a much lower cost.

[2] American Transit Association, "Transit Fact Book: 1970 Edition" (Washington, D.C.), pp. 6, 9.

The decline in transit service placed an additional burden of immobility on "captive riders"—the old, the young, the poor, the handicapped.[3] The steady decline in ridership and service in urban mass transportation has been associated with the tremendous costs of accommodating automobiles in every urban area in the United States; for example, a heavy commitment of tax funds to automobile transport investment, pollution of the atmosphere, rapid and often involuntary changes in land use, mounting costs of law enforcement, and a staggering loss of life and property from accidents. By the early 1960's spokesmen for "captive riders" and opponents of increased urban accommodation to automobiles vociferously argued that urban transportation was in "crisis."

Responding to demands that the Federal Government prevent this deterioration of mass transit service, Secretary of Commerce Luther Hodges and Housing and Home Finance Administrator Robert C. Weaver stated in a 1962 study of these problems that "A cycle of fare increases and service cuts to offset loss of ridership followed by further declines in use points clearly to the need for a substantial contribution of public funds to support needed mass transportation improvements." [4] In addition to (1) the "vicious cycle" of service and ridership decline and fare increases, the "Joint Report" explained the crisis by (2) "the absence of regional comprehensive transportation and land-use planning" and (3) distortion of local community priorities by alleged Federal subsidies to auto use but not transit. The primary program recommended to correct this undesirable state of urban transportation was Federal Government grants to State and local governments to finance urban mass transportation capital projects, with provision that "* * * assistance should be made available only * * * where transportation planning as a part of comprehensive areawide development planning is being conducted as a continuing process. * * *"

Motivations for a Capital Grant

Although the recommendation of Federal aid for urban mass transit and comprehensive transportation planning could be defended by an appeal to the three alleged causal factors, the particular form of the subsidy to transit, the capital grant, could not. Supporters felt that direct grants to local governments to support established operations should be restricted to capital expenditures for reasons that can be reduced to four basic propositions.

1. *Local governments are capital poor.*—Supporters felt that the most promising technology for reviving public transportation was high-speed rail transit, but local governments were not pursuing this technological alternative because of the very large requirement for capital outlays. However, the fact that expenditures were constrained to

---

[3] The extent of the effects of a long-term change in technology and tastes in urban transportation has been well documented elsewhere. In particular, the reader is referred to Lyle C. Fitch and Associates, "Urban Transportation and Public Policy" (San Francisco: Chandler Publishing Company, 1964); J. R. Meyer, et al., *The Urban Transportation Problem* (Cambridge, Mass.: Harvard University Press, 1956); and U.S. Department of Housing and Urban Development, "Tomorrow's Transportation: New Systems for the Urban Future" (Washington, D.C.: U.S. Government Printing Office, 1968).

[4] "Urban Transportation—Joint Report to the President," "Urban Mass Transportation—1962: Hearings Before a Subcommittee of the Committee on Banking and Currency," U.S. Senate, 87th Cong., second sess. (Washington, D.C.: U.S. Government Printing Office, 1962), pp. 71–72.

capital expenses rather than left to the discretion of local government showed a lack of confidence in local government investment policy. This lack of confidence was based not just on observations of the management of the urban transit industry. It was based on the conviction that a great source of inefficiency in local government enterprise is a relative scarcity of durable plant and equipment and that this undercapitalization was likely to persist if local governments were allowed to make their own decisions.

Lyle C. Fitch and Associates of the Institute of Public Administration (IPA), the consultants hired to help prepare the joint report, elaborated on this motivation for the recommendation of a capital grant policy in "Urban Transportation and Public Policy." The Fitch book revealed that a latent model of inept decisionmaking in local government was a primary consideration for the recommendation in the joint report that grants be restricted to capital improvements; aid for service would be "* * * dissipated by * * * wasteful management practices." [5] Although the source of the crisis was alleged to be the absence of proper decisionmaking institutions and incentives in the local community, local communities were not expected to make good decisions even if the alleged institutional barriers and subsidy distortions were to be removed. The evidence that appeared to be so convincing in support of both the IPA model of inept local government decisionmaking and the grants-for-capital-only recommendation was the unyielding conviction that the transit industry was undercapitalized.[6] A subsidy that allowed discretion to transit management, it was charged, would perpetuate the undercapitalization of the industry.

Viewed in perspective, the undercapitalization hypothesis is an example of what could be called the "nincompoop thesis" of unnecessary social problems which recently was highly fashionable in academic circles. The essence of the thesis is that social problems can often be explained by conflicts of misperceived self-interest. In the case of urban personal travel, misguided decisions by transit management and local government—misguided because they failed to effectuate the decisionmakers' "true" self-interest—obstructed the solution of the urban transportation "crisis." [7] Supporters of the capital grant approach saw no inconsistency in arguing that uneconomic incentives to local decisionmakers (subsidies, and so forth) were responsible and in arguing that a failure of incentives to result in self-interested action (the failure of self-interest to produce a more capital-intensive industry) was responsible.

2. *A capital grant restricts the power of transit unions to dissipate most of the grant through wage gains.*—Lyle C. Fitch and Associates also charged that unrestricted grants would be squandered on "feather-

---

[5] Lyle C. Fitch and Associates, op. cit., p. 211.

[6] "The greatest needs at the present time are for system improvement, modernization of suburban railroads * * *. Most of these needs require capital outlays, a fact which somewhat diminishes the strength of the argument for service supports as opposed to support for capital improvement." Ibid.

[7] Precedents for the application of the thesis are not difficult to document. For example, Charles P. Kindleberger suggested in "Economic Growth in France and Britain: 1851–1950" (Cambridge, Mass.: Harvard University Press, 1964), p. 154, that irrationality of management, especially in the textile industry, was partly responsible for the major slowdown in the rate of British technological progress in the last quarter of the 19th century and the eventual eclipse of British economic power. Another variation of this misperceived self-interest thesis was the intriguing hypothesis that slavery in the United States "would have toppled of its own weight," slaves being substantially overpriced due to misperceptions by slaveowners of the profitability of the slave-based agricultural system.

bedding" and outrageous wage gains. According to supporters, if the grant was restricted to the purchase of capital it clearly could not be spent to employ unneeded workers or to increase wage rates of transit employees to levels above community standards. The hapless example of the maritime operating subsidy was frequently mentioned to illustrate this advantage of the capital grant.

3. *A capital grant limits the Federal Government's liability.*—A capital grant would limit the Federal Government's responsibility to that of supporting the industry with a massive initial infusion of capital after which local governments would be expected to carry on. Many proponents advanced the myth that capital investments would reverse the "vicious cycle" and the Federal Government could then reduce its commitment. An operating subsidy would be more difficult to limit because it would provide an open-ended support for labor costs.

4. *A capital grant is highly visible.*—Regardless of the motivations of a benefactor, tangible evidence of his generosity is usually a desired feature of the transaction. Durable facilities serve this function well. While such considerations are probably more important for other programs such as foreign aid, they certainly were at least a subordinate consideration in the decision on mass transit. The Federal Government could see what it was getting for the money.

The Federal Government's Response

The IPA and Hodges-Weaver recommendations were codified when the Urban Mass Transportation Act of 1964 [8] initiated a program of capital grants to local governments to finance up to two-thirds of the costs (net of revenues) [9] of improvements in rolling stock, right-of-way, plant, and other equipment; provided for several other miscellaneous programs; and authorized $75 million for fiscal year 1965 and $150 million annually for later years, the bulk of which was expended for capital grants. The IPA recommendations (apart from recommendations on financing techniques) were incorporated into law almost without change. Administration of the program was placed in the Housing and Home Finance Agency, which subsequently became the Department of Housing and Urban Development (HUD).

Despite the initial excitement over the capital grant program, the results have disappointed many observers. Evidence on the ability of the program to remedy the alleged undercapitalization and expand output in the urban transit industry has produced malaise among program supporters, although the criteria for evaluating the program are not agreed upon. By 1966 HUD was actively seeking solutions which implied that low productivity of available technology rather than undercapitalization was the problem, particularly the "Reuss amendment" program which spent $10 million to "prepare a program of research, development, and demonstration of new systems of urban transportation." [10] The failure of the capital grant program to achieve

---

[8] As amended through Oct. 15, 1970; Public Law 88-365, 78 Stat. 302, 49 U.S.C. 1601.

[9] The Federal share is two-thirds of the net project cost derived by substracting from gross project cost any excess of estimated project revenues over estimated project costs. In practice, net project cost is virtually identical to gross project cost. The Federal share of net project cost is reduced to one-half if the applicant cannot meet Federal standards for areawide transportation planning, but the applicant receives the remaining one-sixth share if planning standards are met within 3 years.

[10] Sec. 6(b), Urban Mass Transportation Act of 1964.

a reversal of the decline in ridership and the seeming recalcitrance of urban transportation problems began to undermine the HUD position that a program of capital grants would effectively increase demand for urban mass transit.

During the summer of 1968, a major reorganization of the urban mass transportation program transferred responsibility from HUD to the Department of Transportation (DOT). Despite substantial evidence questioning HUD policy, the response of DOT has been to escalate a questionable program rather than to examine its assumptions for error. The Urban Mass Transportation Assistance Act of 1970 [11] expanded the size of the program to $10 billion over a 12-year period, mostly for capital grants. The Department of Transportation apparently intends that the capital grant program continue to be the major effort to remedy the problems enumerated in the "joint report."

What Went Wrong With the Mass Transit Program

The Federal Government's program for urban mass transportation continues to be based on axioms that originated with the IPA study:

(1) Federal Government grants for mass transit will reverse the "vicious cycle" and help offset distortions caused by subsidies to autos;

(2) The most effective technique to subsidize mass transit is a capital grant; and

(3) Regional comprehensive transportation and land-use planning will substantially improve local decisions on land use and choice of transport mode.

Considerable attention has been given to the weakness of the IPA-HUD-DOT reasoning which attributed the "crisis" to the "vicious cycle," inadequate comprehensive planning, and distortions of incentives. For example, Meyer et al., attribute the decline in transit demand to increases in income which increase demand for higher quality travel modes and suburban residential land, as well as the decentralization of workplaces due to the effect of changes in intercity transportation and goods-handling technology, all of which imply a response radically different from the capital grant. Also, John F. Kain has developed a model of residential location and travel behavior that questions the "vicious cycle" causal mechanism.[12]

The second axiom has hardly been questioned, although a considerable body of evidence fails to support it. Realistically assuming that urban transit will be federally subsidized regardless of the debate on the validity of the first and third axioms, this paper will test the second axiom of current policy and investigate the implications of rejecting it. The following section will investigate the argument that transit operations are undercapitalized. Part IV will consider the other arguments for the capital grant. The final section will demonstrate that the capital grant adds another price distortion to the ones already thought so onerous—a costly bias in favor of more capital-intensive technology because only capital costs are subsidized.

---

[11] Public Law 91-453.

[12] "A Contribution to the Urban Transportation Debate: An Econometric Model of Urban Residential and Travel Behavior," Review of Economics and Statistics, XLVI (February 1964), 55-65.

III. A Test of the Undercapitalization Hypothesis

The Motor Bus Replacement Problem

A primary consideration in the decision to limit direct support for mass transit to a capital grant was the conviction that the transit industry is undercapitalized and that a capital grant would offset this propensity. No one would dispute the proposition that a capital subsidy encourages a more capital-intensive transit industry. The conviction that the transit industry was undercapitalized prior to the capital grant program is disputable, however. As it stands this hypothesis is difficult to test. Therefore, a model of optimum investment will be developed for one type of mass transportation investment decision, and actual and optimal investment decisions will be compared. If the undercapitalization hypothesis must be rejected for this investment decision, it seems likely that the hypothesis will not stand empirical tests for other investment behavior as well.

The asset that was picked for the test was motor buses, for several reasons. The choice of technology is fairly limited, and the major investment issue is optimum utilization and replacement. More practically, data necessary to test the optimal investment model for motor buses are available. Lastly, investment in motor buses constitutes a considerable part of the industry total. Although investment in buses is only $1.1 billion of the $4.6 billion total gross (undepreciated) investment in transit, 50 thousand of the 61 thousand transit vehicles extant in 1970 were motor buses.[13] Even more importantly, approximately $250 million (34 percent) of the $735 million in funds for approved capital grants as of December 31, 1970, was for new and used buses and related equipment.[14]

Appendix A outlines in greater detail the theoretical bus replacement model used to test the undercapitalization hypothesis. The optimum replacement date for a motor vehicle occurs when the sum of its expected operating, depreciation, and interest costs threatens to exceed the long-run expected costs of a replacement, as measured by the "uniform annual equivalent" (UAE) costs of the "representative vehicle." The model discussed in appendix A considers only those costs which vary with equipment age and accounts for the problems of variation in the level of output, uncertainty, and inflation.

Summary of the Chicago and Cleveland Experience

Utilization and replacement of motor bus equipment in Cleveland and Chicago were at variance with the capital-poor hypothesis. A comparison of optimum and actual investment behavior, based on a model of optimum motor bus replacement, indicates that Cleveland may actually have overcapitalized bus operations prior to the capital grant program by replacing equipment at an earlier age than was justified by cost considerations. Chicago operations, however, seem to have been optimally capitalized before the capital grant was inaugurated.

---

[13] "Transit Fact Book: 1970 Edition", pp. 2, 12.

[14] Urban Mass Transportation Administration, U.S. Department of Transportation, "Approvals of Capital Grants and Loans and Technical Studies Grants."

Specifically, Cleveland data indicate that a vehicle could economically be kept in service at 50,000 miles annually for 15 years. However, 15-year-old buses were actually rendering less than 6,000 miles of output on the average. This evidence of failure to use older equipment as intensively as was warranted by cost was not affected by the use of a low rate of interest. In this way, the replacement model illustrates that loans with low rates of interest, such as provided for in the original Housing and Home Finance Agency program to aid transit, do not encourage capital investment or relieve transit operations of a significant cost burden. Evidence from Chicago confirming these findings is contained in appendix B.

A Test of the Undercapitalization Hypothesis With Cleveland Data

Cleveland's "representative vehicle."—To determine the optimum replacement policy for Cleveland's fleets, the cost parameters of the "representative vehicle" must be determined—the average cost of a new vehicle, its rate of depreciation, and the operating cost parameters. And the UAE (i.e., long-run average) cost of producing various outputs must be determined for the "representative vehicle."

The depreciation of the equipment is obscured by the fact that most equipment manufacturers ceased production of motor buses during the observed period. The "representative vehicle" is assumed to depreciate at the annual rate statistically estimated for suppliers who remain in business (21.28 percent) because the capital losses to Cleveland due to the attrition of bus manufacturers during the observation period should not be imputed to the long-run average cost.

Operating, maintenance, and unreliability costs of a new "representative vehicle" in 1960 were statistically estimated to be 11.23 cents per vehicle-mile and were statistically estimated to grow with age at an annual percentage rate of 4.11 (in the absence of inflation).[15] The cost of capital in the absence of inflation was assumed to be 5.3 percent annually.[16]

Using the parameters estimated for the Cleveland "representative vehicle," table 1 illustrates the behavior of uniform annual equivalent (UAE) costs in 1960 prices for outputs of 50,000, 35,000, and 22,000 annual miles. The entry is asterisked for the replacement date which minimizes UAE costs. These same results are illustrated graphically in figure 1. As was expected, lower annual output is associated with longer equipment lifetime. The slope of the UAE curve is steep at first, but flattens out near the minimum, so that errors in choosing the proper disposal date may result in a loss of only a few dollars even if the margin of error is 3 or 4 years. The evidence indicates that an annual output of 50,000 miles should be maintained for 15 years and the 22,000 mile output for 24 years. Although the Cleveland cost data were not extrapolated beyond 24 years because of the dangers of forecasting beyond the observed cost experience, it is clear that vehicles with lower outputs should be maintained even longer.

---

[15] Recall that only costs which vary with equipment age are included. These parameters were estimated by the technique of least squares using data provided by Cleveland for the period 1954–64.

[16] This rate of return was chosen because it has been estimated to be the average rate of return for utilities.

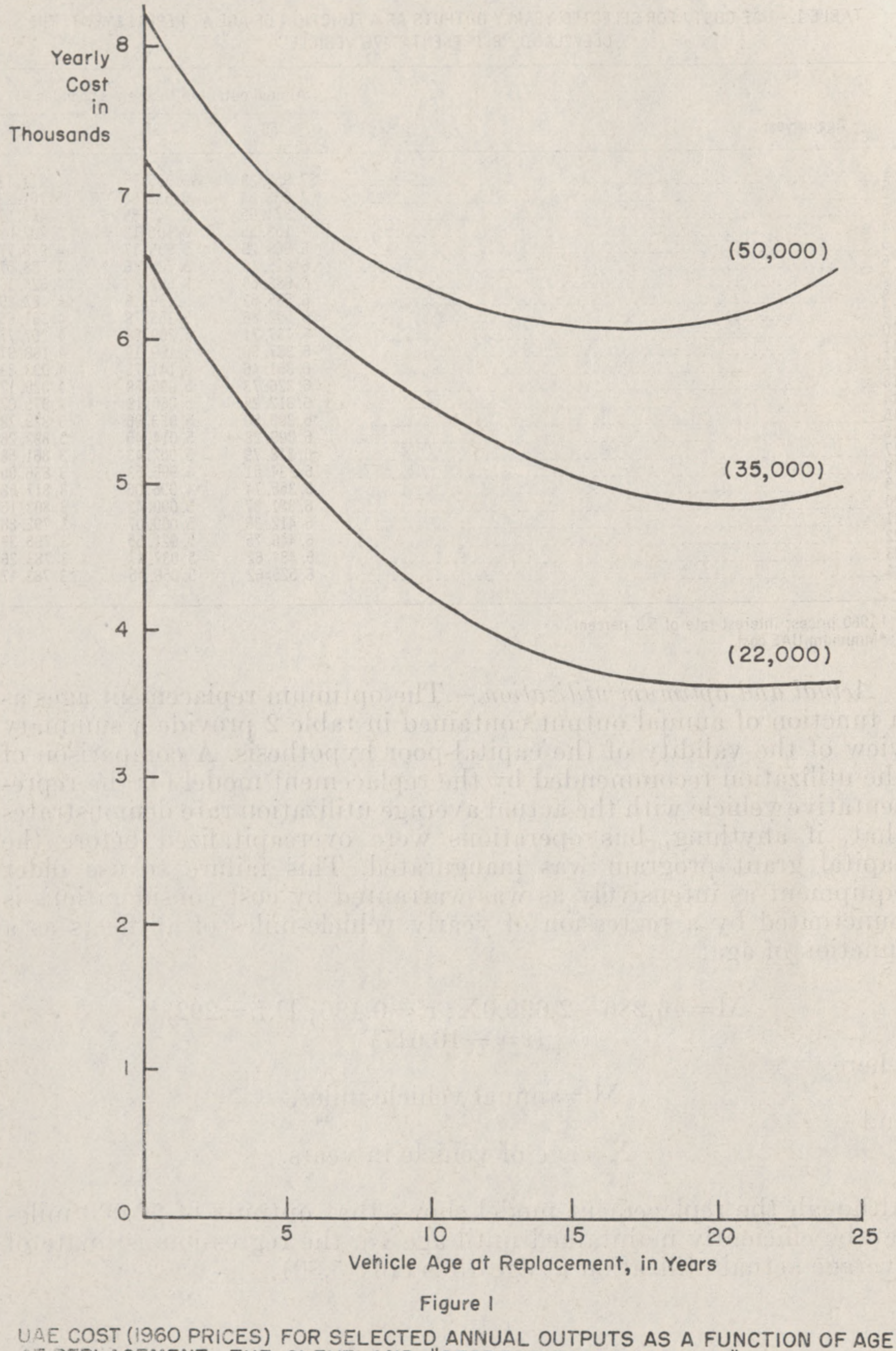

Figure 1

UAE COST (1960 PRICES) FOR SELECTED ANNUAL OUTPUTS AS A FUNCTION OF AGE AT REPLACEMENT: THE CLEVELAND "REPRESENTATIVE VEHICLE"

TABLE 1.—UAE COST [1] FOR SELECTED YEARLY OUTPUTS AS A FUNCTION OF AGE AT REPLACEMENT: THE CLEVELAND "REPRESENTATIVE VEHICLE"

Age in years	Annual output in thousands of miles		
	50	35	22
1	$7,952.28	$6,965.95	$6,111.13
2	7,638.84	6,632.98	5,761.23
3	7,374.95	6,349.39	5,460.57
4	7,153.55	6,108.12	5,202.08
5	6,968.29	5,903.17	4,979.77
6	6,815.10	5,729.46	4,788.57
7	6,688.66	5,582.68	4,624.16
8	6,585.62	5,459.16	4,482.89
9	6,502.86	5,355.78	4,361.65
10	6,437.71	5,269.88	4,257.77
11	6,387.90	5,199.19	4,168.97
12	6,351.46	5,141.75	4,093.33
13	6,326.73	5,095.89	4,029.17
14	6,312.25	5,060.19	3,975.07
15	*6,306.80	5,033.96	3,929.78
16	6,309.28	5,014.45	3,892.26
17	6,318.79	5,002.43	3,861.58
18	6,334.51	4,996.53	3,836.95
19	6,355.74	*4,996.06	3,817.68
20	6,381.87	5,000.42	3,803.16
21	6,412.36	5,009.07	3,792.88
22	6,446.75	5,021.55	3,786.39
23	6,484.62	5,037.47	3,783.26
24	6,525.62	5,056.45	*3,783.17

[1] 1960 prices; interest rate of 5.3 percent.
*Minimum UAE cost.

Actual and optimum utilization.—The optimum replacement ages as a function of annual output contained in table 2 provide a summary view of the validity of the capital-poor hypothesis. A comparison of the utilization recommended by the replacement model for the representative vehicle with the actual average utilization rate demonstrates that, if anything, bus operations were overcapitalized before the capital grant program was inaugurated. This failure to use older equipment as intensively as was warranted by cost considerations is punctuated by a regression of yearly vehicle-miles of all fleets as a function of age:

$$M=46{,}286-2{,}699.0X;\ r^2=0.486;\ D.f.=292,$$
$$(t=-16.617)$$

where

M=annual vehicle-miles,

and

X=age of vehicle in years.

Although the replacement model shows that outputs of 50,000 miles can be efficiently maintained until age 15, the regression estimate of average actual utilization at age 15 is only 5,801.

TABLE 2.—UAE COST [1] AND OPTIMUM REPLACEMENT AGE AS A FUNCTION OF OUTPUT: THE CLEVELAND "REPRESENTATIVE VEHICLE"

Yearly output in thousands of miles:	UAE	Age at replacement (years)	Yearly output in thousands of miles:	UAE	Age at replacement (years)
50	$6,306.80	15	35	$4,996.06	19
49	6,221.90	15	34	4,905.42	19
48	6,136.64	16	33	4,814.77	19
47	6,050.32	16	32	4,724.13	19
46	5,964.00	16	31	4,632.03	20
45	5,877.67	16	30	4,539.94	20
44	5,791.35	16	29	4,447.75	21
43	5,704.49	17	28	4,354.20	21
42	5,616.73	17	27	4,260.65	21
41	5,528.97	17	26	4,166.44	22
40	5,441.22	17	25	4,071.43	22
39	5,353.22	18	24	3,976.22	23
38	5,264.12	18	23	3,879.74	23
37	5,174.93	18	22	3,783.17	24
36	5,085.73	18			

[1] 1960 prices; interest rate of 5.3 percent.

A comparison of actual and optimal mileage of each fleet during the period 1954–64 also tests the capital-poor hypothesis. The utilization rates for 1965 and the years following have been ignored because presumably they were affected by the capital grant's reduction in the cost of new motorbuses. Table 3 illustrates the actual rates of utilization and the predicted optimal rates per vehicle for a sample fleet.[17]

The optimum utilization is based on the assumption that normally a vehicle should be retained at the highest level of output for which total accrual costs eventually become less than the UAE costs of the "representative vehicle." However, the predicted utilization may be adjusted downward to the highest level of output actually experienced by the fleet if this is less, under the assumption that higher outputs are constrained by the absence of off-peak demand. In both cases, the vehicle output is degraded with age in the manner prescribed in appendix A. The mean deviation of predicted and actual performance measures the extent of underutilization; large positive values indicate substantial underutilization.

TABLE 3.—ACTUAL AND PREDICTED UTILIZATION: CLEVELAND TRANSIT SYSTEM, FLEET NO. 10, 1954–64

Vehicle age	Actual utilization	Predicted utilization	Predicted minus actual	Vehicle age	Actual utilization	Predicted utilization	Predicted minus actual
1	45,983	47,000	+1,117	8	32,092	47,000	+14,908
2	34,866	47,000	+12,134	9	43,074	47,000	+3,626
3	21,762	47,000	+25,238	10	36,201	47,000	+10,799
4	35,695	47,000	+11,305	11	28,368	47,000	+18,632
5	31,479	47,000	+15,521				
6	43,126	47,000	+3,874	Mean deviation			+11,548
7	47,116	47,000	−116				

Table 4 presents the mean deviation of actual from predicted utilization per vehicle for all Cleveland fleets. The preponderance of

[17] Each fleet's operating cost was estimated separately. Capital costs were estimated separately for two groups: GM diesel and non-GM diesel.

positive values is evidence at variance with the undercapitalization hypothesis.[18] This finding is particularly significant when it is considered that the decision rule incorporates the advantage of hindsight by avoiding large outputs in the early years of a "lemon's" cost experience, such as for fleets 14X, 15X, and 8X.

TABLE 4.—*Mean yearly deviation of actual utilization from predicted utilization, Cleveland fleets, 1954–64*

Fleet No.[1]	*Mean underutilization*
18+20	+10, 422
9	−3, 946
28	+13, 072
29	+11, 068
10	+11, 548
32	+10, 233
12	+9, 033
8	+7, 389
13	+13, 929
21	+28, 076
14	+15, 418
7	+12, 907
16	+10, 845
15	+19, 610
22	+11, 560
19X	+14, 670
26	+9, 766
17X	+18, 560
20X	−13, 914
18	15, 962
6X	−22, 840
14X	−43, 270
15X	−48, 535
8X	−46, 100

[1] During the period of observation Cleveland changed the fleet numbering system. Fleet numbers in this table do not reflect this change. An X after a fleet number indicates that it is the second fleet to be given that number during the period of observation.

The effect of a change in the interest rate on the least-cost replacement of Cleveland transit equipment.—The calculations for the least cost replacement of the Cleveland "representative vehicle" are repeated in table 5 with an interest rate of 3.5 percent, along with the 5.3 percent rate used in table 2. The results should assuage readers who have embraced the surfeit of arguments for a "risk-free" interest rate which has plagued the literature of public finance. A substantial decrease in the interest rate has almost no consequence for the proper utilization of equipment. Even the 3.5 percent rate will justify a considerably more intensive use of older transit equipment than actually observed in Cleveland.

---

[18] The slight tendency to underutilize vehicles could perhaps be explained by the public's preference for newer vehicles, which was not considered in the replacement decision except for imputed road-call costs which increased with age. Changes in technology ("new-look" body, improved suspenison, air conditioning, and so forth) may have played a minor role, but throughout the period underutilization was consistent.

TABLE 5.—UAE COST AND OPTIMUM DISPOSAL DATE AS A FUNCTION OF OUTPUT FOR THE CLEVELA "REPRESENTATIVE VEHICLE": 5.3 PERCENT AND 3.5 PERCENT DISCOUNT RATES

	5.3 percent		3.5 percent	
	UAE (1960 prices)	Age at replacement (years)	UAE (1960 prices)	Age at replacement (years)
Output in thousands of miles:				
50	$6,306.80	15	$6,168.34	15
49	6,221.90	15	6,083.42	15
48	6,163.64	16	5,998.50	15
47	6,050.32	16	5,913.58	15
46	5,964.00	16	5,828.67	15
45	5,877.67	16	5,743.75	15
44	5,791.35	16	5,657.50	16
43	5,704.49	17	5,571.16	16
42	5,616.73	17	5,484.81	16
41	5,528.97	17	5,398.46	16
40	5,441.22	17	5,311.56	17
39	5,353.22	18	5,223.78	17
38	5,264.12	18	5,135.99	17
37	5,174.93	18	5,048.21	17
36	5,085.73	18	4,959.85	18
35	4,996.06	19	4,870.63	18
34	4,905.42	19	4,781.40	18
33	4,814.77	19	4,692.17	18
32	4,724.13	19	4,601.66	19
31	4,632.03	20	4,510.98	19
30	4,539.94	20	4,420.31	19
29	4,447.75	21	4,328.48	20
28	4,354.20	21	4,236.35	20
27	4,260.65	21	4,144.15	21
26	4,166.44	22	4,050.56	21
25	4,071.43	22	3,956.97	21
24	3,976.22	23	3,862.48	22
23	3,879.74	23	3,767.42	22
22	3,783.17	24	3,671.69	23

Incidentally, the effect of the change in interest rate explains the failure of the Housing and Home Finance Agency loan program that preceded the capital grant program. The reduction in the rate of interest occasioned by the loan guarantees had only a marginal benefit in reduced UAE costs of operation at each output level. Because interest costs are a relatively small expense item, the reduction in interest rates was only a gesture in relieving transit operations of their total costs. Neither was there any incentive for management to pursue the other goal of the program, to intensify the capitalization of the industry.

Conclusion

The motor bus replacement model indicated that Cleveland was not increasing overall costs of operation by utilizing old equipment which should have been replaced. Certainly, earlier replacement would not have resulted in significant cost savings. This finding very seriously questions the assumption that restriction to a capital grant can be justified by efficiency considerations.

IV. The Labor Relations, Limited Liability, and Visibility Considerations

The Effect of a Capital Subsidy on Labor Contracts

Supporters of a capital grant have alleged that it encourages improved transit service and lower fares because funds are not made available to indulge in giveaways to transit workers through "excess"

wages and unproductive use of labor, that is, featherbedding. The intuition behind this hypothesis is obvious: Funds which are restricted to capital investments obviously are not being spent to raise wages or hire unneeded workers.

This hypothesis provides an excellent example of how easy it is to be fooled by superficial, one-step economic analysis. The intuitive reasoning supporting this alleged benefit of a capital grant is completely baseless. Analysis of the effects of a capital grant on fares, output, wages, and the demand for labor indicates that, to the extent that the grant provides benefits to the recipient, those benefits may be appropriated by transit workers with no more difficulty than if the grant had not been restricted to capital expenses.[19] If the recipient prefers to hold fares and service at the same level as would prevail in the absence of the grant and pass along the benefits of reduced costs to the workers, the capital grant mechanism is certainly no impediment.

When a Federal two-thirds capital subsidy decreases a community's long-run average costs of providing transit service, its response is bounded by two extremes. First, as the Congress intended, the response could be an increase in service and/or a decrease in fares, thus passing all the benefits to the transit consumer. Alternatively, the same fare and service could be maintained as before the Federal subsidy. If the latter alternative is pursued, all the benefits of the Federal subsidy may be passed on to the workers by diverting to them fare receipts and local tax funds which were formerly needed to support transit capital expenses.[20] If the recipient intends to reward transit workers with wage gains and featherbedding and ignore the needs of transit patrons, he will not be impeded by the fact that the source of the funds is reduced capital expenses.

In fact, whenever fare receipts exceed operating expenses, a recipient who is leaning toward passing on the benefits to the workers is actually encouraged to do so by the 1964 law. Any part of capital costs which are financed from operating revenues are not available for Federal subsidy. If fare receipts are potentially greater than operating expenses and if wages are increased so that operating expenses equal operating revenues, two-thirds of this giveway is financed by an increase in the Federal capital subsidy.[21]

The possibility of diversion points to a clear inconsistency in two objectives of the mass transit support program, to provide general financial aid to State and local governments and to prevent wasteful management practices. Supporters of Federal capital subsidies have frequently argued that local support for transit strains limited municipal financial resources, and one purpose of the aid is to free local resources for other programs. To the extent the grant reduces transit costs to the community, local communities may indulge transit workers, if they desire, rather than fund other needs. Whenever transit unions have the political muscle to gain at the expense of others, the capital grant does not do anything to prevent this from happening. Nor does any reasonable alternative grant mechanism, for that matter.

---

[19] Because this proposition is counterintuitive, readers are encouraged to examine carefully the more detailed arguments presented in appendix C, "Incidence of the Benefits of a Transit Capital Subsidy."

[20] At this point defenders of a capital grant will concede that communities receive a windfall, or income effect, on transit service they would have provided anyway. "But doesn't the lower cost induce increased service?" they ask. The answer, of course, is yes it may, and if it does, some or all of the benefits are enjoyed by transit users. But the capital grant does nothing special to encourage this to happen.

[21] This rather subtle point is elaborated in appendix C.

Because the decision to divide the grant benefits between transit workers and patrons is unaffected by the capital grant subsidy mechanism, a subsidy not restricted to capital expenses which reduced cost per unit of output by the same amount as a capital grant would produce the same results—with one important exception, as will be demonstrated in part V. A subsidy to capital but not operating expenses tends to increase the overall costs of operation through premature replacement, inadequate maintenance, and overcapitalized technology. The greater the waste created by the capital grant, the more Federal funds are dissipated through increased costs and the fewer the potential benefits which can be passed on to transit workers. By reducing the benefits of the grant program through inefficiency, the capital subsidy may only in this perverse way be successful in reducing any windfalls to transit workers.

Therefore, it must be agreed that proponents were entirely right in arguing that the capital grant program will hold down excess wage increases and featherbedding in the transit industry. However, this objective is very difficult to defend when it is realized that the major way in which it is achieved is by a profligacy greater than any that local government could have devised if left to its own resources.

The "Limited Liability" Argument

Supporters also believed that a pledge of limited Federal aid to transit was essential for congressional support for the Urban Mass Transportation Act of 1964 and that the size of the commitment was best limited by a capital grant. The significance of this consideration was far greater than was warranted, primarily because the distasteful experience of the open-ended maritime subsidy was a frequently cited example of the dangers of an operating subsidy. An operating subsidy was held to be uncontrollable because the size of the subsidy is primarily dependent on labor costs, and firms have an incentive to employ more labor than is optimal. A repetition of "the colossal failure of the maritime subsidy" was thought to be the only alternative to the capital grant.

Supporters of subsidy to mass transit who subscribed to the "vicious cycle" hypothesis reluctantly accepted the principle of limited aid because they endorsed the myth that a strong dose of initial aid would reverse the cycle. The mass transit lobby felt that a capital grant would achieve their objectives and assuage the opposition's fears that the subsidy would get out of hand.

Why there should be an asymmetry between the incentives of an operating subsidy and a capital subsidy is difficult to fathom. The operating subsidy was objectionable because it created an incentive to use labor inefficiently, but the capital grant created an equally objectionable incentive to waste capital. As a result, the demand for capital grant funds has risen inexorably, as evidenced by the recent tremendous increase in the scope of the program. In short, fear of an operating subsidy's incentive to waste labor was the basis for the capital grant's incentive to waste capital.

A capital grant was thought to limit the Federal liability in another way: If the program should fail to reach its objectives, it is politically easier to terminate. With an unrestricted subsidy based on the recipient's performance, the recipient who has invested with expectation

of continued subsidy would incur a heavy loss with program termination. If a capital grant is terminated, the subsidy would gradually decrease as the equipment depreciates, and vested interests would not be as firmly established.

Such arguments carry great weight during a program's inception, especially when advocates promote the myth of the need for temporary aid only. Whatever merit these arguments might have had in 1964, the 1970 commitment to a long-term aid program now makes them irrelevant. Continuing to pay lipservice to the goal of temporary aid will prove to be very costly under a long-term aid program.

The "Visibility" Argument

As for the final defense of the capital grant, its greater visibility, nothing much can be said. While it is true that a capital good provides more tangible evidence of the benefactor's generosity, Part V will demonstrate that this attribute is purchased at a tremendous cost.

V. The Consequences for Public Policy

Summary: Implications of the Chicago and Cleveland Replacement Analysis

Tests of the undercapitalization hypothesis have shown it to be completely without empirical support in both Cleveland and Chicago, even when an extremely low interest rate is assumed. This chapter will show that a significant reduction in the least-cost replacement age will result from the capital grant's two-thirds decrease in the cost of a new vehicle. This distortion of premature replacement decisions is estimated to result in the waste of a minimum of 22 percent of the Federal funds appropriated for bus replacement. A subsidy to transit operations allocated among States and localities on a transportation revenue-sharing basis available for both capital and operating expenses would avoid this costly waste.

The Effect of the Capital Grant on Cleveland and Chicago Replacement

The replacement model may be used to show that the two-thirds decrease in the cost of a new vehicle occasioned by the capital grant program has the substantial impact on the UAE costs of producing a given output intended by its supporters.[22] Table 6 illustrates the effect of a two-thirds decrease in the price of a new bus on the UAE costs and optimum replacement dates of the Cleveland "representative vehicle." Unfortunately, the decrease in long-run average costs for Cleveland is achieved only by a substantial underutilization of equipment: The lifetime which minimizes costs to the firm is at least halved.

---

[22] Although one-sixth of the grant has often been withheld pending the approval of a comprehensive metropolitan land-use and transportation plan, almost all grants assumed that operating income would be insufficient to defray any capital costs.

TABLE 6.—UAE COST [1] AND OPTIMUM DISPOSAL DATE AS A FUNCTION OF OUTPUT FOR THE CLEVELAND "REPRESENTATIVE VEHICLE": BEFORE AND AFTER CAPITAL GRANT PROGRAM

	Before grant		After grant [2]	
	UAE	Age at replacement (years)	UAE	Age at replacement (years)
Annual output in thousands of miles:				
50	$6,306.80	15	$4,683.18	6
49	6,221.90	15	4,610.80	6
48	6,136.64	16	4,538.43	6
47	6,050.32	16	4,465.09	7
46	5,964.00	16	4,391.36	7
45	5,877.67	16	4,317.62	7
44	5,791.35	16	4,243.89	7
43	5,704.49	17	4,170.16	7
42	5,616.37	17	4,096.43	7
41	5,528.97	17	4,021.63	8
40	5,441.22	17	3,946.53	8
39	5,353.22	18	3,871.43	8
38	5,264.12	18	3,796.33	8
37	5,174.93	18	3,721.23	8
36	5,085.73	18	3,645.18	9
35	4,996.06	19	3,568.71	9
34	4,905.42	19	3,492.24	9
33	4,814.77	19	3,415.77	9
32	4,724.13	19	3,338.84	10
31	4,632.03	20	3,260.98	10
30	4,539.94	20	3,183.13	10
29	4,447.75	21	3,105.27	10
28	4,354.20	21	3,026.63	11
27	4,260.65	21	2,947.38	11
26	4,166.44	22	2,868.13	11
25	4,071.43	22	2,788.44	12
24	3,976.22	23	2,707.80	12
23	3,879.74	23	2,627.15	12
22	3,783.17	24	2,545.80	13

[1] 1960 prices; interest rate of 5.3 percent.
[2] Assumes a ⅔ decrease in the cost of the new vehicle.

Table 7 illustrates that the capital grant program incentives are to increase markedly the capital intensity of motorbus operations in Chicago also. A two-thirds decrease in the cost of new vehicles fully halves the length of time for which a vehicle should be utilized at given outputs to minimize costs. A rather sizable decrease in the UAE costs is experienced as well.

TABLE 7.—UAE COST [1] AND OPTIMUM DISPOSAL DATE AS A FUNCTION OF OUTPUT FOR THE CHICAGO "REPRESENTATIVE VEHICLE": BEFORE AND AFTER CAPITAL GRANT PROGRAM

	Before grant		After grant [2]	
	UAE	Age at replacement (years)	UAE	Age at replacement (years
Yearly output in thousands of miles:				
50	$8,470.95	8	$5,828.81	3
49	8,368.82	8	5,746.28	3
48	8,266.01	9	5,663.76	3
47	8,159.47	9	5,581.24	3
46	8,052.93	9	5,498.72	3
45	7,946.38	9	5,416.20	3
44	7,839.84	9	5,333.68	3
43	7,733.02	9	5,248.59	4
42	7,626.76	9	5,162.46	4
41	7,520.22	9	5,076.32	4
40	7,413.60	10	4,990.18	4
39	7,302.47	10	4,904.05	4
38	7,191.34	10	4,817.91	4
37	7,080.21	10	4,731.77	4
36	6,969.08	10	4,645.64	4
35	6,857.95	10	4,558.00	5
34	6,746.82	10	4,468.10	5

See footnotes at end of table.

TABLE 7.—UAE COST [1] AND OPTIMUM DISPOSAL DATE AS A FUNCTION OF OUTPUT FOR THE CHICAGO "REPRESENTATIVE VEHICLE": BEFORE AND AFTER CAPITAL GRANT PROGRAM—Continued

	Before grant		After grant [2]	
	UAE	Age at replacement (years)	UAE	Age at replacement (years)
33	6,633.67	11	4,378.20	5
32	6,517.77	11	4,288.30	5
31	6,401.86	11	4,198.40	5
30	6,285.96	11	4,108.50	5
29	6,170.05	11	4,018.60	5
28	6,053.90	12	3,925.51	6
27	5,933.04	12	3,831.69	6
26	5,812.17	12	3,737.88	6
25	5,691.30	12	3,644.06	6
24	5,570.44	12	3,550.25	6
23	5,446.18	13	3,454.07	7
22	5,320.16	13	3,356.18	7
21	5,194.13	13	3,258.29	7
20	5,067.88	14	3,160.40	7
19	4,936.48	14	3,060.83	8
18	4,805.08	14	2,958.70	8
17	4,673.38	15	2,856.57	8
16	4,536.41	15	2,754.29	9
15	4,399.43	15	2,647.74	9
14	4,259.11	16	2,541.20	9
13	4,116.33	16	2,433.17	10
12	3,970.49	17	2,322.04	10
11	3,821.69	17	2,210.29	11
10	3,668.02	18	2,094.38	11

[1] 1960 prices, interest rate of 5.3 percent.
[2] Assumes a ⅔ decrease in the cost of the new vehicle.

The Waste Due to a Capital Grant [23]

The waste of public funds created by the incentives built into the capital grant program depends on the degree to which the industry responds to those incentives. Enterprises in the transit industry may continue to use the old thumb rules despite the change in incentives. However, a more likely development is that they will change investment policy. Under this assumption, the inefficiencies created by the capital grant subsidy technique can be estimated by comparing the benefits to the recipient attributable to a two-thirds decrease in the cost of the new bus with the cost of the subsidy to the Federal Government.

The capital grant benefits the recipient because his long-run average costs decline. Table 8 illustrates the relationship between costs to the Federal Government and savings to the transit operation, assuming that 50,000 miles of output are produced by minimizing cost to the recipient.

For Cleveland, this output could have been produced for $6,306.80 (line 2) before the grant, and after the grant for $4,683.18 (line 3), producing savings to the recipient of $1,623.62 (line 4). Unfortunately, to achieve this savings Cleveland must use equipment at this output level for only 6 years, and according to table 1, this increases overall annual costs of operation to $6,815.10 (line 1), producing $508.30 (line 5) in waste. The Federal share of the grant is the difference between total costs after the grant and costs borne by the recipient,

[23] This analysis assumes that the objective of the replacement decision is to minimize long-run average costs to the community regardless of the breakdown between local capital costs (which are paid by the taxpayer) and operating expenses (which are chiefly paid by transit users).

or $2,131.92 (line 6). In this example, 23.8 percent (line 7) of the cost of the grant to the Federal Government is squandered through inefficiency.

TABLE 8.—BENEFITS AND COSTS OF THE CAPITAL GRANT IN CLEVELAND AND CHICAGO: 50,000 MILES OF SERVICE

	Cleveland	Chicago
(1) Sum of Federal and local share after grant	$6,815.10	$9,239.38
(2) Long-run average cost before grant	$6,306.80	$8,470.95
(3) Local cost of service after grant	$4,683.18	$5,828.81
(4) Savings to recipient due to capital grant: (2) − (3)	$1,623.62	$2,642.14
(5) Waste due to capital grant: (1) − (2)	$508.30	$768.43
(6) Cost of grant to Federal Government: (1) − (3)	$2,131.92	$3,410.57
(7) Percent inefficiency; [(5)÷(6)] × 100	23.8	22.5

Source: Tables 1, 6, 7.

A similar inefficiency may be demonstrated if the benefits of the capital grant program to the Chicago Transit Authority are compared with the costs to the Federal Government. Using the same assumptions, 22.5 percent of the grant is waste.

The foregoing calculations indicate that if 50,000 miles of annual output is selected for the calculation of benefits, the "deadweight loss" of the capital grant technique is enormous. Had a lower output been chosen, the estimated inefficiency would have been somewhat less.[24] Applied to the $250 million allocated to date for new and used buses and related equipment, the inefficiency through premature replacement alone (22 percent) could amount to more than $55 million.

Premature replacement of motorbuses by no means exhausts the opportunities for inefficiencies inherent in the capital grant. Enterprises are also strongly encouraged to neglect maintenance and accelerate equipment deterioration with age. Ever-increasing capital intensity, as exampled by the Bay Area Rapid Transit District's choice of technology in San Francisco, can be expected to push the operating cost savings to the point where the Federal Government's entire two-thirds contribution is wasted on marginal investment projects. In short, it is not likely that transit firms will be content to achieve cost savings with underutilization of current technology; instead they will choose very highly capitalized technology that will shift substantial sums of local operating costs to federally shared capital costs regardless of the inefficiency. The ultimate consequence will be the development of "throwaway buses" which, like paper cups, have no maintenance costs.

The malaise that pervades the urban mass transportation program can therefore be explained in part by the error of accepting the IPA–HUD undercapitalization hypothesis even though it was contrary to the evidence. Acceptance of the hypothesis implied support for the capital grant program, although incentives for prodigal use of the funds obstructed the goal of increasing output. The probability of even greater waste through even greater overcapitalization strongly implies that this disaffection will grow.

---

[24] Table 1 indicates that, as a result of the incentives of the capital grant, the change in replacement date from 24 to 13 years for a 22,000-mile annual output increases Cleveland UAE cost by $245. This is 16.6 percent of Federal cost of the grant.

An Alternative to the Capital Grant: Transportation Revenue Sharing

Inefficiencies in the capital grant program considerably enhance the desirability of alternative subsidy techniques that provide an incentive to expand service but not to overcapitalize. These alternatives are endless: Subsidies that give aid directly to the passenger such as script which transit enterprises could cash in to the Federal Government; subsidies that give aid directly to the transit operation based on patronage, capacity, revenues, or total costs; subsidies to State and local governments to be used for transit objectives.

All of the schemes that distribute aid to the transit enterprise or to the user suffer from one or more of the following objections: They require unnecessary and unwise agreements on national priorities for urban transportation which would interfere with the determination and execution of local preferences, allocate funds in an arbitrary manner among recipients, do not allow congressional discretion over the level of funding, are costly to administer, encourage inefficiency in labor utilization and choice of technology, and offer no incentive to increase ridership.

On the other hand, merely distributing the capital grant funds to State and local governments for transit purposes without restriction to capital expenses has merit because the recipient is not required to become inefficient in order to maximize his share of grant funds. Such a program would be perfectly consistent with the least controversial of the arguments for Federal interest in urban transportation, the fiscal inadequacy of the cities to meet their transportation responsibilities.

Therefore, it is recommended that, as an alternative to the U.S. Department of Transportation's present vast expansion of the capital grant program, Federal grants to transit firms, whether publicly owned or privately owned, be allocated among States and municipalities on a revenue-sharing basis without restriction to capital expenses.

Generalization of the Findings

If the arguments supporting a capital grant must be rejected, most intergovernmental income transfer programs that subsidize only capital should be reexamined to determine the costs of inefficient incentives. Those programs that measure success in terms of units of capital goods created rather than units of output are most obvious: Highways, public housing, foreign aid, education, et cetera. In each of these cases, recipients are encouraged to reduce the future operating costs almost to the minimum by increasing the capital intensity of the technology, regardless of the inefficiency, thus shifting the costs to the benefactor.

Appendix A

A Model of Motorbus Replacement [25]

Bus Replacement Under Certainty

Optimum replacement with fixed output.—Assume that a firm must decide when to dispose of a vehicle and acquire a new one under the following conditions:

1. The output (hence revenue) does not depend on machine age and will be maintained at a constant rate forever;

---

[25] This appendix is intended only to clarify the test of the undercapitalization hypothesis in pt. III. For a more complete discussion of the motorbus replacement problem, refer to Tye, op. cit.

2. No other type of vehicle will be considered a candidate for the task, and all new vehicles will have cost functions identical to those of the present vehicle;
3. The total cash flow of operating, maintenance, and unreliability costs increases exponentially with age at a constant percentage rate; the disposal value of the vehicle declines exponentially with age at a constant percentage rate; and these functions are known with certainty;
4. The "cost of capital," or discount rate, is known with certainty and does not change with time; and
5. The goal of the enterprise is to maximize the current market value of owners' equity.

The assumption that the output will be maintained indefinitely implies that revenues are known to be greater in present value than costs if the replacement date is optimally chosen or implies that output will be maintained at a fixed level regardless of revenues. It follows from these assumptions that a replacement date should be chosen to minimize the present value of the costs of providing service into the infinite future.

The necessary condition for a minimum.—The information necessary to the solution of the problem can be summarized by the following equations:

$$V(x)=be^{-\gamma x} \tag{1}$$

and

$$C(x)=ae^{\rho x}, \tag{2}$$

where

$V(x)$ = market value of the vehicle,
x = age of vehicle,
b = cost of new vehicle,
e = base of natural logarithms,
γ = percentage rate of depreciation of vehicle,
$C(x)$ = operating, maintenance, and unreliability (breakdown) costs of vehicle,
a = operating, maintenance, and unreliability costs of a new vehicle,
ρ = percentage rate of increase of operating, maintenance, and unreliability costs [26] with age.

Revenues from the sale of output can be ignored because they are independent of the replacement decision. Let the variable Y be the disposal date. An optimal disposal date, Y, is sought such that every vehicle in the infinite chain of replacements has a lifetime of Y and, if cash outlays are represented by positive numbers, the present value of the infinite stream of cash flows is minimized.

This condition is given by the following equation:

$$ae^{\rho Y}+(\gamma+r)be^{-\gamma Y}=F(Y), \tag{3}$$

where

$$F(Y)=\left[\frac{r}{1-e^{-rY}}\right]A(Y).$$

This equation has an intuitive interpretation. The left-hand side of (3) is the sum of instantaneous operating, interest, and depreciation costs as a function of the replacement date. $A(Y)$ is the value at the time of purchase of the first vehicle's discounted cash flows during its service life.[27] The expression

$$\left[\frac{r}{1-e^{-rY}}\right]$$

is the "capital recovery factor" (CRF). The product of the CRF and $A(Y)$ is the continuous annuity for Y years that has present value of $A(Y)$ when discounted at r percent. Therefore, the right-hand side of (3) is the "uniform con-

---

[26] Hereafter called "operating costs."

[27] That is $A(Y)=\int_0^Y ae^{\rho x}e^{-rx}dx+b-be^{-Y(\gamma+r)}$.

tinuous equivalent" (UCE) of the uneven cash flow of $A(Y)$. The criterion of (3) is that when the current accrual of operating, interest, and depreciation costs of the vehicle equals the UCE cost, $Y=\hat{Y}$. That is, replacement should occur when the current accrual cost is equal to the "long-run average cost" of a vehicle. Remarkably, it is a myopic decision rule involving the costs of only the present vehicle even though the present value of the infinite cash-flow stream was minimized.[28]

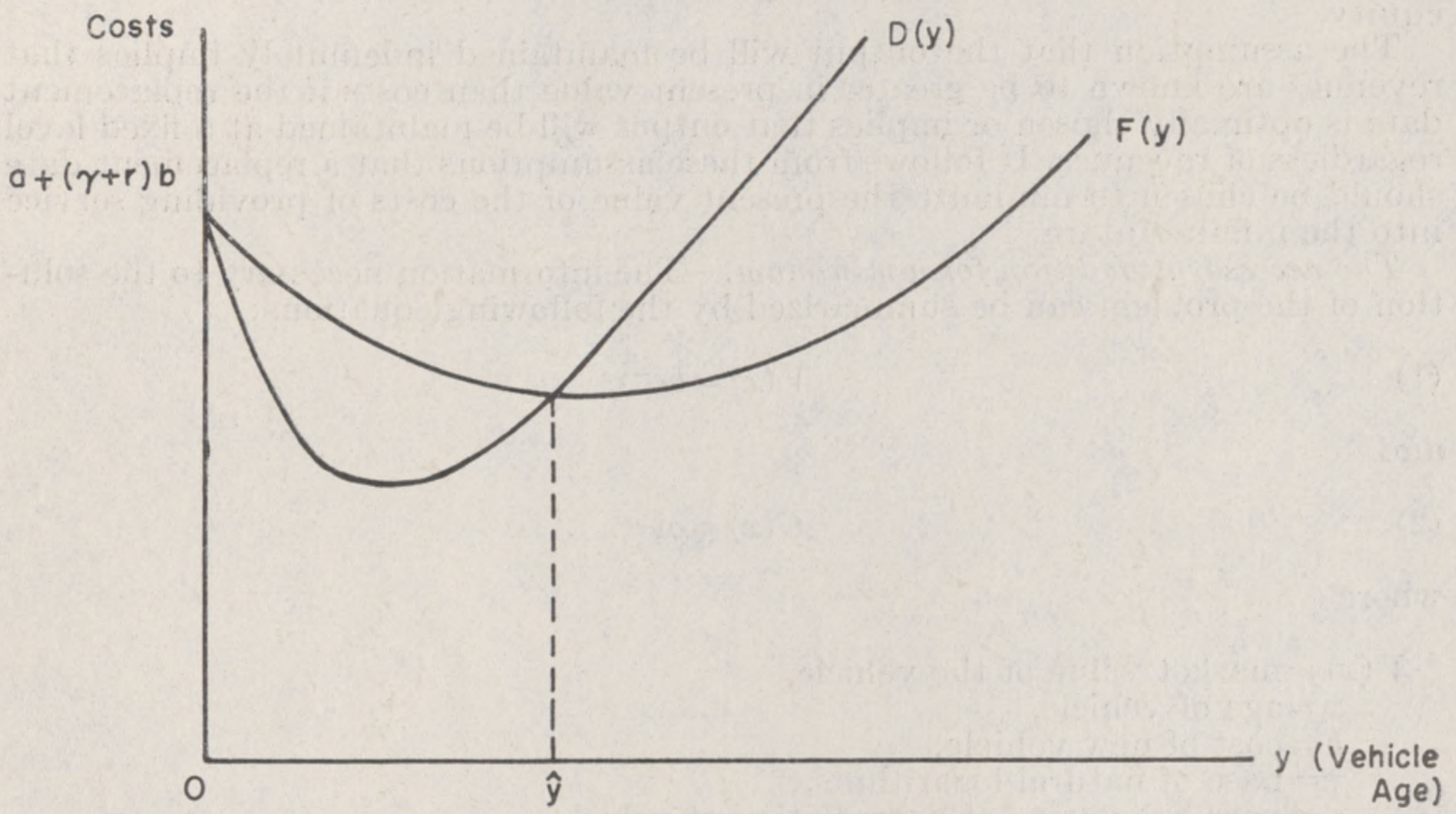

Figure 2

"MARGINAL COSTS" AND "WEIGHTED AVERAGE COSTS" AS A FUNCTION OF VEHICLE AGE

Graphic illustration of the solution.—Define $D(Y)$ to be the sum of the continuous accrual of operating, interest, and depreciation costs:

$$D(Y)=ae^{\rho Y}+(\gamma+r)\ be^{-\gamma Y}. \tag{4}$$

A constant percentage rate of increase in operating costs and a constant percentage rate of decrease in resale value of equipment will cause $D(Y)$ to be U-shaped. The decreasing rate of decrease of interest and depreciation costs must eventually be overcome by the increasing rate of increase of operating costs. For buses, the minimum of the total accrual cost curve will occur when $Y>0$ as in figure 2. Two very interesting features of the model are illustrated in this figure, both of them verifiable by mathematical proof. The first is that $D(Y)$ intersects $F(Y)$, the value of the UCE cost curve, when $Y=0$. Sufficient conditions for a minimum show this solution to be spurious. The illustration also shows that $D(Y)$ intersects the minimum of $F(Y)$, or that the derived solution minimizes long-run average costs.

The U-shape of the accrual and UCE cost curves in figure 2 and the condition that $D(Y)$ intersect $F(Y)$ at the minimum are analogous to the familiar relationships of marginal and average costs for a firm. Hence the UCE cost may be thought of as a "weighted average cost," and the accrual cost as a "marginal cost."

Variation of the level of output.—Although equation (3) has been derived with an exogenously determined output held constant, George Terborgh has noted that replacement.

---

[28] The convenience of deriving a myopic rule can be seen by referring to a solution of a similar problem by Pierre Massé in "Optimal Investment Decisions" (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962), p. 62. The details of the myopic derivation are contained in Tye, *op. cit.*

"* * * comes usually by degrees, through a process that may be described as functional degradation. It is a kind of progressive larceny, by which the ever-changing but ever-present competitors of an existing machine rob it of its function, forcing it bit by bit into lower grade and less valuable types of service until there remains at last nothing it can do to justify further existence. A capital good that can no longer hold some useful function against competition is a mechanical cadaver, whether buried or not. By the same token, an asset that has been forced into low-grade service through the expropriation of its original function is dead in part. In the bloodless warfare of machines, life is taken, as a rule, by stages." [29]

Even if one assumes a constant output throughout the equipment's lifetime, G. A. D. Preinreich has shown that determining the proper level of constant output is not a trivial matter.[30] Clearly, both of these problems are solved if the model can be extended to determine the optimum rate of output as a function of age.

The pronounced bimodal daily peaking of demand for the services of transit vehicles suggests that vehicles be assigned a range of duty from service to all markets throughout the day to service to peak-hour markets only. As a vehicle is assigned duty to serve fewer markets, its annual output of vehicle-mileage reduces accordingly. The problem is to determine how a vehicle should be assigned to serve each graduation of the hierachy of market groups over its lifetime.

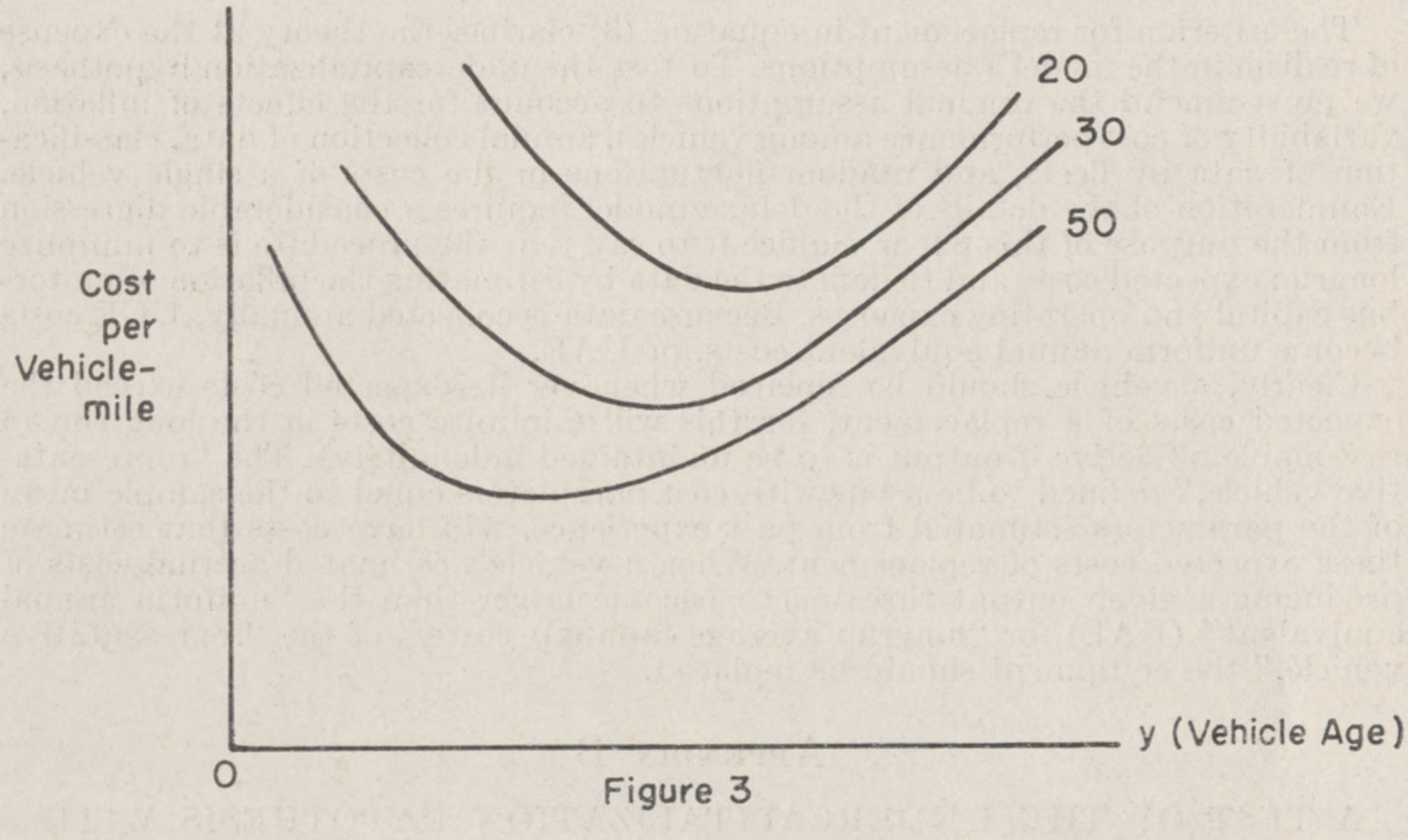

Figure 3

UNIFORM CONTINUOUS EQUIVALENT (UCE) COSTS PER VEHICLE-MILE AS A FUNCTION OF VEHICLE AGE AT REPLACEMENT AND YEARLY OUTPUT (IN THOUSANDS)

The proper utilization of vehicles depends on: (1) The behavior of costs as a function of vehicle age and output, and (2) the timing of demand. Figure 3 illustrates the behavior of UCE costs per vehicle-mile if depreciation and interest costs are a function of vehicle age but not output, and if operating costs are an exponential function of vehicle age and proportionate to the number of annual vehicle-miles. The figure shows: (1) For a given age, spreading fixed interest and depreciation costs over more mileage reduces the total cost per vehicle-mile if average operating costs per mile are constant, and (2) as the level of output declines, the optimum service life increases.

If depreciation is independent of utilization, clearly the newest vehicles should be utilized most intensively because operating costs per vehicle-mile are lower. How long a vehicle should be maintained at a given output level is a more difficult question. The minimum of the UCE cost curve for a given output no longer

---

[29] "Dynamic Equipment Policy" (Washington, D.C.: Machinery and Allied Products Institute, 1949), pp. 16–17.

[30] "The Economic Life of Industrial Equipment," Econometrica, VIII (July 1940), 35–39.

unambiguously measures the long-run average cost. If a decision is made to retire a vehicle from peak-hour service, for example, the replacement rule (3) assumes that the alternative is to buy a new vehicle for peak-hour service only. In fact, it will be more likely replaced by a vehicle coincidentally retired from a higher level of service. And even if it is replaced by a new vehicle, that new vehicle will probably also be used in the early years for service during the off peak. This off-peak service should properly bear some of the fixed capital costs of the new vehicle. Hence, it is not possible to derive a straightforward rule such as (3) when the level of utilization must also be determined.

However, the minimum UCE cost for a given output provides a valuable reference for utilization decisions. First, no vehicle should continue to produce a given output after the minimum is reached, because it can be economically replaced by a new vehicle. Also, a vehicle should usually continue to serve a given level of output as long as UCE costs are falling. When relieved from duty in that market, it should proceed to the next level of output for which UCE cost is still declining and continue at that level of service until UCE cost is at the minimum. Like a sinking ship which can remain afloat only if the excess cargo is jettisoned, the vehicle can remain economically viable only if output is reduced.

Bus Replacement With Uncertainty

The criterion for replacement in equation (3) clarifies the theory at the expense of realism in the model's assumptions. To test the undercapitalization hypothesis, we must amend the original assumptions to account for the effects of inflation, variability of cost performance among vehicles, annual collection of data, classification of data by fleets, and random fluctuations in the costs of a single vehicle. Enumeration of the details of the deluxe model requires a considerable digression from the purpose of this paper. Suffice it to say that the procedure is to minimize longrun expected costs and to deflate the data by estimating the inflation of motor-bus capital and operating expenses. Because data is collected annually, UCE costs become uniform annual equivalent costs, or UAE.

Clearly, a vehicle should be replaced whenever its expected costs exceed the expected costs of a replacement, for this will minimize costs in the long run (a reasonable objective if output is to be maintained indefinitely). The "representative vehicle," defined to be a bus with cost parameters equal to the sample mean of the parameters estimated from past experience, will have costs that estimate these expected costs of replacement. When a vehicle's estimated accrual costs of producing a given output threaten to become larger than the "uniform annual equivalent" (UAE), or "longrun average (annual) costs," of the "representative vehicle," the equipment should be replaced.

Appendix B

A TEST OF THE UNDERCAPITALIZATION HYPOTHESIS WITH CHICAGO DATA

Summary of the Chicago experience.—Data provided by the Chicago Transit Authority were similar to the Cleveland data. However, important differences in the utilization and performance of equipment provide an excellent opportunity to test the undercapitalization hypothesis with a different set of data. These differences are illustrated by a regression of vehicle-mileage on age for Cleveland and Chicago:

$$(5) \qquad M = 46{,}286 - 2{,}699.0\ X;\ r^2 = 0.486;\ \text{D.f.} = 292;\ (t = -16.617)$$
$$(6) \qquad M' = 33{,}911 - 87{,}764\ X;\ r^2 = 0.0012;\ \text{D.f.} = 115;\ (t = -0.373)$$

where

M = Cleveland yearly vehicle-mileage,
M' = Chicago yearly vehicle-mileage,
X = vehicle age in years.

The two equations clearly demonstrate a notably less significant effect of age on Chicago utilization. The evidence on the actual and predicted utilization of Chicago equipment shows that this relatively intense use of older equipment is fully warranted by costs, a finding directly contrary to the undercapitalization hypothesis.

Chicago's "representative vehicle."—Estimation of the cost parameters and UAE costs of the "representative vehicle" for Chicago was carried out much the same as the Cleveland.[31] The annual rate of depreciation of equipment sold by firms that remained in business was 30.466 percent. The operating, maintenance, and unreliability costs of a new vehicle are 6.85 cents per vehicle-mile in 1960 and were estimated to grow with age at a rate of 9.07 percent annually (in the absence of inflation).

Obviously, the mechanics of estimation of the optimum replacement of the Chicago "representative vehicle" are identical to the Cleveland example. Although the costs curves were characterized by the same features as Cleveland's, table 9 illustrates that Chicago experienced considerably higher UAE costs and the recommended replacement dates for given outputs are considerably earlier than Cleveland's.

TABLE 9.—UAE COST [1] AND OPTIMUM DISPOSAL DATE AS A FUNCTION OF OUTPUT: THE CHICAGO "REPRESENTATIVE VEHICLE"

Yearly output in thousands of miles	UAE	Age at replacement (years)	Yearly output in thousands of miles	UAE	Age at replacement (years)
50	$8,470.95	8	29	$6,170.05	11
49	8,368.82	8	28	6,053.90	12
48	8,266.01	9	27	5,933.04	12
47	8,159.47	9	26	5,812.17	12
46	8,052.93	9	25	4,691.30	12
45	7,946.38	9	24	5,570.44	12
44	7,839.84	9	23	5,446.18	13
43	7,733.02	9	22	5,320.16	13
42	7,626.76	9	21	5,194.13	13
41	7,520.22	9	20	5,067.88	14
40	7,413.60	10	19	4,936.48	14
39	7,302.47	10	18	4,805.08	14
38	7,191.34	10	17	4,673.38	15
37	7,080.21	10	16	4,536.41	15
36	6,969.08	10	15	4,399.43	15
35	6,857.95	10	14	4,259.11	16
34	6,746.82	10	13	4,116.33	16
33	6,633.67	11	12	3,970.49	17
32	6,517.77	11	11	3,821.69	17
31	6,401.86	11	10	3,668.02	18
30	6,285.96	11			

[1] 1960 prices; interest rate of 5.3 percent.

Actual and optimum utilization.—The actual average utilization estimated for Chicago fleets in equation (6) shows a close similarity to the recommended replacement in table 9. For example, the average vehicle-mileage according to equation (6) at 10 years is 33,034. Table 8 shows that an output of 33,000 miles can be maintained economically for as long as 11 years. The alleged undercapitalization of the transit industry is certainly not substantiated by Chicago's cost figures.

The replacement rule was applied, when possible, to the replacement problem of each of the Chicago fleets in a manner similar to the Cleveland exercise.[32] Table 10 summarizes the results with the "mean underutilization," or yearly average deviation of predicted from actual values. The positive values imply that the Chicago bus operations may have been slightly overcapitalized, but the actual behavior is very nearly identical to optimal behavior.

---

[31] The Chicago data were as complete and reliable as Cleveland's, but inferior in several respects. The time series extended only from 1962 to 1968, and only two classes of operating cost data, "Total Vehicle Maintenance" and "Fuel and Power," were specified. Road call information was available only for the year 1968. An equation was estimated with 1968 data to approximate the road call costs for the other years. Using an estimate of the road calls per mile, each road call was valued at $40, a price suggested by the Chicago management, and the estimated road call costs were added to reported costs. Obtaining reliable observations for the Chicago depreciation curve was even more troublesome than for Cleveland. The asset accounts had been updated for several years after the purchase of new vehicles to include break-in costs incidental to new vehicles, which prevented an unambiguous measure of the capital cost of a new vehicle. The value of the capital account 1 year after purchase was chosen as the estimated cost of the new vehicle. For disposal values Chicago management recommended the salvage value on the books ($300), although the true market value will deviate considerably from this value. Unfortunately, Chicago makes almost no sales of buses for cash (except junk), and book values are the only measure of the market value of older vehicles.

[32] Again, operating costs were estimated separately for each fleet. Depreciation costs were estimated separately for GM and non-GM fleets. Operating costs per vehicle-mile were assumed to be constant for all output rates at a given age. Depreciation costs were assumed to be independent of the output level.

TABLE 10.—*Mean yearly deviation of actual utilization from predicted utilization, Chicago fleets, 1962–64*

Fleet No.—	*Mean underutilization*
1	+1, 197
3	+1, 302
5	+1, 166
11	+1, 028
50	+531
55	+1, 474
72	+3, 119
80	+894
82	+3, 151
84	+125
85	+4, 700
87	−221
65	+5, 373
Group 2 [1]	+11, 531

[1] Fleet Nos. 16, 17, and 18; all are twin or GM gasoline vehicles.

The effect of a change in the interest rate on the least-cost replacement of Chicago transit equipment.—Table 11 illustrates that a change of interest rate from 5.3 percent to 3.5 percent for Chicago has an effect comparable to that noted for Cleveland. The UAE costs are reduced, but not significantly, and the least-cost replacement of equipment is practically unchanged.

TABLE 11.—UAE COST [1] AND OPTIMUM DISPOSAL DATE AS A FUNCTION OF OUTPUT FOR THE CHICAGO "REPRESENTATIVE VEHICLE": 5.3 PERCENT AND 3.5 PERCENT DISCOUNT RATES

Yearly output in thousands of miles	5.3 percent		3.5 percent	
	UAE	Age at replacement (years)	UAE	Age at replacement (years)
50	$8, 470. 95	8	$8, 301. 63	8
49	8, 368. 82	8	8, 213. 92	9
48	8, 266. 01	9	8, 107. 38	9
47	8, 159. 47	9	8, 000. 83	9
46	8, 052. 93	9	7, 894. 29	9
45	7, 946. 38	9	7, 787. 75	9
44	7, 839. 84	9	7, 681. 21	9
43	7, 733. 02	9	7, 574. 67	9
42	7, 626. 76	9	7, 468. 13	9
41	7, 520. 22	9	7, 361. 59	9
40	7, 413. 60	10	7, 255. 04	9
39	7, 302. 47	10	7, 148. 50	9
38	7, 191. 34	10	7, 041. 94	10
37	7, 080. 21	10	6, 930. 82	10
36	6, 969. 08	10	6, 819. 68	10
35	6, 857. 95	10	6, 708. 55	10
34	6, 746. 82	10	6, 597. 42	10
33	6, 633. 67	11	6, 486. 29	10
32	6, 517. 77	11	6, 375. 16	10
31	6, 401. 86	11	6, 260. 50	11
30	6, 285. 96	11	6, 144. 60	11
29	6, 170. 05	11	6, 028. 70	11
28	6, 053. 90	12	5, 912. 79	11
27	5, 933. 04	12	5, 796. 89	11
26	5, 812. 17	12	5, 677. 81	12
25	5, 691. 30	12	5, 556. 95	12
24	5, 570. 44	12	5, 436. 08	12
23	5, 446. 18	13	5, 315. 21	12
22	5, 320. 16	13	5, 191. 94	13
21	5, 194. 13	13	5, 065. 92	13
20	5, 067. 88	14	4, 939. 89	13
19	4, 936. 48	14	4, 813. 68	14
18	4, 805. 08	14	4, 682. 29	14
17	4, 673. 38	15	4, 550. 89	14
16	4, 536. 41	15	4, 418. 40	15
15	4, 399. 43	15	4, 281. 42	15
14	4, 259. 11	16	4, 144. 44	15
13	4, 116. 33	16	4, 002. 58	16
12	3, 970. 49	17	3, 859. 80	16
11	3, 821. 69	17	3, 711. 73	17
10	3, 668. 02	18	3, 561. 46	18

[1] 1960 prices.

Appendix C

INCIDENCE OF THE BENEFITS OF A TRANSIT CAPITAL SUBSIDY

Figure 4 illustrates that the decision by the recipient to award the subsidy's benefits to the transit user or to the transit worker is in no way affected by the capital grant mechanism.[33] In this example, the enterprise (firm, authority, et cetera) is assumed to incur in the absence of a capital grant long-run total costs per bus-mile of 80.4 cents, an average estimated for the industry in 1969.[34] Taxes are excluded from this cost estimate because they vary so greatly. Operating expenses (mostly labor) are estimated to be 67 cents per mile and capital costs (interest and depreciation) are 13.4 cents. If the enterprise receives a Federal capital grant, its long-run average costs will be reduced by 13.4 cents per mile, 9 cents (two-thirds) borne by the Federal Government and 4.4 cents borne by the local government. Hence the sum of operating expenses and the local share of the capital subsidy is 71.4 cents per vehicle-mile.

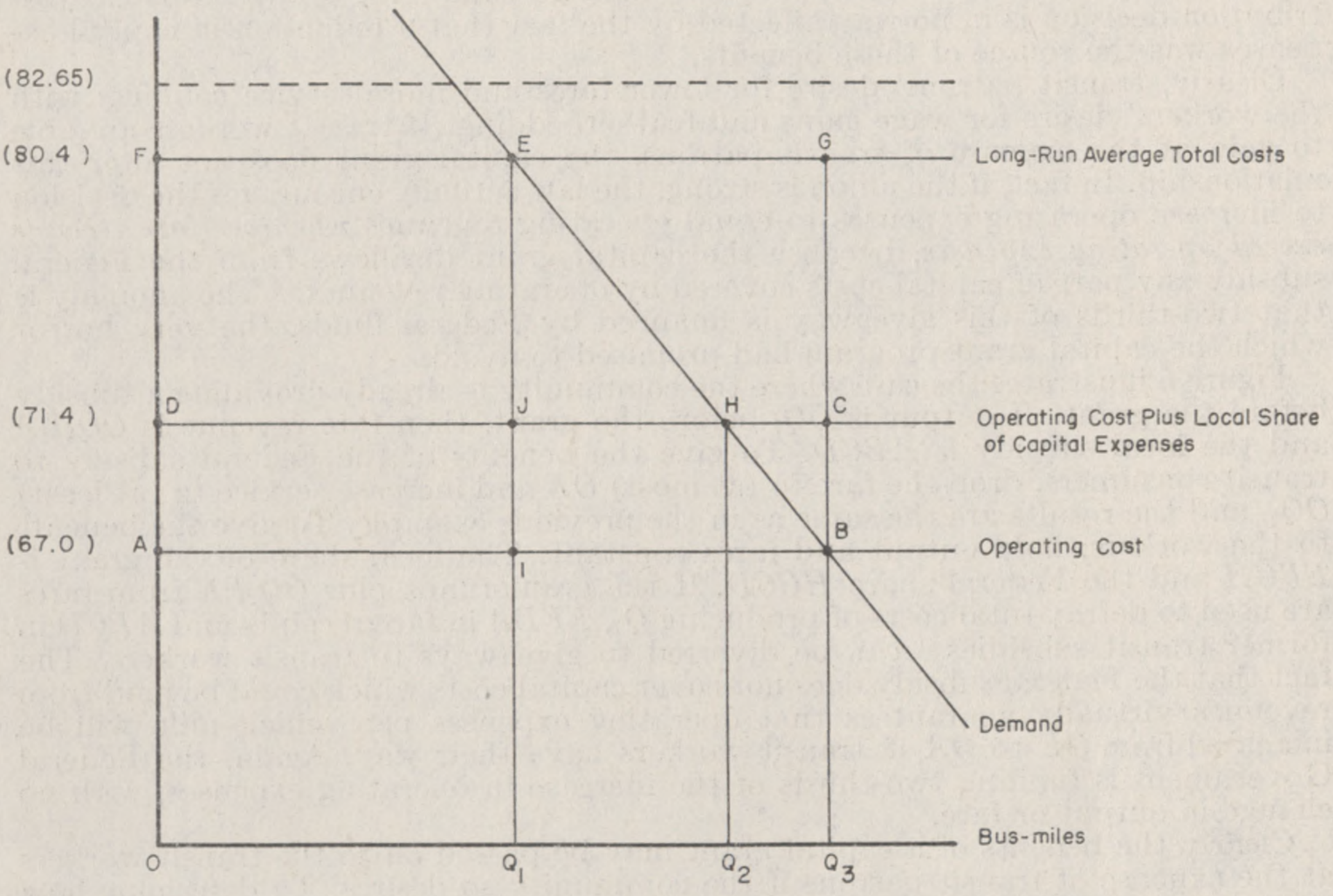

Figure 4

Demand and Cost Curves with a Capital Grant (No Local Operating Subsidy)

Assume first for the purpose of illustration that the capital subsidy does not change *total* long-run average cost, 80.4 cents, and that the community provided no subsidy before the capital grant. If a demand curve for transit "service" (average revenue curve for vehicle-miles) is introduced, output is OQ_1 and fare per vehicle-mile must be OF to cover long-run average costs before the grant.

Suppose that the recipient intends to pass on to transit users all the benefits of the capital grant subsidy. In this case, fare falls to OA to cover the operating costs, output expands to OQ_3, the local share of the subsidy is $ABCD$ and the Federal share is $DCGF$.

---

[33] Of course, this principle is not limited by the specific mode, costs, et cetera, assumed in the example. In practice, the product demanded is not strictly vehicle-miles, nor can output be changed continuously as suggested in this hypothetical example.

[34] A flat curve is drawn to indicate that bus operations do not experience economies of scale, an assumption consistent with recent empirical evidence.

Clearly in this example the benefits [35] of the capital grant to transit consumers are *ABEF* (ignoring any costs to them as local taxpayers). If the community desires to channel the benefits of the capital subsidy to the transit user, this outcome is perfectly logical.[36] After the grant, fares generate revenues of OQ_3BA, exactly enough to pay operating costs, so that the Federal grant is maximized. Total payments to workers have gone up, but only enough to pay for the expansion of output.[37] Certainly this is the outcome desired by the designers of the capital grant.

However, suppose that the recipient succumbs to wage demands and decides instead to give the benefits of the subsidy to the workers despite congressional intent. If fares are maintained sufficient to generate 80.4 cents per mile and output is maintained at Q_1, the local share of the capital grant is *AIJD* and the Federal share is *DJEF*.[38] If *AIEF* is paid out as excess wages and featherbedding, fares are now sufficient to cover the minimum operating expenses plus "giveaway," and labor gets both local and Federal shares.[39] Or perhaps the recipient will pass on only the Federal share by raising operating costs by 9 cents a mile. Most recipients will probably share the benefits between the two competing groups. But the distribution decision is in no way affected by the fact that a reduction in capital expenses was the source of these benefits.

Clearly, transit patrons' desire for lower fares and more service conflicts with the workers' desire for wage gains and featherbedding. If transit workers are able to gain at the expense of transit patrons, the capital grant does not alter this relationship. In fact, if the union is strong, the law actually encourages the decision to increase operating expenses to equal operating revenues *whenever fare receipts exceed operating expenses*, because the capital grant disallows from the Federal subsidy any part of capital costs covered by operating revenues.[40] The anomaly is that two-thirds of this giveaway is financed by Federal funds, the very horror which the capital grant program had promised to avoid.

Figure 5 illustrates the case where the community is already providing a subsidy before the grant. If output is OQ_1 before the grant, then fare revenue is OQ_1BA and the local subsidy is *ABCD*. To give the benefits of the Federal subsidy to transit consumers, drop the fare to (at most) *OE* and increase service to (at least) OQ_2, and the results are the same as in the previous example. To give the benefits to the workers, hold output and fares constant. The local share of the grant is *EFGH* and the Federal share *HGCD*. If the grant funds plus OQ_1FE from fares are used to defray total costs of producing Q_1, *EFBA* in fare receipts and *ABCD* in former transit subsidies [41] can be diverted to giveaways to transit workers. The fact that the Federal subsidy does not cover capital costs which could be paid from revenues virtually guarantees that operating expenses per vehicle-mile will be increased from *OE* to *OA* if transit workers have their way. Again, the Federal Government is funding two-thirds of the increase in operating expenses, with no change in output or fare.

Clearly the benefits of a capital grant may be passed on to the transit workers at the expense of transit patrons if the community so desires. To determine how the workers would be affected by relaxing the capital restriction, imagine in figure 4 that, instead of a two-thirds capital subsidy, an unrestricted 9 cents per vehicle-mile subsidy were instituted.[42] The reduction in locally borne costs would be

---

[35] "Benefits" are measured by the principle of "consumers' surplus," the difference between the willingness to pay rather than do without incremental units (as measured by demand curves) and the actual amount paid.

[36] Of course, the output Q_3–Q_2 provides benefits to riders of value less than costs to the community. This would constitute an allocative inefficiency unless some generalized "external" benefit to nonusers were identified.

[37] If more workers could be hired only at a higher wage rate, this increase in the demand for labor could raise the wage rate. But this is not the type of wage increase that concerned supporters of a capital grant: "excess wages" are those in excess of what is required to elicit the required supply of labor.

[38] Note that the decision not to expand output reduces the required subsidy.

[39] To see how a surplus of *AIEF* is generated for distribution to the workers, note that revenues from fares are OQ_1EF and minimum costs of operation only OQ_1IA after the grant. The giveaway can be financed directly from farebox revenues.

[40] Conversely, if transit patrons are strong politically they will press for a decrease in fares to equal operating expenses so that the Federal share is maximized. Whether benefits accrue to workers or riders there is never any incentive to allow fare receipts to exceed operating expenses.

[41] It is frequently asserted that *ABCD* is more immune to wage demands than *EFBA*. This may be true, but it is unrelated to the subsidy mechanism.

[42] The alternative to the capital grant must be based on a constant rate per vehicle-mile for the comparison to be proper. A subsidy based on a percent of total costs incurred would encourage giveaways to the workers because part of wage rate increases could be passed on to the benefactor. With a capital grant or a subsidy per vehicle-mile, wage rate increases are passed on to the transit consumer by higher fares and decreased service or to the local taxpayer by an increased operating deficit.

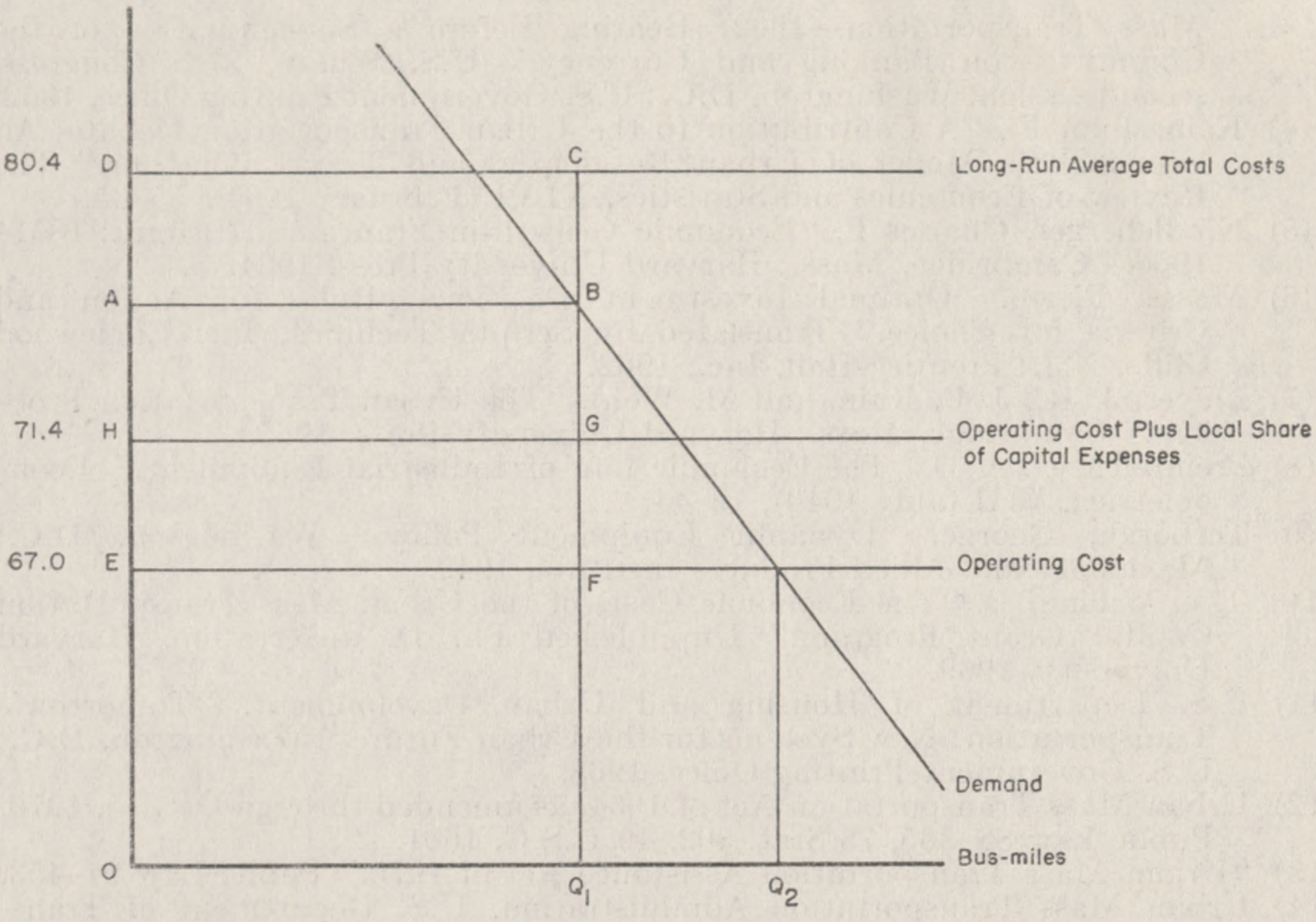

Figure 5

Demand and Cost Curves with a Capital Grant (Local Operating Subsidy in Effect)

exactly the same as with a capital grant and the fare/output decision would be unaffected. Neither would there be any change in the Federal subsidy costs. The reader may confirm for himself that the same findings hold for the second case illustrated. Hence the capital restriction in no way limits the decision to allocate the benefits of a Federal subsidy as the local political process sees fit.

Still, however, remains the intuition that a generalized subsidy to both capital and labor would make available a source of funds to benefit transit labor that would not be available with a capital grant. Does there still remain some way in which a capital grant may prevent a giveaway to transit workers? As illustrated in part V, the effect of a subsidy to capital but not labor is to encourage a substitution of capital expenses for operating expenses through premature replacement, inadequate maintenance, and overly capital-intensive technology. This incentive to overcapitalize transit operations increases overall costs so that the cost of the project to the Federal Government is greater than the benefit to the recipient through reduced costs. This is illustrated in figure 4 by the shift upward in total costs per vehicle-mile from 80.4 to, say, 82.65.[43] In this way the reduction in costs to the local community is only 6.75 cents instead of 9. Of course, the more inefficient the subsidy mechanism, the further the upward shift in total costs and the fewer the benefits to the recipient which can be appropriated by labor. Only through its gross inefficiency can a capital grant insure that few benefits will be passed on to transit workers.

Bibliography

(1) American Transit Association. "Transit Fact Book: 1970 Edition." Washington, D.C.

(2) Fitch, Lyle C., and Associates. "Urban Transportation and Public Policy." San Francisco: Chandler Publishing Co., 1964.

(3) Hodges, Luther H., and Robert C. Weaver. "Urban Transportation—Joint Report to the President by the Secretary of Commerce and the Housing and Home Finance Administration." Mar. 28, 1962. Reprinted in "Urban

[43] This is an increase of roughly 25 percent of the Federal subsidy, an amount suggested by the calculations in part V.

Mass Transportation—1962: Hearing Before a Subcommittee of the Committee on Banking and Currency," U.S. Senate, 87th Congress, second session. Washington, D.C.: U.S. Government Printing Office, 1962.
(4) Kain, John F., "A Contribution to the Urban Transportation Debate: An Econometric Model of Urban Residential and Travel Behavior." The Review of Economics and Statistics, XLVI (February 1964), 55–65.
(5) Kindleberger, Charles P. "Economic Growth in France and Britain: 1851–1950." Cambridge, Mass.: Harvard University Press, 1964.
(6) Massé, Pierre. "Optimal Investment Decisions: Rules for Action and Criteria for Choice." Translated by Scripta Technica, Inc. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962.
(7) Meyer, J. R., J. F. Kain, and M. Wohl. "The Urban Transportation Problem." Cambridge, Mass.: Harvard University Press, 1965.
(8) Preinreich, G. A. D. "The Economic Life of Industrial Equipment." Econometrica, VIII (July 1940), 12–44.
(9) Terborgh, George. "Dynamic Equipment Policy." Washington, D.C.: Machinery and Allied Products Institute, 1949.
(10) Tye, William B. "The Economic Costs of the Urban Mass Transportation Capital Grant Program." Unpublished Ph. D. dissertation, Harvard University, 1969.
(11) U.S. Department of Housing and Urban Development. "Tomorrow's Transportation: New Systems for the Urban Future." Washington, D.C.: U.S. Government Printing Office, 1968.
(12) Urban Mass Transportation Act of 1964, as amended through Oct. 15, 1970. Public Law 88–365, 78 Stat. 302, 49 U.S.C. 1601.
(13) "Urban Mass Transportation Assistance Act of 1970." Public Law 91–453.
(14) Urban Mass Transportation Administration, U.S. Department of Transportation. "Approvals of Capital Grants and Loans and Technical Studies Grants." Mar. 24, 1971.

SUBSIDIES TO GENERAL AVIATION

By JEREMY J. WARFORD*

SUMMARY AND CONCLUSIONS

General aviation includes all aircraft other than those operated by the commercial airlines. The importance of this activity is illustrated by the fact that general aviation aircraft account for about 98% of the nation's civil aviation fleet, travel twice as many miles as the certificated route air carriers, and make about three-quarters of the landings and takeoffs at airports with control towers operated by the Federal Aviation Administration (FAA).

Subsidies arise mainly as a result of the failure of Federal, State and local authorities to charge general aviation sufficient to cover the cost of the services they provide. The Federal government subsidizes general aviation in two main ways. First, it provides direct construction grants to State/local airport authorities, for which no cost recovery is made. Second, and more important, are the subsidies which arise because the "user charges" (mainly the fuel tax and aircraft registration tax) payable by general aviation fail to cover the costs that this activity imposes upon the air traffic control, communications, and navigational facilities known as the Federal airways system. State and local authorities subsidize general aviation by providing airport landing areas, hangars, terminal buildings, and so on, and failing to recover charges sufficient to cover costs. A further type of subsidy arises in the form of net transfers from the commercial airlines, because of the delay costs imposed upon them by general aviation.

Official predictions indicate that general aviation will be responsible for the preponderant part of the growth in total aviation activity in the next ten years. Relating this to expected system costs, it is conservatively estimated that under present legislative arrangements subsidies to general aviation will be of the order of $640 million annually, this figure being made up as follows: $445 million federal airways system costs; $30 million federal subsidies for airport development; $130 million state and local subsidies to general aviation airports; and $35 million congestion and delay costs.

It is predicted that the average number of aircraft in the general aviation fleet during the period 1971–80 will be about 176,000, the subsidy to general aviation therefore amounting to over $3,500 per annum per aircraft. Since the intention is that civil aviation as a whole should pay its way for federal facilities by the end of this pe-

---

*International Bank for Reconstruction and Development. The research upon which this paper is based was completed while the author was at the Brookings Institution; he is indebted to Charles L. Schultze for guidance throughout the course of the study. An earlier version of the paper was presented at the Brookings Seminar on Incentives in Public Policy, May 21, 1971. For a more detailed analysis, see the author's "Public Policy Toward General Aviation," Brookings, 1971. The opinions expressed here in no way purport to represent those of the brookings Institution, or of the International Bank for Reconstruction and Development.

riod, subsidies at that time would be mainly from passengers of the commercial airlines to general aviation rather than, as at present, subsidies from the general taxpayer.

The paper discusses arguments used by general aviation interests to resist increased user charges, and concludes that they fail to make a satisfactory case. The basic assumptions underlying official predictions of aviation activity and facility "needs" are therefore queried, and methods of eliminating the subsidy are discussed. Immediate introduction of 100 percent cost recovery is not however recommended. Rather, subsidies should be eliminated by gradually raising charges over a number of years, thereby avoiding a dramatic reduction in activity, and excess capacity in the creation of airport and airways facilities, which would be of benefit to no one. Federal user charges should take the form of landing fees for the use of terminal areas with FAA facilities, the existing fuel taxes being retained, but substantially increased, to recover the costs of en route, air navigation and flight service sub-systems. The FAA is probably not the best authority to determine the appropriateness of Federal airport subsidies, and the "regional development" type of argument used to defend Federal, State and local subsidies should be examined with much more care than in the past. At airports where delays are prevalent, greater reliance should be placed upon use of pricing, and less upon direct regulation, to control congestion.

I. Introduction

This paper describes the way in which general aviation is subsidized by Federal, State, and local governments, and by transfers from other categories of aviation, and discusses the implications of these subsidies for economically efficient use of the Nation's airways and airports.

The general aviation fleet is defined to include all civil aircraft other than those officially classified as air carriers, or, more loosely, the commercial airlines. Typical general aviation aircraft range widely in size and sophistication, from single piston-engined aircraft costing around $10,000, to turbojets which cost about $3 million. They are used for a wide variety of purposes: By doctors and lawyers in the course of their business; for the transportation of company executives, salesmen, and other personnel for business purposes; for air taxi services; crop dusting; surveying; advertising; photography; recreational and instructional flying.

The Federal airways system consists of air traffic control facilities, navigational and other flight aids and services, and a vast communications network, and is operated almost entirely by the Federal Aviation Administration (FAA). Publicly owned airports, however, consisting of runways, taxiways, aprons, hangars, terminal buildings, access roads, and automobile parking, are normally the responsibility of State or municipal authorities. The paper is not concerned with the operation of privately owned general aviation airports, which comprise two-thirds of all landing areas on record with the FAA.

Although attention will be focused primarily on general aviation, the competing demands of various types of aircraft for airport facilities

and airspace normally mean that a given policy for general aviation has automatic implications for policy toward military aircraft or the commercial airlines. Consequently, adequate discussion of public policy toward general aviation cannot proceed without some reference to the treatment of the other categories of aviation.

Indeed, the distinction that is made between general aviation and air carriers is for many purposes meaningless and is the source of much confusion regarding the way in which the various segments of aviation should be treated by public authorities. However, sufficient reason to concentrate on general aviation is that those responsible for establishing charges for airways and airport use do make this distinction, relatively favorable treatment of general aviation being the result. It is clear that methods of charging general aviation for the use of airports and airways facilities are economically less efficient, and result in much greater subsidies, than those applied to the commercial airlines. Indeed, this paper concludes that under present legislative arrangements, subsidies to general aviation over the next 10 years will average well over $600 million annually, which corresponds to more than $3,500 per annum per aircraft.

While the activities of the commercial airlines have been subject to a considerable amount of economic analysis, general aviation has been largely ignored by economists.[1] This is somewhat surprising in view of its importance in the overall aviation picture. Thus, at the end of 1968, 98 percent of all civil aircraft on record with the FAA were used for general aviation purposes.[2] In that year, general aviation aircraft traveled twice as many miles as the certificated route air carriers and made about three-quarters of the landings and takeoffs recorded by FAA-operated control towers.

Moreover, the relative importance of general aviation is expected to increase during the next decade. The FAA predicts an increase of about 60 percent in the number of general aviation aircraft between 1969 and 1980, compared with one of 30 percent for the air carrier fleet. Similarly, the bulk of the increase in aviation activity is expected to be attributable to general aviation; for example, it is estimated that over the same period, general aviation will be responsible for 94 percent of the annual increase in operations (landing and takeoffs) at airports with FAA control towers. The total number of general aviation operations in 1980 is expected to be more than double that for 1969.[3]

The predicted rapidity in the growth of general aviation, and the consequent pressure placed upon the Nation's airports and airways system, should make the subsidization of this important sector of civil aviation a matter of deep concern. Despite recent legislative measures authorizing greater Federal aviation expenditures, it is fair to say that public authorities with responsibilities for providing airport and airways facilities are in a state approaching despair as they see the rapid growth in demand for those facilities. Journalists and aviation interests continually warn of the dangers of future aviation "crises" that can only be avoided by a substantial program of expan-

---

[1] A notable exception is the work done by Gary Fromm. See, for example, his testimony in "Economic Analysis and the Efficiency of Government, Part 2," hearings before the Subcommittee on Economy in Government of the Joint Economic Committee, U.S. Congress, September 1969, p. 518 ff.

[2] "FAA Statistical Handbook of Aviation," FAA, 1969.

[3] "Aviation Forecasts Fiscal Years 1969-80," FAA, January 1969.

sion and modernization of airport and airways facilities. The problem is perhaps exhibited most clearly by the delays and dangers associated with congestion, both in the air and on the ground, at airports such as Kennedy and O'Hare.

Failure to make positive use of price as an aid to decisionmaking is a fundamental explanation of the difficulties now being encountered, recent measures designed to remedy this situation being woefully inadequate. Official attitudes toward the problem are illustrated quite clearly by the FAA's method of forecasting aviation activity, which relies largely upon extrapolation of past trends, modified in the light of expected changes in such variables as population and technical advances. Separate forecasts are made for various types of aircraft, for airport, and airway facility planning is dependent to a significant degree upon the aircraft mix. Estimates are made of the numbers of active aircraft by region, hours flown, fuel consumed, and of aircraft operations and other usage of the Federal airways system. In total, these predictions embody a good deal of technical expertise and knowledge of the workings of the airports and airways system as well as of the characteristics of the aircraft themselves. Unfortunately, this substantial edifice is constructed on somewhat shaky ground, and this applies particularly to forecasts of general aviation activity.

The basic criticism of the procedure is that the least-cost method of achieving certain physical output targets is determined with scarcely any attention being paid to the benefits (expressed in terms of consumers' willingness to pay) that will accrue from the expenditure. This is unavoidable in the case of many services normally provided by public authorities; this applies particularly to such things as national defense, or police services, where a pricing system cannot work properly. However, in other cases, among which may be numbered the provision of certain aviation facilities, satisfactory pricing and investment policies may be frustrated, not by the technical difficulties of implementing a pricing policy, but rather by institutional and political obstacles.

The terms "needs," "demands," and "requirements" for airport and airways facilities are used extensively (and synonymously) by aviation interests, the public at large, and, indeed, frequently by the FAA itself. But in economic terms, proof of social need requires evidence that beneficiaries would be willing to pay a price for a commodity or service that is at least as large as the net cost to society of its provision: A pricing and investment policy conforming to this criterion can be defined as economically efficient. However, as far as the services supplied by the FAA are concerned, the present method of financing fails entirely in this respect.

Apart from relatively minor adjustments, the extrapolation method implies that the influence of changes in variables affecting the use of aviation facilities will follow the same trend as in the past. The FAA does not levy charges based directly upon the use made of various parts of the system by general aviation, and only a token amount is recovered by indirect charges. Similar policies are normally followed by airport operators. Failure to adjust for changes in the influence of a price variable therefore implies a continuation of existing charging policies, and, since forecasts of aviation activity are the basis for facility planning,

pressure for a greater than optimal amount of investment is exerted. In other words, although the forecasting method employed by the FAA and other interested parties may (if the influence of other variables is correctly estimated) yield accurate predictions, the predictions, themselves are almost certain to be of levels of activity that are economically undesirable.

It is clear that the subsidization of general aviation—achieved in recent years by allowing it to use publicly owned facilities virtually free of charge—has been responsible to a considerable degree for its phenomenal rate of growth, and the increasing burden it places upon the Nation's airports and airways system. The objectives of this paper are therefore to define the magnitude of the subsidy if present regulations and plans remain in force, and to suggest a method of eliminating the subsidy in a way that, as far as is practicable, provides the necessary signals to policymakers concerned with expenditure decisions in this field.

II. Federal Subsidies to General Aviation

The Federal Airways System

The Federal airways system consists of four major elements, these being the terminal area, en route traffic control, air navigation, and flight service subsystems. The terminal area subsystem is based upon the air traffic control tower, and may include airport surveillance and approach control facilities, approach lighting, instrument landing systems, visual aids, and radio navigation facilities. The part of the terminal area subsystem used most extensively by general aviation is the air traffic control tower itself, of which over 300 are operated by the FAA. Other terminal area facilities are used predominantly by aircraft operating under instrument flight rules (IFR). IFR conditions exist when weather conditions are below the minimum officially prescribed for flight under VFR, or visual flight rules, under which the bulk of general aviation activity is carried out; consequently, the commercial airlines are the main users of the rest of the terminal area subsystem. This also applies to the en route traffic control subsystem, which is designed to facilitate safe and efficient movement by controlling the separation of IFR traffic along the airways, and which consists of about 30 air route traffic control centers, long-range radar, and direct voice communications between controllers and pilots.

General aviation is a relatively unimportant user of the air navigation subsystem which provides visual, electronic, mechanical, and magnetic guidance to aircraft. The flight service subsystem on the other hand is used extensively by general aviation. Flight service stations are manned facilities, and are usually located at airports, their main function being to provide weather, altitude and route information by air-ground communication. They also initiate search and rescue operations.

Cost Allocation and User Charges

The method that has been employed by the FAA to allocate the costs of the Federal airways system among users is to take the total annual cost of each facility (including operating, maintenance, and

annual-equivalent capital costs) and to divide this among military aircraft, air carriers, and general aviation in proportion to the use made of that facility by each of the three categories. Use of traffic control towers is measured by the number of landings and takeoffs, the remainder of the terminal subsystem costs being allocated according to the number of instrument operations or approaches. En route traffic control and air navigation subsystem costs are allocated according to the number of IFR aircraft handled, while flight service subsystem costs are allocated on the basis of the number of flight services (i.e., pilot briefs) recorded. The costs of the Federal airways system, including research and development were allocated for fiscal 1969 as shown in table 1.[4]

TABLE 1.—ALLOCATION OF FEDERAL AIRWAYS SYSTEM COSTS, FISCAL YEAR 1969

[Dollar amounts in millions]

	General aviation		Air carrier		Military	
	Percent	Amount	Percent	Amount	Percent	Amount
Subsystem:						
Terminal	38.3	$88.4	48.7	$112.3	12.9	$29.7
En route	15.9	45.6	60.9	174.8	23.2	66.6
Air navigation	15.9	9.3	60.9	35.5	23.2	13.5
Flight service	79.5	83.2	8.4	8.8	12.1	12.7
R. & D. projects	17.0	8.3	61.9	30.3	21.1	10.3
Total	32.2	234.8	49.6	361.7	18.2	132.8

Source: FAA unpublished data June 13, 1969.

Prior to May 1970, taxes on aviation activity, generally recognized as user charges, were of the following form:

- Passengers traveling by air carrier or scheduled air taxi paid a ticket tax of 5 percent.
- All gasoline used by civil aviation was taxed at an effective rate of 2 cents per gallon.

In 1969 these taxes recovered $257.7 million from the air carriers, and $12.8 million from general aviation. So while about 70 percent of the costs attributed to the air carriers was recovered from them, general aviation paid for only 5 percent of its allocated share, the subsidy to general aviation being roughly $220 million. A particularly glaring anomaly was that privately operated turbojet or turboprop aircraft using untaxed kerosene were subject to no charges at all.

In May 1970 the Airport and Airway Development and Revenue Acts introduced the following changes:

- An increase in the passenger ticket tax to 8 percent.
- A new tax of $3 on passenger tickets for most international flights.
- A new tax on air freight waybills of 5 percent.
- Abolition of the gasoline tax for air carriers.
- Replacement of the existing gasoline tax for general aviation by a 7 cents per gallon tax on all fuel used by general aviation, unless used for purposes subject to passenger or freight taxes.

[4] This paper deals solely with the domestic Federal airways system, ignoring international airways system costs borne by the FAA.

- As an entirely new feature, an annual registration fee for all civil aircraft of $25 per aircraft, plus 2 cents per pound for piston-engined aircraft of more than 2,500 pounds maximum takeoff weight and 3½ cents per pound for all turbine powered aircraft.

Including a small tax on tires and tubes, the estimated yield from these taxes was $666 million in fiscal 1971, of which $73 million would be obtained from general aviation. As demonstrated in table 2, the fuel tax will continue to be the main source of revenue from general aviation. If the tax liability for 1971 is related to the 1969 airways cost allocation figures, the revenue produced by general aviation would be less than one-third of its allocated share. The revenue obtained from general aviation over the period 1971–80 is estimated to average just over $100 million annually. In view of the expected growth in the importance of general aviation, it is clear that it will be subsidized to an ever-increasing extent despite the increased liability to user charges.

TABLE 2.—PROJECTION OF GENERAL AVIATION AND AIR CARRIER LIABILITY TO USER CHARGES, FISCAL YEARS 1971–80

[In millions of dollars]

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
General aviation:										
Fuel tax	47.2	50.9	55.1	59.2	63.8	68.3	72.7	76.5	81.0	85.4
Aircraft use tax	10.4	11.0	11.8	12.4	13.2	14.0	14.7	15.4	16.2	17.0
Waybill tax	.5	.6	.6	.6	.6	.7	.8	.9	.9	1.0
Passenger tax	13.8	15.0	15.8	16.9	18.2	19.8	21.4	23.0	24.7	26.7
Taxes on tires and tubes	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Total general aviation liability	72.9	78.5	84.4	90.3	97.1	104.2	111.1	117.4	124.5	131.9
Air carrier:										
Total air carrier liability	592.9	647.0	711.3	781.6	862.6	958.3	1,504.2	1,158.2	1,269.5	1,405.0
Total liability	665.8	725.5	795.7	871.9	959.7	1,062.5	1,165.3	1,275.6	1,394.0	1,536.9

Note.—All data on revenue and costs have been adjusted and are in constant dollars to facilitate comparison.

Source: FAA, and Senate Report 91–706, February 1970.

The FAA predicts that over the period 1971–80, general aviation will be responsible for:

- 55 percent of the increase in the number of IFR departures;
- 52 percent of the increase in IFR aircraft handled by air route traffic control centers;
- 94 percent of the increase in landings and takeoffs recorded at FAA-operated control towers; and
- the whole of the increase in number of contacts made by flight service stations.

In view of these estimates, a conservative measure of the cost of general aviation activity over the next decade would be obtained by allocating to it half of the annual increase in expenditures on the airways system, and adding this to its estimated cost responsibility for the 1969 base year.[5] Total Federal airways expenditures in 1969 were

[5] The 1969 base year is used since this is the last year for which the FAA has released its cost allocation estimates. One reason for this is the FAA's unwillingness to anticipate the findings of a 2-year cost allocation study which was required by the 1970 legislation.

estimated at $675 million.[6] The 1970 legislation provided for an increase in obligational authority to at least $250 million annually for the improvement of the airways system, and in the light of this, the total expenditure on the airways over the period 1971–80 is predicted to average $1,295 million annually (see table 3), an increase over the 1969 figure of $620 million. If 50 percent of this is added to general aviation's cost responsibility of $235 million for the 1969 base year, the amount annually allocable to it over the next 10 years will be about $545 million. Since the revenue obtained from general aviation over the period is predicted to be about $100 million annually, the net result will be an annual subsidy of about $445 million.

TABLE 3.—PROJECTION OF EXPENDITURES ON THE FEDERAL AIRWAYS SYSTEM, FISCAL YEARS 1971–80

[In millions of constant dollars]

	Civil	Military	Total
Fiscal year:			
1971	840	210	1,050
1972	970	242	1,212
1973	972	243	1,215
1974	965	241	1,206
1975	985	246	1,230
1976	1,042	260	1,302
1977	1,090	273	1,363
1978	1,130	283	1,413
1979	1,166	291	1,457
1980	1,200	300	1,500
Total	10,359	2,589	12,948

Source: Senate Report 91–706, February 1970.

Cost Recovery and Economic Efficiency

The new user charges for general aviation, in common with those in force prior to 1970, can be criticized on two major grounds. The first concerns the structure and incidence of the charges, which do not permit full advantage to be taken of the benefits of the market mechanism. The second refers to the amount of revenue the charges produce, for the large subsidy received by general aviation has no clearly identifiable economic or social rationale.

A basic criticism is that liability to user charges does not vary adequately with the use of particular facilities. Because of differing patterns of airway use within the general aviation sector, an equality of the real cost burden an individual operator imposes on FAA facilities and the user charge he pays will be largely fortuitous. This would continue to be true even if the costs allocated to general aviation as a whole were matched by an equivalent amount of revenue. These user charges do not have the fundamentally important function of a price, of allocating resources in an efficient or equitable manner, but are merely crude devices to recover costs from the various broad categories of aviation responsible for them. In short, fuel consumption is a poor proxy to use, and is certainly inferior to a system of direct charges for use of particular parts of the system.

[6] U.S. Budget, Appendix, 1971.

FAA policy on the choice between direct user charges (for example, those which require the establishment of a pricing mechanism) and indirect charges such as the fuel and passenger taxes, is worth quoting at length:

> A system of direct charges under which a specific dollar charge would be levied for each use of a component or service of the airway system would meet the requirement of an equitable program of user charges if the direct charges were related both to the use made and the benefits derived from individual facilities and services. However, the operational and administrative problems inherent in direct charging (for example, charging for each flight plan filed, each radio contact made, etc.) appear to preclude its consideration for the domestic Federal airway system in the aggregate. A vast and expensive administrative establishment would undoubtedly be required to administer and to collect such fees throughout the United States. A further objection to direct charges is that their imposition could adversely affect the safety of flying by decreasing the readiness of some civil users to avail themselves of all appropriate facilities and services.[7]

Although written in 1966, this continues to be an accurate summary of the FAA's position, which is one that appears to be too demanding in its approach to direct charging. Although the costs of introducing direct charging for the use of some FAA facilities would doubtless exceed the benefits resulting from such action, direct charging for other facilities would certainly be justified. It is therefore recommended that:

(1) direct charges, in the form of landing and takeoff fees, be levied for use of terminal area subsystems; and
(2) indirect charges, mainly fuel taxes, be used to recover the costs of the remainder of the Federal airways system (that is, the en route traffic control, air navigation, and flight service subsystems), after appropriate allocation of those costs among broad categories of user.

Use of such a policy would mean that roughly three-fifths of general aviation's share of Federal airways system costs would arise from use of facilities or services subject to direct charging. Thus, it is estimated that, in fiscal 1971, 100-percent cost recovery for the Federal airways system would have required general aviation operators to pay about $290 million in landing fees and $220 million by means of indirect charges such as the fuel tax.[8]

Economic efficiency requires that distinctions for pricing purposes between, for example, air carriers and general aviation, should be based solely on the real cost that different types of aircraft operation impose on the system. This principle should be followed in levying charges for use of terminal subsystems, and as far as possible in determining indirect charges. Where there are particular reasons for divergence from this requirement, such as the external benefits to society at large that may accrue from certain activities, any subsidy that may result should be, to quote a previous Secretary of Transportation, "direct, specially identified, and its purposes clearly defined." [9] This paper will demonstrate that the way in which general aviation is currently subsidized is very far removed from this ideal.

---

[7] "Administration's Proposals on Airway User Charges," hearings before the Committee on Ways and Means, House of Representatives, August 1966, p. 58.

[8] For details of the assumptions upon which this calculation is based, see "Public Policy Toward General Aviation," ch. 5.

[9] Secretary of Transportation Alan Boyd in "Airport Development Act of 1968," hearings before the Aviation Subcommittee of the Committee on Commerce, U.S. Senate, June 1968, pp. 41–42.

Direct Charges for the Terminal Subsystem

Direct charging is an eminently practicable proposition for the terminal area subsystem. The cost of operating a pricing mechanism would be negligible and landing fees could be collected at the same time as charges levied by airport operators for use of landing areas. In fiscal 1971, the fee levied by the FAA for each landing or takeoff at an averagely equipped FAA-controlled airport would need to have been about $5, in order to achieve full cost recovery.[10]

In establishing the amount of the landing fee, it is recommended that no distinction be made between IFR and VFR traffic on days when both types use a terminal facility.[11] This is for two reasons. First, to make such a distinction would discourage general aviation operators from flying IFR. Many are already reluctant to do so, and to encourage this tendency would be completely at odds with the FAA's function of promoting air safety. Second, aircraft flying IFR often do so partly in order to obtain assistance in avoiding VFR traffic: the FAA's method of allocating the costs of approach control facilities, for example, disregards this fact altogether, thereby underestimating the costs attributable to general aviation.

This is not however, to agree with the FAA's rejection of direct charges altogether on safety grounds. Its attitude amounts to the position that some aircraft operators could not be trusted to act in a manner that is conducive to safety if direct charges were enforced. If this is to apply to the terminal subsystem, the argument is that they would tend to land at airports with inadequate air traffic control or navigational facilities, because it would be cheaper to do so. We would however argue that the proposed user charge policy should be introduced gradually, over a period of years. It would then be possible to estimate in advance the extent and direction of substitution of one airport for another. An airport with little in the way of FAA installations might therefore become increasingly popular as a result of the charging policy: this could be allowed to continue unchecked up to the point at which, on grounds of safety or avoidance of congestion, the FAA determines that some installation at that airport is required.

Should the additional expenditure be relatively large, price should be raised in advance of the installation, to ration existing airport capacity up to the point that potential users are willing to pay for capacity extension. At this stage, some operators may find it preferable to revert to use of the original airport, in which case, subject to correct decisions regarding investment, safety and congestion costs, efficiency in the allocation of FAA resources between the two airports will have been achieved. This procedure may eventually result in a much stricter degree of Federal or local control over landing areas, and, therefore, over general aviation operations. This may be unavoidable if acceptable standards of safety are to be maintained.

We shall not discuss the technical complexities of how an economically efficient pricing policy for aviation facilities might be implemented, save to note that the prices charged should approximate

---

[10] "Public Policy Toward General Aviation," ch. 5.

[11] As we shall show later, however, there may be a case for charging prices on strictly IFR days that differ from those charged on days when VFR traffic is also permitted.

the long-run marginal cost imposed by users.[12] One general problem, however, arises by virtue of the fact that terminal airways facilities and the airport at which they are located are operated by different bodies: the FAA on the one hand, the State or local airport authority on the other. If overall economic efficiency is our goal, the whole terminal area should be treated as a single unit for pricing purposes. Since an airport and the terminal airway subsystem provide services that are complementary to each other, economic efficiency would require the FAA to compensate for any shortcomings in airport operators' pricing policies. For example, at each airport where price is less than marginal cost, the price for FAA services should be greater than marginal cost, and vice versa. In fact, as we shall show below, the price general aviation aircraft operators pay for airport use is normally less than marginal cost—if needed it is related to airport use at all. This would imply the need for increased FAA intervention if economic efficiency is to be achieved.

This, of course, is no simple matter. As a general rule, the FAA would be unable to impose a pricing system on airport operators even if it wanted to, and it would seem to be politically unrealistic to expect municipal and State airport authorities to abrogate their authority in this regard, including the right to subsidize their own airports if they see fit. There is obviously a case for arguing that such intrusion in State-local affairs is unwarranted, because of the (political) desirability of local autonomy. If this is accepted, the implication must be that the FAA should not, through charging for its terminal facilities, correct for inefficiencies in airport pricing either. There are, therefore, certain theoretical difficulties involved in the suggestion that the FAA should pursue a version of marginal cost pricing where such a policy does not exist for closely complementary services. On the other hand, if the ultimate objective is to achieve optimal pricing and investment throughout the aviation system, it can be argued that we should begin with Federal policy, in the hope that a favorable "demonstration effect" results.

Indirect Charges for Nonterminal Subsystems

Any system of indirect charging is necessarily imperfect from the aspects both of efficiency in resource allocation and of equity. Acceptance of the use of indirect charges for the remainder of the airways system implies agreement with the FAA position that the costs of operating a pricing system for the en route, air navigation and flight service subsystems would exceed the benefits derived therefrom.

The costs, as indicated in the FAA statement quoted above, would be primarily of two forms. First, there would be the administrative expense of physically identifying and billing the individual aircraft operator each time an air-ground contact is made or a flight plan filed. While this may be fairly straightforward for scheduled air carrier traffic, it would certainly not be so for general aviation. The possibility of doing so would, however, warrant further discussion in this paper were it not for the implications for air safety associated with direct charging.

---

[12] This is fully discussed in "Public Policy Toward General Aviation," ch. 5, 8, and 9.

There is already evidence that some general aviation pilots are unwilling to take advantage of all the aids potentially made available to them by the FAA, and direct charging would undoubtedly be a further deterrent. This would be less clearly a matter for public concern if it were not for the possibility that accidents to other parties may result from such behavior. Moreover, the growth in air traffic is associated with greater need for ground-air supervision; use of all the services supplied by the FAA will therefore become a factor of ever-growing importance in maintaining acceptable standards of safety.

There is insufficient evidence to permit quantification of the potential effects on air safety of direct charging for nonterminal subsystems. Nevertheless, as it is a fundamental duty of the FAA to assist the safe passage of aircraft, it would be unrealistic to expect it to establish a direct charging system, the results of which could only be at variance with this objective. In practice, therefore, the demands of equity and efficiency can best be satisfied by levying an indirect charge, the liability to which varies as closely as possible with use of the safety-oriented facilities, but does not deter an aircraft operator from using them once a decision to undertake a journey has been made.

If there is a high correlation between the liability of individual users and the burden that each places upon the system, the policymaker should follow marginal cost pricing rules as closely as possible in establishing the indirect charge. The less accurate the proxy measure of use of the system, the less clear it is that those rules should be adhered to. It would, however, seem desirable to aim for the best system of charging, that is, to arrive at the best possible proxy measure of use, and then charge in a way that conforms as closely as possible to the theoretical ideal. Despite its obvious weaknesses, the fuel tax for the bulk of general aviation operations appears to be the most satisfactory method to use. This tax should distinguish where possible between the different demands placed upon the system by various categories of aircraft.

At first sight the common rate of tax now levied on jet fuel and kerosene appears to discriminate against turbine-powered aircraft. Since a typical turbojet used in general aviation travels about 1½ miles per gallon of kerosene while a typical single piston-engined aircraft travels about 14 miles per gallon of gasoline, the liability per mile of a uniform tax is almost 10 times as much for the jet as for the smaller aircraft. But there is no technical reason why different rates of tax should not, if necessary, be levied on kerosene and aviation gasoline. A distinction for charging purposes can therefore be made between turbine and piston-engined aircraft, this being about as far as we can go in allowing for variations in the burden placed on the system by different types of aircraft activity.

It is generally accepted that an important justification for the higher tax rates for jet fuel is that turbine powered aircraft make greater use of the en route and air navigation subsystems than piston-engined aircraft do. If the assumption is made that turbine-powered general aviation aircraft place demands on the airways system that are similar to those of the air carriers, use of the FAA's method of cost allocation suggests that about 65 percent of the costs of the en route and air navigation subsystems allocable to general aviation for 1971 should be allocated to turbine aircraft, the remainder to piston-engined aircraft.

Coverage of these costs at the predicted rate of fuel consumption would require a tax of about 27 cents per gallon on jet fuel and 6 cents per gallon on aviation gasoline.[13]

The costs of the flight service subsystem may now be allocated on a basis which conforms more closely to mileage covered. It is estimated that in 1971 turbine-powered aircraft flew roughly 7 percent of total general aviation mileage. Full cost recovery for the flight service subsystem would require—at this level of activity—an aviation gasoline tax of 25 cents, and a jet fuel tax of 4 cents per gallon. In aggregate, therefore, the tax payable on both aviation gasoline and jet fuel would have to be about 31 cents per gallon in 1971. Despite the contrast with the existing rate of 7 cents per gallon, the foregoing suggests that current legislative proposals may be on the right lines in establishing a common rate for both types of fuel. It is, however, clear that more accurate data on the relationship between utilization of the airways and fuel consumption is needed if indirect charging is ever to be a satisfactory instrument of policy.

Introduction of Full Cost Recovery

Table 4 illustrates the liability to user charges that operators of representative general aviation aircraft are estimated to face in 1971 under existing legislative arrangements. This shows that the liability to user charges for representative aircraft ranges between 2 percent and 4 percent of total aircraft operating costs. This effectively discriminates in favor of smaller aircraft in terms of the proportion of allocable airways costs that are recovered, for this would vary from 4 percent for the single piston engined 1–3 place aircraft, to 22 percent for the turbojets. In absolute terms, however, the subsidy is greater for the larger aircraft, the annual subsidy for the smaller type of aircraft listed in table 4 being about $2,000 while that for a representative turbojet aircraft is about $38,000. A pricing policy resulting in full cost recovery would therefore impose an immense burden on general aviation: relative to aircraft operating costs, it would be much harsher for smaller than for larger aircraft, although in terms of the absolute increase in tax liability the reverse is true.

TABLE 4.—ANNUAL OPERATING COSTS, COST-RESPONSIBILITY, AND USER CHARGES PAYABLE FOR REPRESENTATIVE GENERAL AVIATION AIRCRAFT 1971

[Costs and charges in dollars per aircraft]

	Single-engine piston 1–3 places	Single-engine piston 4 places and over	2-engine piston	Turboprop	Turbojet
Annual aircraft operating cost (A)	2,730	6,750	27,200	156,600	258,350
User charges payable: current legislation (B)	100	180	640	4,300	11,000
Liability as percentage of operating costs (C)	3	3	2	3	4
Annual cost-responsibility (D)	2,320	2,670	4,320	19,720	49,250
Liability as percentage of allocated costs (E)	4	7	15	22	22
Subsidy (D–B)	2,220	2,490	3,680	15,420	38,250

Source: Operating costs and utilization data are from "General Aviation Operating Costs," FAA 1969. User charges and cost-responsibility are author's estimates. For further details see "Public Policy Toward General Aviation," ch. 5.

[13] Ibid., ch. 5.

However, immediate implementation of 100-percent cost recovery is not recommended. Rather, it should be introduced gradually; say, over a period of 5 years. This would avoid what would certainly be a dramatic drop in aviation activity, resulting in hardship for many people, such as pilots and employees of manufacturers and fixed base operators, and the capital losses which would be sustained by aircraft owners. Another result of immediately introducing the scheme would be the creation of excess capacity in FAA facilities and airports, which would be of benefit to nobody. These effects would be mitigated by gradual introduction of charging, which over time would allow the assumed increase in demand for general aviation facilities to offset, to some extent, the effect of increased costs. The best policy may therefore be to maintain the current level of general aviation activity by gradually raising charges, until such time as aircraft operators reveal their willingness to pay for an expansion of the system.

General Aviation Interests and the User Charges Controversy

General aviation interests have been vociferous in their opposition to proposals to increase their contribution toward the cost of the Federal airways system. They argue that general aviation should pay no charges because the airways system was designed for military aircraft and the air carriers, its existence, therefore, being virtually unaffected by the presence of general aviation. FAA facilities would have been built anyway, the argument runs, and general aviation bears no responsibility for their costs. To allocate costs on a proportionate use basis is therefore unjust.[14] This raises the question of the proper allocation of joint costs, a question to which economic theory is usually unable to provide a satisfactory answer.

However, given the limited objective of allocating costs equitably to various broad categories of aircraft, the quantity of use method employed by the FAA is essentially correct in a situation in which demand is increasing rapidly and pressure is constantly being brought to bear on the capacity of FAA facilities. The joint cost argument would have greater validity in a purely static situation in which excess capacity persisted. But as we have shown, FAA forecasts are that general aviation will be responsible for the bulk of the growth in aircraft activity in the foreseeable future. In so doing, it will continue to contribute to the demand for additional capacity, for which considerations of economic efficiency require that it should pay.

A related complaint voiced by general aviation operators is that in the past, owners of private aircraft have been forced to invest in equipment they did not want; for example, two-way radios have been made mandatory for aircraft landing at tower-controlled airports, and the associated facilities provided by the FAA are too sophisticated for their requirements. They therefore ask whether it is proper to force persons to spend money on their aircraft so that they can use the facilities and, in addition, to charge them a fee for using those facilities.[15] Given the desirability of the regulation itself—which in this case can easily be justified on safety grounds—the answer, from the standpoint of economic efficiency, is clearly affirmative. As already

---

[14] See, for example, "Administration's Proposals on Airway User Charges," hearings, August 1966, p. 127.
[15] Ibid., pp. 103–106.

argued, the important thing is that according to the cost allocation data, general aviation does use the sophisticated facilities, and consequently places a burden on the system for which its members should be charged.

General aviation interests have maintained that the user charges proposed by the FAA are not user charges at all, for they are not related to actual use of facilities in any precise way. Many general aviation aircraft used for such things as crop spraying, pipeline patrol, and offshore drilling never use the airways system. Indeed, about 30,000 general aviation airplanes are not even equipped with two-way radio. And while general aviation uses over 9,000 airports, only 300 or so of them have federally provided control towers, yet all general aviation operators are taxed on the same basis.[16]

The conclusion that should be drawn from this situation is rather different from that of certain general aviation interests. Agreement with the basic validity of such objections has already been indicated in this paper, and the alternative charging method proposed goes some way toward meeting them. Even though the needs of equity and allocative efficiency are not precisely served by the proposals some proxy measure of use is more valuable than none at all. The choice lies between charging those who are probably direct users of the system, or are certainly potentially direct users—and those who, in general, are certainly not; that is, the general taxpayer. The alternative to an absolutely perfect method of cost allocation is not necessarily the signal to abandon all attempts at cost recovery by some form of user charge.

One clearly invalid claim made by general aviation interests is that the air carriers are not charged at all for their allocated share of costs because it is their passengers, and not they, who pay the ticket tax.[17] However, it is difficult to see why general aviation should be concerned over who pays for the air carriers' share of costs, as long as liability is not transferred to general aviation. The argument is particularly interesting as it is claimed that the bulk of general aviation activity is for business purposes. Presumably, therefore, at least some of the aviation gasoline tax can equally be passed on to ultimate consumers.

The complaint is also frequently made that certain nonaviation forms of transportation are subsidized.[18] Such a complaint could be expressed in terms of economic efficiency, as a version of what economists call the "second best" problem.[19] Although marginal cost pricing is the ideal, a practical approach would simply be to accept that the case for recovering total costs from general aviation is reinforced if its direct competitors are not subsidized. If so, the "second best" argument does not seem to pose a serious obstacle to total cost recovery. The major competitors, the commercial airlines, already pay user charges of a sort, by means of the passenger ticket tax, and these cover the bulk of the airways costs allocated to them. Equality of treatment vis-a-vis the airlines would therefore require a considerably higher contribution from general aviation.

---

[16] Ibid., p. 129.
[17] Ibid., pp. 92 and 105.
[18] See "Airport Development Act of 1968," hearings, June 1968, p. 191.
[19] The "second best" problem refers to the possibility that what might appear at first sight to be a move in the direction of economic efficiency, many not be at all if nonefficient conditions prevail elsewhere. For example, a supposedly efficient marginal cost price charged general aviation users of FAA facilities would be too high if competing forms of transportation are charged at less than marginal cost, and too low if complementary facilities, such as airport runways, are priced at less than marginal cost.

Other competitors of general aviation (and probably to a greater degree of the commercial airlines) are the railways, where Federal subsidy is negligible. In addition, the taxes paid by inter-city bus operators, which are paid into the Highway Trust Fund, are estimated to cover the bulk of allocated costs. Waterway users, strangely enough, are often cited by general aviation interests as being worthwhile candidates for the imposition of user charges. This suggests that the complaint concerns the "equity" rather than the "efficiency" benefits of extending user charges to various groups, for it is difficult to see how relevant efficiency in pricing waterways is for the treatment of general aviation. Of more significance is the fact that in the U.S. economy, nearly all goods and services produced for final consumption are sold in the market, and these, in the last resort, are also competitive with aviation. The telephone call, for example, is a more important substitute for a long distance flight than is use of the Nation's waterways. Finally, as we shall show below, public airports serving general aviation are normally subsidized. If the "second best" rule is the avoidance of subsidy, the complementary nature of airports and FAA facilities would suggest that the price of the latter should be raised to recover a sum in excess of total costs.

General aviation interests make a good deal of the argument that the FAA should be constrained in its attempts at cost-recovery, because the "small man" would be harmed by such action.[20] Prima facie, this argument is not very sensible. Much more pertinent might be the argument that the current policy of failing to recover full costs from general aviation users is, in real terms, a subsidy to individuals in the upper and middle income groups. Beyond making the obvious point that private flying is not a poor man's occupation, however, one would be hard put to prove this statistically.

An important reason for this is that although we may suspect that claims for income tax relief on aircraft use are not entirely accurate, we must presumably accept the claim that the bulk of general aviation aircraft hours are flown for business purposes, and that the aircraft are therefore largely intermediate, or producers' goods. If so, the benefit from their use may be passed on in part to the final consumer, and there is no way of tracing the income-distributional impact of FAA expenditures benefitting general aviation.[21] Data on incomes of private aircraft owners are rather poor, and also, therefore, of doubtful relevance if the aim is to prove that the upper income groups are the main beneficiaries. But it is clearly safe to proceed with proposals for charging general aviation on the basis of facility usage without being unduly disturbed by the income-redistributional impact on general aviation aircraft operators.

There may, however, be some public interest in general aviation activity that is over and above the private interest of the aircraft owner/operator in making use of the Nation's airports and airways. If such "external" benefits are associated with general aviation activity, payment for which cannot be recovered from beneficiaries directly, there may indeed be a sound case for subsidization. More generally, if external benefits or costs are attributable either to general aviation, to

---

[20] "Administration's Proposals on Airway User Charges," hearings, August 1966, p. 92.

[21] Note that the possibly diffuse effects of general aviation activity are sufficient reason for the general taxpayer to be concerned that user charges are economically efficient as well as being the means of eliminating subsidy.

its competitors or to complementary activities these should ideally be taken into account in the formulation of the pricing rules proposed above.

The "public interest" argument appears to consist of two major elements. First, there is the argument that the existence of general aviation helps to arrest the decline of sparsely populated regions, thereby conferring benefits for which society as a whole, rather than the aircraft operators themselves, should be called upon to pay. However, we are presently concerned with Federal expenditures and the financing of services supplied by the Federal Government. Subsidization of general aviation on the grounds that local communities are beneficiaries therefore requires some indication that there is a Federal interest in so doing. The attraction of industry to a given area (which is usually cited as the main benefit of this kind) will normally merely be at the expense of another area, with no net gain to society as a whole. On the other hand, a net national gain may be realized if industry is attracted from an area with full employment, where activity stimulated by general aviation will merely replace other activity, to one with a high unemployment rate, where an increase in real income may be generated.[22] There could be a Federal interest in stimulating this form of substitution, but subsidization of the whole general aviation community is a most inefficient way of doing so.

The Federal Government has in the past been sympathetic to the argument that sparsely populated regions should be subsidized, and there are many ways, such as the direct subsidization of feeder airlines, in which this is done. Such subsidies may be justified by inability to pay at the local level, but free installation and operation of FAA facilities may not be the best method of aiding the economic growth of the community. This should be a matter of judgment in each individual case, but the FAA is not particularly well qualified to make such a decision. The Economic Development Administration of the Department of Commerce might be in a better position to do so.

The free provision of FAA facilities is in any case an inefficient method of giving assistance for it benefits both those communities (and individuals) that could and those that could not afford to pay for them. If a decision is made to subsidize a declining region, the subsidy should be open and direct—as those to the feeder airlines are. An alternative possibility would be to install FAA facilities, and to charge for their use, but to subsidize air transport (presumably air taxi operations) directly if this is felt necessary.

Another form of "external" effect concerns possible benefits for defense and other emergencies that result from the presence of general aviation. A good deal has been made of the ability of general aviation aircraft to operate under conditions in which larger aircraft would be useless, and their potential value in various kinds of emergency employment has been stressed. However, as Fromm [23] has pointed out, benefits to defense may be claimed by almost any industry, and special treatment for civil aviation would be unjustified. But it could be argued that if there were particular defense benefits resulting

---

[22] See Gary Fromm's discussion of this in "Civil Aviation Expenditures" in R. Dorfman (ed) "Measuring Benefits of Government Investments," Brookings, 1965, pp. 210–215.

[23] Ibid., p. 181.

from general aviation activity, efficient utilization of resources would be better achieved by direct subsidy from the Defense Department in those areas, such as pilot training, where subsidy was felt to be justified.

We now refer to the familiar argument that the value of general aviation to society is reflected in its contribution to GNP. It has been claimed at a congressional hearing that the contribution of general aviation to GNP ($3 billion in 1969, $14 billion by 1980) plus the multiplier effects of these expenditures provides an estimate of the benefits attributable to that activity.[24] Clearly, the resultant figure would be a tremendous overstatement of the net benefits of general aviation activity, for the approach would only yield valid results if all the factors of production used would otherwise have been unemployed. But were there no such thing as general aviation it is fairly safe to say that the bulk of the land, labor, and capital absorbed by the industry would be put to some other beneficial use. There is an element of validity in the argument in that immediate imposition of a 100-percent cost recovery policy would create temporary unemployment for some resources; however, gradual introduction of full cost recovery should take care of this. Finally, it should be noted that the basic arguments concerning what is loosely known as the "economic impact" of general aviation are widely used by the industry to justify subsidization at the national level; they are used still more frequently to justify subsidization at the State/local level, a matter to be discussed in section III of this paper.

The Airport Development Aid Program

This section briefly discusses Federal airport subsidies, which are over and above the airways subsidies discussed so far. Federal subsidies for airports have been available since the end of World War II, and this policy is maintained under the provisions of the 1970 Airport and Airway Development Act. This act increased the obligational authority for airport assistance from $75 million annually to an average of $250 million annually over the period 1970–80. It provides that of this total, the amount available for airports used solely by general aviation should be $30 million annually over the period 1971–75. Allocations to various categories of airport for the rest of the 10-year period are not specified in the act.

The $30 million, if actually appropriated, would clearly be a conservative estimate of Federal subsidies to general aviation through the airport development program. It excludes aid to air carrier airports, which are used jointly by the commercial airlines and general aviation, and also excludes aid to "reliever" airports, which are used solely by general aviation, but are designed to relieve congestion at air carrier airports. Reliever and air carrier airports together are designated to receive the remainder of the $250 million during the 1971–75 period. Expenditure on these airports is of benefit to and necessitated by the demands jointly placed upon airport capacity by general aviation and the commercial airlines, but no attempt is made here to allocate the subsidy among the two groups.

---

[24] See "Airport/Airways Development, pt. I," hearings before the Aviation Subcommittee, Committee on Commerce, U.S. Senate, June 1969, p. 140.

An important characteristic of Federal airport aid is that its allocation among States is determined largely by an "area/population formula," which is similar to that used in allocating expenditures from the Highway Trust Fund. This is designed to give relatively greater assistance to sparsely populated regions, and it is clear that an objective of the program is to stimulate development of such areas. This may be a motive worthy of Federal attention, but the question raised earlier as to whether or not the FAA is the appropriate organization to determine the precise allocation of funds for these purposes, remains a relevant one.

III. State and Local Airport Subsidies

To recommend some version of marginal cost pricing for FAA terminal facilities is to imply either that airport landing and terminal areas are also price efficiently or, if not, that the implementation of theoretically optimal rules for FAA facilities might be justified if airport authorities are thereby encouraged to adopt a similar approach. This section indicates that, at the State-local level, there is a considerable gulf between the theoretical ideal and actual practice.

General Aviation Airports

A recent FAA study demonstrates that publicly owned general aviation airports with less than 50,000 itinerant operations annually are invariably subsidized out of general tax revenue.[25] Typically a loss on current account is made, with no contribution being made toward capital development or repayment of principal and interest on past loans. Subsidies become relatively smaller as airport, size increases, but it is estimated that total annual subsidies from State-local governments to general aviation airports (excluding relievers) will continue to be around $130 million if current plans and financial policies are adhered to.[26]

Operating revenue at general aviation airports is obtained from a number of sources, and this normally results in some cross-subsidization between various users. Landing area revenues reported by respondents to the questionnaire accounted for 16.2 percent of all revenue, building and ground rent and "other sources," yielding 51.3 and 32.5 percent, respectively. Yet landing areas, even excluding FAA terminal facilities, are responsible for virtually the whole of general aviation airport construction costs, and depending upon size, from roughly 50 percent to 100 percent of operating costs.

Only 8 percent of the airports reported that they charged landing fees. The main source of revenue attributable to users of the landing area was the fuel flowage fee. This is a fuel tax of the sort discussed in the previous section, and accordingly suffers from the fact that the charge is but tenuously related to the use made of a particular airport facility. It is therefore an unsatisfactory method of financing an airport, should economic efficiency be the objective.

---

[25] "Report on FAA's 1969 General Aviation Public Airport Financial Survey," FAA, 1970. Itinerant operations can be roughly defined as all operations other than those originating at or departing for airports within a 20-mile radius.

[26] For details of this estimate see "Public Policy Toward General Aviation," ch. 7.

Air Carrier Airports

In common with general aviation airports, the larger the air carrier facility, the more likely it is to show a surplus on current account.[27] Where an airport used jointly by air carriers and general aviation is subsidized, it is not possible to define the extent to which general aviation is the true beneficiary. General aviation operators may justly claim that it was built and is operated solely for the air carriers; they are therefore responsible for little or no marginal cost, and are therefore not subsidized. This argument, also used in connection with the Federal airways system, is intuitively more appealing in this context, because most general aviation aircraft require landing areas that are considerably smaller than those needed by the airlines. Although one cannot escape joint cost allocation problems entirely, the method currently employed at most large airports of charging users on the basis of weight, has a good deal of merit as long as the airport is operating at less than full capacity.

In addition to any subsidy that might be received by the airport as a whole, the typical pattern is that users of landing areas are further subsidized by users of terminal areas and buildings (renters of hangers, motorists, concessionaires' customers, et cetera). Users of landing areas and users of the remainder of the airport complex may in an ultimate sense be indistinguishable, but whether they are or not, this remains an unsatisfactory situation. The justification for investment in airport facilities can only be correctly signaled if the price charged for each element of the terminal system corresponds to its cost of supply.[28] This becomes particularly important where the costs imposed by users depend largely on the time at which their operations take place.[29]

Rationale for State-Local Airport Subsidies

It was implied earlier that an obstacle to the achievement of efficient pricing is the dichotomy of responsibility for the Nation's airports and airways. Inefficiency at the local level arises in part from a conflict of interest between communities, which may indulge in competitive subsidization of general aviation. It is often claimed that the availability of a general aviation airport is an important determinant of industrial location, which brings with it the benefits of a broadening of the local tax base and creation of employment. If, therefore, one airport authority decides to subsidize general aviation by providing airport facilities and services at less than cost, neighboring municipalities will have to follow suit. If they do not, they will, if the loss of industry or the failure to attract new industry is their criterion, suffer accordingly. (Similar arguments are, of course, applied to the subsidization of air carrier airports.)

Although the arguments regarding the benefits of general aviation airports in attracting industry to a locality are used so frequently, important questions arise. First, how true is it that a general aviation airport has to be provided in order to attract industry to a given

---

[27] For a summary of the financial situation of air carrier airports, see Senate Report 1355, July 1968.

[28] There is, of course, a powerful incentive to airport managers to discriminate in favor of landing area users, for while their own responsibility and status in the industry are unlikely to be enhanced by the restriction of aircraft activity—even at peak hours—they will be widely acclaimed for extracting monopoly profits from concessionaires, from which operation and extension of landing areas may be financed.

[29] The "peak problem" is discussed in sec. IV of this paper.

location? Second, is it also essential that the airport should be subsidized if this object is to be achieved; and, if so, how effective is this compared with, say, subsidization of some other public utility or tax incentives? Third, even if industry is attracted to a given locality by this means, is it necessarily true that that community benefits as a result?

Surveys and case studies relevant to the first two questions have been summarized elsewhere.[30] It is noteworthy that surveys of overall locational determinants rarely identify the presence of a general aviation airport as being an important factor; but when the subject is approached from a different angle, and local aircraft owners are asked how important general aviation facilities were in determining their locational decisions, we find them rated highly indeed. This is not a surprising result since these studies are usually carried out by bodies with vested interests in the encouragement of general aviation, such as State aeronautic commissions, aircraft manufacturers, and the like.

A good example is supplied in a report issued by the Michigan Aeronautics Commission, which contains an impressive list of companies and the use they make of general aviation aircraft in the course of their business: the implication is that such business could not be conducted without convenient access to general aviation airports. The report is forthright in its views on the type of local benefits which accrue from attraction of industry, and it also demonstrates the condescending attitude displayed by a large segment of the aviation community to the nonflying public. Thus:

> Spurred by the rise in business aviation, many communities around the country are feverishly building new airports to aid in both attracting new industry and keeping established firms. Although the business community understands the value of airports and what they mean to economic growth in the community, often the citizenry is hesitant about voting new tax measures to finance airport development or improvement, primarily because *they do not see* the direct benefit of an airport which will act as an economic generator for new industry, creating more jobs and a greater tax base.[31]

It is easy to sympathize with the citizenry in this regard, for the "broadening of the tax base" and "employment generation" arguments are particularly vague, and often used when enthusiasts are unable to justify on a strictly cost-benefit calculation the construction or subsidization of general aviation airports.

Airport subsidies may be justified at the local level if industry is attracted to a community which is currently experiencing a high rate of unemployment. If local productive factors employed in aviation related activities (including industry attracted by the airport) would otherwise have been unemployed, their value in alternative uses therefore being zero, the incomes they now receive can be counted as a benefit of the airport development. But if construction of the airport and the establishment of new industries merely attracts local labor from other local employment, there will be no net gain to the community, apart from the presumably slightly higher incomes or better working conditions required to induce employment mobility. It is therefore incorrect to include the whole of the incomes received from

---

[30] See "Guidelines for an Appalachian Airport System," Appalachian Research Report No. 3, Management and Economic Research, Inc., California, January 1967.

[31] *Aviation Economic Development,* Michigan Aeronautics Commission, November 1968 (italics supplied).

aviation-related activities as benefits, known in cost-benefit literature as secondary benefits, of airport construction or subsidization.

The attraction of industry to a community with low rates of unemployment will normally draw resources from outside the area. In these circumstances, industrial expansion will only benefit the community if growth in the population of that community is also desirable. This need not, of course, necessarily be the case, but those who attempt to justify the subsidization of general aviation in areas of low unemployment might be asked to defend their policy on these grounds. In sum, there is fairly good reason for believing that the major beneficiaries of competitive subsidization are the members of the aviation community itself.

IV. Congestion and Delays

The Congestion Problem

A feature of aviation activity attracting a good deal of public concern in recent years has been the increasing problem of the delays experienced by users of certain major air carrier airports. The basic cause of delay is congestion, both of the airport surface and of the terminal airspace. It is normally particularly severe at air carrier airports when weather is bad and instrument flight rules (IFR), calling for wider spacing of aircraft, are in operation. It has recently been estimated that at eight major terminal areas, 30 percent of aircraft delay time was experienced during IFR conditions, which were in force for only 10 percent of the time.[32]

Another feature of the delay problem is that it is subject to extreme "peaking." Aircraft delays during peak hours (defined as the average delay during the peak 2 consecutive hours of the week) may vary from five to 20 times the average hourly delay experienced. Furthermore, delays to passengers do not necessarily end upon disembarkation, congestion of administrative buildings and access roads often being a peak hour phenomenon.

Data on delays reported by three airlines, and extrapolated by the FAA, suggest that in 1968 delays to commercial airlines totaled about 318,000 hours, costing some $118 million in aircraft operating costs alone.[33] This excludes the value of passenger time and the associated costs of diversions, inconvenience, missed connections and the increased risk of midair collision. It also excludes the delay costs incurred by general aviation aircraft using congested air carrier airports.

Until fairly recently, neither the FAA nor the airport authorities themselves had any general policy for deterring operations contributing to such delays. The favored solution remains, where possible, to increase effective capacity by the cheapest possible means, whether by extension of an existing airport, the construction of a new one, improvement of instrument landing systems, automation of approach control facilities, or by changes in air traffic control procedures. This is despite the fact that a good deal of the necessary expenditure at a given time is incurred solely for the purposes of accommodating peak hour demands.

---

[32] "Alternative Approaches for Reducing Delays in Terminal Areas," FAA, November 1967, p. 5.
[33] "Terminal Area Airline Delay Data 1964–1968," FAA, September 1969.

Aircraft arrivals are normally accepted on a first-come, first-served basis, no distinction being made between peak and offpeak use, or according to the willingness of aircraft operators to pay for the delay costs they impose on other users of the terminal area. This policy has provoked a wave of criticism from economists [34] who have been virtually unanimous in proclaiming the merits of flexible, or peak-load pricing as a remedy for the airport congestion problem.

It is important to note that as the number of operations in any one period rises, the average delay per aircraft also tends to rise. For example, it has been estimated that if at a given rate of runway use the average delay is 4 minutes, a 10-percent increase in activity may cause a 60-percent increase in delay, while a 20-percent increase in activity may cause an increase of up to 200 percent.[35] The precise effect depends upon a number of circumstances: the aircraft mix, runway size and configuration, the ratio of arrivals to departures, adequacy of air traffic control equipment, weather conditions and so on. Nevertheless, it is clear that once congestion appears, marginal delay costs will normally exceed average delay cost. But in determining whether or not to use an airport at a particular time, an aircraft operator will only be concerned with average delay costs. The difference between average and marginal costs does not enter his calculation, for this element is "external" to him, being shared among a number of other users. Efficient utilization of airport capacity, requiring all costs to be taken into account, would therefore require price to be equated to the sum of the relevant (i.e. marginal) airport operating costs and marginal external delay costs. Delays normally vary according to the time of day, so flexible pricing would have to be employed. Separate charges would be required for landings and takeoffs to permit this to be achieved.

Flexible Pricing and Congestion Charges

A result of increasing charges during peak periods would be that variability in the demands placed upon airport and terminal airspace capacity over the day would tend to be smoothed out. Over a period of time, there would be a tendency for scheduled air taxis and air carriers to shift schedules, but nonscheduled air carrier and general aviation operations could be shifted from peak to offpeak periods right away. Since the demands for capacity on and offpeak are interdependent (the demand for capacity during peak hours will be partly determined by the price charged offpeak, and vice-versa), ultimate peak and offpeak charges may have to be determined by an iterative procedure.

Delays need not necessarily be eliminated altogether by this means; some amount of delay may be consistent with economic efficiency. This would be the case if, for example, marginal delay costs are less than the marginal cost of expanding capacity. At present, there is an officially prescribed "acceptable level" of delay, this being an average of 4 minutes during the peak consecutive 2 hours of the week.[36] But

---

[34] See, for example, M. E. Levine, "Landing Fees and the Airport Congestion Problem," Journal of Law and Economics, April 1969, J. V. Yance, "The Possibilities of Pricing in Allocating Air Traffic in the Washington-Baltimore Area," 1968 (Mimeo), J. R. Minaisian and R. Eckert, "The Economics of Airport Use, Congestion and Safety," California Management Review, Spring 1969.

[35] "Alternative Approaches," p. 3.

[36] "Airport Capacity Criteria Used in Preparing the National Airport Plan," FAA, July 1968.

this is not based upon any economic criterion. Indeed, it cannot be; it is not possible to determine the value of alternatives such as the extension of capacity where congestion is experienced, for the price mechanism is inoperative.

Although all categories of aircraft are normally undercharged for operating during peak hours, it is apparent that present pricing arrangements at air carrier airports are particularly favorable to general aviation. The policy of charging a landing fee based on weight, perfectly reasonable when capacity is underutilized, becomes utterly inadequate when terminal areas and airspace are congested. It is not uncommon to find a typical general aviation aircraft paying a landing fee of $5 irrespective of the time of day it lands. It is also conceivable that this one aircraft could cause delays to a number of air carrier aircraft, either on the airport surface or in the air, which total, say, 30 minutes. The airline delay survey mentioned earlier estimates the average operating cost attributable to delay at about $6 per minute. Even ignoring the cost of passenger time, therefore, the delay cost attributable to that general aviation aircraft would be $180. Efficient allocation of resources would require that in this situation the landing fee should be at least equivalent to that sum.

During periods of congestion, therefore, weight becomes less and less relevant in calculating landing fees. The basis for charging should be the cost imposed on airport authorities and other aircraft operators. Nelson [37] points out that discrimination in favor of light aircraft may be particularly large where such aircraft are equipped for IFR operations. The imposition of IFR will have little effect on the number of air carrier operations, the consequence of which being that at predominantly air carrier airports IFR capacity is likely to be reached well before VFR capacity: the marginal operation during IFR conditions will cause greater delay than the marginal operation on VFR days. An IFR-equipped general aviation aircraft, using an air carrier airport during a period of poor visibility, is therefore likely to be considerably undercharged when landing fees are based upon weight.

Ideally, therefore, pricing should take account of the fact that variation in the pressure placed upon capacity at different times may be due not only to demand, but also to supply fluctuations. Even with demand constant, peak problems may arise because of poor weather conditions and visibility. Since the number of aircraft that can be handled in a given period is greater on clear days, it might appear at first sight that landing fees charged during IFR conditions should invariably exceed those charged when VFR are in force.

This would typically be true of predominantly air carrier airports, even though there may be a fall in demand for landing space during IFR conditions. But, at general aviation airports, the fall in demand when IFR are in force may be so large that capacity limits are not reached on IFR days at all, but on VFR days. Whether this is so or not, there is a case for varying price according to prevailing conditions of visibility.

Such a policy could be introduced quite easily. Even though peaks arising from adverse weather conditions cannot be predicted with as

---

[37] J. R. Nelson, "Airport Landing Fees as Rentals for Congested Airspace", Department of Transportation, 1969 (Mimeo).

much certainty as purely demand-induced peaks, most general aviation operators already need to be advised in advance as to whether IFR are going to be in force at an airport at which they wish to land.

If demand peaks and supply troughs are both to be incorporated into a flexible pricing system, there should be four pricing schedules:

- VFR—offpeak demand.
- VFR—peak demand.
- IFR—offpeak demand.
- IFR—peak demand.

In instituting a marginal cost pricing policy, a distinction should be drawn between:

- Joint costs.—Those costs which would have been incurred had either IFR or VFR conditions persisted throughout the year; and
- Separable costs.—Those costs incurred purely for IFR or purely for VFR days (for example, an additional runway needed solely for heavier traffic on VFR days).

Capacity and operating costs which are truly joint would then be shared among all peak users, with no distinction between traffic on IFR and VFR days. Separable costs would be allocated, as appropriate, to IFR and VFR days. Marginal delay costs, which at a given level of demand can be expected to be greater during IFR conditions, would be added to marginal "airport costs" and, if necessary, capacity may be rationed by increasing price still further. The joint demands of IFR and VFR peak (and, if applicable, offpeak) users should then be used to indicate the need for further investment, the distinction between marginal joint and separable costs being maintained. Note that at capacity—or when congestion occurs—the landing fee for most general aviation aircraft should rise more rapidly than that charged the air carriers, for at this point aircraft weight becomes a relatively unimportant factor in determining the real cost of an operation.

No airport authority has yet fully embraced the principle of peak load pricing, although the Port of New York Authority has moved in this direction, requiring a minimum landing fee of $25 for general aviation aircraft at Kennedy, La Guardia and Newark at certain peak-hours, a $5 minimum charge being levied at other times. The weakness of this policy is that an arbitrary distinction is made between aircraft on a basis other than the real social costs imposed by them, no peak pricing scheme being enforced for the air carriers. This leaves PNYA open to a number of legitimate criticisms. The policy was designed to discriminate in favor of aircraft carrying large numbers of passengers, but the AOPA [38] correctly points out the danger of anomaly; for a general aviation flight carrying more passengers than an airline flight could still be charged more for landing. And it asks, "will a cargo airliner carrying animals * * * have priority over the businessman flying his own plane?" [39]

Such questions reveal the weakness inherent in any discriminatory charging scheme, but they may be answered in a way that would hardly be received favorably by general aviation. The AOPA stresses

---

[38] The Aircraft Owners & Pilots Association, a large and effective spokesman for private aircraft operators.

[39] "AOPA Pilot," November 1969, p. 7.

the benefits received from the airways, rather than the costs imposed by users, as being the appropriate basis upon which charges should be levied. Sellers or consumers of public services are on dangerous ground when they make this sort of judgment. It is much better that the various resources used up by peak-hour airport demands should be rationed in accordance with willingness to pay for them. Consequently, if it is really more important for the businessman to use Kennedy during a peak hour than for the planeload of animals to do so, he can demonstrate this by offering to pay more than the animals' owner for the privilege.

The landing fee to be charged at a particular time of day requires estimation of the relative delay caused by various types of aircraft. This is a matter of great complexity, but it does appear that both air carriers and general aviation pay landing fees during peak periods that are considerably less than the real resource costs involved. The $25 fee represents a very small step in the direction of economic efficiency. Nevertheless, it is a step in the right direction and is the only example of peakload or flexible pricing to be found among the large air carrier airports.

The existence of long-term contracts between air carriers and airports creates a stumbling block for the immediate introduction of peak pricing at PNYA Airports and elsewhere, but achievement of such a system should be a long-term policy. Alternatively, the FAA could introduce the system in charging landing fees for its own terminal facilities. But it has rejected peak pricing, preferring to ration capacity by fiat. Hourly flight quotas, clearly establishing the preferential treatment of air carriers, are now in force at five "high density" airports: Washington National, Kennedy, Newark, La Guardia, and O'Hare. Whereas PNYA was unable, or reluctant, to put all its faith in pricing as a means of allocating airport and terminal airspace capacity, the FAA quota system fails utterly in this regard. Although the quota system is recognized by the FAA as being a stopgap measure, the preferred solution is simply to further extend capacity. To suggest that aviation activity should be restricted by a congestion charge equal to the marginal cost of delay, or that a situation in which congestion persists could possibly be preferable to the extension of capacity, is to introduce ideas that are alien to most aviation officials.

Delay Costs Attributable to General Aviation

A rough estimate for 1968 puts the total delay caused to the commercial airlines by general aviation at about 63,400 hours, representing $23,500,000 in aircraft operating costs.[40] At an average of 56 passengers per flight, the corresponding loss in passenger time is about 3,550,000 hours. Using a figure of $5 per hour, the cost of lost passenger time becomes $17,750,000, making a total loss inflicted on airline operators and passengers by general aviation of $41,250,000. Since scarcely any of this was recovered by means of a congestion tax, this sum could be seen as a further subsidy to general aviation if it were not for the fact that congestion is a reciprocal phenomenon.

---

[40] Details of the calculation of delay costs imposed by general aviation, and those suffered in return, are described in "Public Policy Toward General Aviation," ch. 8.

On a per aircraft basis, general aviation delay time attributable to the air carriers is estimated to be greater than air carrier delay caused by general aviation. However, this ceases to be the case when calculated in terms of passenger time, for the average general aviation passenger load is only about three. This, coupled with the fact that average operating costs of general aviation aircraft are considerably lower than those of the air carriers, means that the cost of general aviation delay caused by the air carriers is relatively small: it has been estimated at about $5 million annually,[41] despite valuing a general aviation occupant hour at $10. General aviation is therefore estimated to impose delay costs on air carriers which are roughly $35 million greater than those suffered in return.

In consequence, there are not only economic efficiency aspects of congestion and delays ,but also interesting implications concerning the redistribution of real income. Since the occupants of general aviation aircraft are assumed to be more wealthy than those of the commercial airlines, the net effect of congestion (to the extent that delay costs are not passed on) is to transfer real income from the relatively poor to the relatively rich, if real income is defined to include time that could be spent in ways more profitable or enjoyable than traveling.

The introduction of peak pricing is unlikely to eliminate this redistributional effect altogether, for presumably the greater income of general aviation users will imply, on a per capita basis, their greater willingness to pay for the privilege of landing during periods of congestion. But, since air carrier passenger loads and aircraft operating costs are normally greater than those of general aviation, the perverse distributional effect should be reduced considerably by the introduction of a congestion charge.

V. Conclusion

Despite the 1970 legislation, the total subsidy annually received by general aviation over the period 1971–80 will continue to increase unless there is considerable reform of user charges policies. If Federal, State, and local subsidies and congestion costs are included, the difference between the revenue collected from or costs incurred by general aviation, and the costs it imposes on the rest of society, will be well over $600 million annually. It will be recalled that this figure, which excludes aid to those airports constructed for the joint benefit of general aviation and the commercial airlines, and is therefore somewhat conservative, is made up as follows:

- $445 million Federal airways system costs.
- $30 million Federal subsidies for airport development.
- $130 million State and local subsidies to general aviation airports.
- $35 million congestion costs (assumes no change in annual cost from 1968 figure).

It is predicted that the average number of aircraft to be found in the general aviation fleet over the period 1971–80 will be 176,000. The subsidy to general aviation would therefore amount to over $3,500 per annum per aircraft. This may be compared with the annual cost that an owner privately incurs in operating and depreciating his air-

---

[41] Ibid.

craft, which ranges from $2,700 for a typical single piston-engined aircraft to $260,000 for a general aviation turbojet. Since over 80 percent of the general aviation fleet is of the single piston-engined variety, it will commonly be the case that *the public at large contributes more toward the total cost of safety operating a light aircraft than the owner does himsel!*

It is, however, instructive to observe how the burden of supporting Federal expenditures on facilities used by general aviation is predicted to change over the forthcoming decade. In 1971, total Federal airways and airports expenditures were financed in large part by the general taxpayer, but this deficit is expected to be eliminated by 1980. Maintaining the conservative assumption that general aviation will be responsible for 50 percent of the increase in airways expenditures over the period 1969–80, its share of airways costs in the latter year is estimated at $627 million. To this may be added $30 million in airport subsidies. Liability to user charges in that year is predicted to be $132 million, leaving a subsidy of $495 million.

However, the total liability of all civil aviation to user charges in 1980 is estimated at $1,537 million; and total Federal expenditures on civil airports and airways, at $1,420 million.[42] This indicates that the commercial airlines will, in that year, contribute almost $500 million toward general aviation's share of Federal aviation expenditures, as well as making available a surplus of $100 million or so.

Estimates made for 10 years hence are of course subject to a good deal of error; and since the projections are in constant dollars, adjustment to tax rates would have to be made to retain liability in real terms. Nevertheless, the continued heavy subsidization of general aviation, financed on an ever-increasing scale by the passengers of the commercial airlines, is quite clearly implied by present legislative arrangements. The danger is that overall cost recovery, with no regard to structure or incidence, may be accepted as a satisfactory aviation user charges policy. This, as we have argued at some length, would be an entirely false conclusion to reach.

---

[42] See tables 2 and 3. To Federal airways expenditure of $1,200 million, we add $220 million for Federal subsidies, this being the annual average amount remaining out of the $2.5 billion authorized after expenditures specified for fiscal years 1971–75 have been made.