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General Aviation and the Airport and Airway System: An Analysis of Cost Allocation and Recovery

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Since 1967 it has been the policy of the National Business Aircraft Association that all beneficiaries of the nation's airways system have an obligation to pay a share of its costs. As airport and airway user charges are taken up in the 97th Congress in 1981, the questions are, What is the fair share of system costs that should be recovered from general aviation, and how much of that share was recovered under the 1970 legislation, which has expired? This study addresses these questions and finds that between 58 and 73 percent of general aviation's fair share was recovered in FY 1978 (used herein as the study year) by the taxes enacted in 1970. This does not take into account any public (nonuser) benefit that Congress may assign to general aviation activities. Costs of federal expenditures on the airport and airway system allocable to general aviation amounted to $368.8 million, 13.2 percent of the total system cost, based on data in a Federal Aviation Administration cost-allocation and recovery report for FY 1978. Other allocated cost shares were $1400.5 million for air carriers, 50.3 percent of the total; $281.2 million for military and government aviation, 10.1 percent of the total; and $735.0 million for the public (nonusers), 26.4 percent of the total. Recovery of costs by taxes depends on federal policies that are based on the efficient allocation of national resources, maintaining fair competition among the several modes of transportation, and fair taxation. Absent a cohesive national transportation policy, applying a consistent policy for percentage of costs recovered for like transportation activities to the general aviation primary use categories results in general aviation's fair share of costs that should be recovered to lie within the range of $126.1-$157.5 million for the study year. A comparison, therefore, of the fair share of costs that should be recovered from general aviation, with recovery from the taxes imposed by the Airport and Airway Development and Revenue Acts of 1970, which amounted to $91.5 million in the FY 1978 study year, shows that between 58.1 and 72.6 percent of general aviation's share was recovered by that tax structure. The fourfold increase in petroleum prices since 1974 and the enactment of the Airline Deregulation Act of 1978 emphasize the increasing role of general aviation in the air taxi, executive, and business primary-use categories as a vital and unique transportation resource in the United States.

COST ALLOCATION IN EXPERIENCE AND THEORY

Earlier proposals to tax or charge users for federal expenditures on airports and airways finally resulted in passage of the Airport and Airway Development and Revenue Act of 1970 (1), which provided for the taxes set forth in Table 1 (5), many of which expired or were reduced on October 1, 1980. The legislation provided that receipts from collection of these taxes be paid into a trust fund to offset certain federal expenditures on airports and airways. There was an uncommitted balance in that fund of $3225 million at the beginning of FY 1981 (2).

Experience With Cost Allocation

Four cost-allocation studies are summarized in Table 2: Three were conducted by the Federal Aviation Administration (FAA) and predecessor organizations (in 1950, 1962, and 1978) and one in 1973 by the Office of the Secretary of the U.S. Department of Transportation (DOT). These works show that the annual federal costs of the airport and airway system have grown almost fiftyfold in the 30 years from FY 1949 to FY 1978 covered by these studies. The share of federal airport and airway costs allocable to general aviation varies from a low of 13 percent of all costs to a high of 32.1 percent of all costs, depending on the method of cost allocation used in the study. The existence of this wide range of costs, determined to have been attributable to general aviation, may be used to illustrate the difficulties of allocating costs (the cost-allocation process) and to illustrate what has been learned about that process over the years represented by studies.

Where the costs of providing a facility or service are uniquely and exclusively traceable to a single user, they are said to be clearly allocable or clearly assignable costs and may be charged entirely to that user. Unfortunately, most of the facilities and services provided by federal expenditures on the airport and airway system cannot be so uniquely traced. The system serves all users pretty much on a first-come, first-served basis--considered to be one of its great strengths by many in the aviation community. But in such cases, the so-called "joint" costs or "common" costs must be allocated to the different users and user groups. This--the first flaw in the cost-allocation process--is a flaw because any known way of allocating joint costs [and there are many (3)] is necessarily arbitrary and imperfect, although some methods are generally considered to be more fair and more reasonable than others (4).

Thus, user costs in the two earlier studies were allocated between general aviation [the 1961 FAA study allocated costs only between commercial aviation and military aviation (6)], air carrier, and military aviation simply on the basis of use: so many landings at FAA-manned tower airports, so many enroute fix-postings, and the like. There are at least two objections to the application of this method. First, the resulting allocation of joint or common costs to a user does not necessarily reflect

Table 1. Summary description of aviation user tax structure, 1978-1980.

Type of Tax	Tax Base	Rate	
		Through September 1980	Starting October 1980
Domestic passenger ticket tax[a]	Passenger transportation charges	8 percent	5 percent
International air passenger enplanement tax	Passenger enplanements	$3/person	0
Domestic air cargo waybill tax[b]	Cargo transportation charges	5 percent	0
Aviation gasoline	Fuel purchases	7 cents/gal	1.5 cents/gal
Jet fuel	Fuel purchases	7 cents/gal	0
Aircraft registration	Aircraft	$25/aircraft	0
Aircraft weight tax			
Nonturbine-powered	Aircraft weight	2 cents/lb over 2500 lb	0
Turbine-powered	Aircraft weight	3.5 cents/lb	0
Aircraft sales tax			
Tires	Tire weight	5 cents/lb	5 cents/lb
Tubes	Tube weight	10 cents/lb	9 cents/lb

[a]Tax on the transportation of persons by air. [b]Tax on the transportation of property by air.

Table 2. Summary of principal airport and airway cost allocation studies, 1950-1978.

Item	1978 FAA Study FY 1978 Forecast Data	1973 DOT Study FY 1975 Forecast Data	1961 FAA Study FY 1962 Data	1950 CAA Study FY 1949 Data
Airport and airway system costs (millions)	$2785	$1820	$431.4	$58.7
Basis:	FAA annual appropriation. Included in allocation below under "public and other" are public interest costs (regulation and other government expenses $236.2 million, nonaviation weather expenses $28.1 million, clearly allocable defense costs $90.1 million and expenses associated with subsidized air transportation service to small communities $44.4 million) and service benefits limited to local users (National and Dulles Airport expenses $33.5 million) amounting to $432.3 million total. Investment costs treated as current costs.	Included are DOT research and development and FAA airport and airway materiel and services; DOD enroute services overseas and NOAA net aviation weather costs. Excluded are FAA safety regulation, National Capital Airports and Aviation War Risk Revolving Fund; Coast Guard search and rescue and operation of navigation aids; National Transportation Safety Board; joint use DOD facilities; NASA; and CAB subsidy and regulatory activities. Investment costs treated: (a) as current costs, (b) amortized after start of base period, (c) amortized prior to start of base period.	FAA annual maintenance and operations costs including administrative costs, depreciation on capital investment, amortization of long range research and development costs and interest on unamortized investment in capital facilities and in long range research and development projects. No credit for military standby value.	Annual cost of maintenance and operation, amortization of depreciation charges, and interest on unamortized investment of the domestic part of the Federal Airways System. No credit for military standby value.
Allocation of costs (millions) and share of total (%)				
General aviation	$368.8-$671.6 (13-24%)	$373-$536 (19.6-32.1%)	$302.4 (70.0%)	$15.7 (26.7%)
Air carrier	$1400.5 (50%)	$861-$928 (47.3-51.0%)		$27.0 (46.1%)
Military and government aviation	$281.2 (10%)	$356-$584 (19.6-32.1%)	$129.0 (29.9%)	$16.0 (27.2%)
Public and other	$432.3-$735.0 (16-27%)	None shown	None shown	None shown
Basis:	Allocations are based on two methods; new investment-marginal cost method and the requirement for minimum service method. In the latter method, the "cost of common system" ($302.7 million) is subtracted from general aviation and added to public and other.	Ten-year system costs are allocated by 10 different methodologies for the three different treatments of investment costs. Study singles out long-run marginal cost method as preferred; that and one other method, benefits/value of service, are shown above to provide range.	Costs of 5 groups of domestic airway facilities are allocated on 5 different bases of use; e.g., the sum of costs for terminal area radars, instrument landing systems and approach lighting are allocated on basis of instrument approaches. No breakdown of commercial aviation between general aviation and air carrier is shown.	Costs of terminal aids and enroute aids allocated on basis of use (variously tower operations, approaches, fix postings and mileage).
User tax revenues (millions) and share of allocable costs covered (%)				
General aviation	$91.5 (14-25%)	$94 (17.5-25.2%)	$20.3 (6.7%)	$0.4
Air carrier	$1229.2 (88%)	$882 (95.0-102.4%)		$8.1
Basis:	Air passenger ticket tax 8 percent, international enplanement tax $3, cargo waybill tax 5 percent, gasoline and jet fuel sales tax 7¢/gal, aircraft registration fee $25, weight tax 2¢/lb nonturbine over 2500 lb and 3.5¢/lb turbine, tire and tube sales tax 5¢/lb tire weight and 10¢/lb tube weight.	Same as 1978 FAA study.	2¢/gal tax on aviation gasoline. Proposed adding 0.5¢/gal per year until properly allocable costs to civil aviation are substantially recovered.	For the year 1953 based on recommended new federal 1.5¢/gal tax on all jet aviation fuel and all aviation gasoline of 91 or greater octane rating; the latter to exempt the smaller type of aircraft, which are essentially nonusers of the airways.

the costs incurred to serve that user. For example, the different aircraft of the separate user groups vary in performance (flight speed) and equipment carried and, hence, impose different controller workloads and system costs for the use of the system. The 1973 DOT study attempted to take some of these differences into account by devising and applying weights to the amount of system use made by different users (3).

But there is a second and more fundamental objection to the measure-of-use method of allocating joint costs, and it is that relatively little attention is paid to what each user wants and is willing to pay for. Usually a single facility or service is offered the user as a result of federal expenditures on airports and airways--the user accepts the single service or none at all (when that choice exists). Yet a particular facility or service may have been designed for a higher level of performance than a particular user needs or wants.

Special Question of Public or Nonuser Cost Share

The 1973 DOT study made an extensive study of the allocation of joint costs among users, in addition to improvements in the units-of-use method noted above: In all, 10 different methods were applied. The study has been characterized as basically flawed, however, because "it decided there was no merit in general tax support of the system as a matter of public interest" (8,9); that is, no share of system costs was allocated to nonusers. At that time, a reasonable literature had begun to develop around concepts of measuring the economic benefits from air transportation activities such as share of gross national product (air carrier, $10-11 billion, about 1 percent of the U.S. total in 1971, and general aviation, $2-3 billion) and the number of workers employed in industry jobs [920 000 in 1971 (3,10)], the number employed in supplying the industry, and the number employed in serving the people who earn their living in the industry.

These data are useful for a number of purposes, including estimation of the value of benefits to users for the purpose of allocating joint or common costs (as distinguished from methods based on measures of use and costs). But to the professional economist, these data do not provide the basis in our mixed public and private enterprise market system for determining what the general public (as distinguished from system users) should be willing to pay for the airport and airway system supported by expenditures of the federal government. This is also true of similar values of gross national product (GNP) and employment that pertain to the baking of bread or the manufacture of steel; they do not indicate the share of those activities that should be borne by the public out of general tax revenues. There must be a showing of foregone activities--i.e., these people would not be working at all, or as well, if they were not working in air transportation (11), or significant reductions in GNP and the national standard of living would be precipitated by the lack of expenditures on the airport and airway system (12). No estimates of public benefit based on these principles of economic theory have been found.

However, other nonuser benefits of air transportation have been identified (11):

> The increase in capitalized value of real property due to improved access is one benefit that transportation users clearly do not reap. Improved air transportation has allowed a number of Americans to take winter vacations of relatively short duration in the Caribbean, in Florida, and at Western ski resorts--a certain benefit. However, a major gain accrues to the owners of property in these areas who have seen their property values rise substantially--that is, to nonusers of air transportation. The same comment can be made when a new airport increases the value of industrial and commercial property located near it.

The gain in tax revenues to communities so situated might also be added.

The 1973 DOT study concluded no share of FAA expenditures should be allocated to nonusers. The 1978 FAA study moved in two ways to identify nonuser federal expenditures on the airport and airway system and to separate these from the costs allocable to the user groups. The military ultra-high frequency communication requirement was noted. It was similarly found that certain regulation and other government expenses, nonaviation weather expenses, expenses associated with subsidized air transportation services to small communities and the expenses of National and Dulles Airports, where service benefits are limited to local uses, could be identified as public expenses, not to be included in FAA expenses to be allocated among the users of the system.

The 1978 FAA study took one additional step in the identification of public interest costs. In reaction to the 1973 DOT study, the general aviation community had also observed that it was being overwhelmed with facilities and services provided by the FAA that it did not want or require (9).

In the 1978 study a separate minimum-requirements airport and airway system was designed for each user group--general aviation, air carrier, and military and government aviation--and used as the basis for allocating costs among the users. The residual or left-over costs (FAA expenditures less the costs of the three separate systems added together) in the amount of $302.7 million annually (FY 1978) were allocated as the public share.

ALLOCATION METHODOLOGY SELECTED

Multiple and sometimes conflicting evaluation criteria exist to select the method for allocating joint and common costs. The 1978 FAA study applied the following criteria: "economic efficiency, equity, ability to pay, and minimizing or reducing funding deficits. The selection is also constrained by desirability to minimize administrative burdens, i.e., consideration of the practical problems of implementation" (4).

The method selected here to allocate joint and common costs is the minimum separate requirements method reported in the 1978 FAA study. This is consistent with the cost-allocation methodology developed by the U.S. Army Corps of Engineers over the years to allocate cost among multipurpose water projects, the basis of which is that no single-purpose project should be allocated a greater share of multipurpose costs than the costs that project would incur "going it alone" (13). Although economists admit to the arbitrary nature of the various methods for allocating joint costs, they are in agreement that "no group of users should have to pay more overall than they would pay for a separate system of their own" (14).

Conclusion

Therefore, by using the most recent data and analysis available, that from the FAA 1978 study and shown in Table 3, experience and theory suggest that federal expenditures on the airport and airway system should be allocated as follows: 26.4 percent to

Table 3. Allocation of federal expenditures on airports and airways based on FY 1978 data.

Item	Cost ($ millions)	Percentage of Total
Total airport and airway system cost	2785.5	100.0
Public (nonuser) costs	735.0	26.4
General aviation (5)	368.8	13.2
Air carrier[a]	1400.5	50.3
Military and government aviation	281.2	10.1

[a]Includes allocation to both direct and indirect users.

the public (nonusers), 13.2 percent to general aviation, 50.3 percent to air carriers, and 10.1 percent to military and government aviation. The general aviation and air carrier share includes both the direct users' share (the aircraft operators) and the indirect users' share (the passengers and shippers that use and, hence, directly benefit from the service provided by the aircraft operators).

COST RECOVERY IN EXPERIENCE AND THEORY

The level of recovery of federal expenditures on a particular element of our transportation system has been determined from time to time through the political process, responding largely to the goals of a particular transitory bureaucracy then in power, to the local interests that the legislators individually represent, and to pressure of the several usually well-organized interest groups representing the various industry elements affected. The overall pattern of recovery resulting from this process has not been uniform: The level of recovery is not the same for all modes, the kinds of changes and taxes levied are not the same for all users who are told they must pay, and the kinds of federal expenditures (maintenance, operators, and investment) on which taxes for recovery are based varies. When full recovery of federal expenditures is not made, the gap is made up by a transfer payment from general revenues (15).

Basis for Recovery

The user tax concept supporting the specific tax levies on users of the airport and airway system enacted in 1970 (shown in Table 1), is grounded in basic principles of efficient allocation of resources, fair competition, and fair taxation (16,17). Each merits careful consideration.

Efficient Allocation of Resources

It is an accepted principle of economic theory that when prices or average revenues are set equal to the marginal costs of production, the private market system, operating in free and open competition in the private sector, will efficiently allocate the nation's scarce resources (18,19). This concept has been extended to encompass the idea that "if users of special services or facilities are not required to pay their share of the costs, the market system for matching demand and supply at a price reflecting value to the purchaser and cost to the supplier will be inoperative. The users will demand more of the services or facilities than they would if the price fully reflected the cost, and resources will be shifted from more productive activities to the special services or facilities" (16).

These concepts are not relevant to, and do not support, taxes equivalent to full cost recovery from general aviation users of the airport and airway system on the grounds that economic efficiency is thereby enhanced through a better allocation of scarce resources. In the first place, for the theoretically efficient allocation to occur, price must be equated to marginal not average cost and "it is no simple matter to measure marginal costs" (16). "This test of value is rather crude, since total revenues are compared with total cost, and no tests are performed at the margin" (20).

But a much more fundamental flaw in applying the efficiency logic from economic thinking to justify a user tax on general aviation equivalent to full cost recovery is that the desired result of efficient allocation of the nation's scarce resources is achieved only in competitive markets. "Competitive behavior assures the equation of price and marginal cost that is required if free consumer choices are to result in the optimal allocation of resources" (18). The FAA provides goods and services to general aviation as a monopolist; there is no competition and in reality no market at all in any conventional sense. Under the conditions of monopoly, average revenues or price exceeds marginal costs. "Inefficient allocation results, and consideration must be given to public policies that force firms to produce at an optimal output where AR equals MC" (21).

The other parts of the argument, not necessarily related to full cost recovery, are based on the benefit principle, and the free-goods concept. Both have limited applicability to cost recovery of federal expenditures on airports and airways from general aviation users.

The benefit principle calls for the distribution of taxes in accordance with the benefits received from the expenditures on which the taxes are spent. It is a sort of substitute for the market test in the private economy; people pay for the goods and services received in the private economy, so why not in the public sector? "After all, if the people who will benefit from expenditures are not willing to pay for them through their taxes, presumably they are not worth the cost and should not be undertaken" (20). The difficulty is that the general aviation user has no choice; the airport and airway system are there to provide safety to all users. A user cannot decide the system or part of it is not worth the cost and should not be undertaken unless the user stops flying altogether. If he or she flies at all, the user must pay all the taxes. Most of the time you can pay the toll and use the turnpike, or not pay the toll and take an alternate route. Here, there is no such choice.

The other part of the argument, namely that one will use less of a resource if one has to pay for it, also provides only limited support for the collection of user taxes from general aviation on the grounds of enhancing the efficient use of resources. The kind of taxes to which this relates--a terminal charge at airports with FAA towers or an enroute service fee--have been considered time and time again, and rejected on the grounds of safety and administrative complexity (5). It cannot be played both ways; on the one hand, justifying taxes on the grounds payment will discourage use of a free good or service, and then turning around and imposing taxes that do not relate to use or nonuse of any particular good or service that is offered.

Fair Competition

The scheduled airlines and in general aviation--the air taxi operators, executive transportation, and business transportation--compete with water, rail, and highway carriers for the movement of both passengers and freight (16). For each mode of transportation to bear its share of the cost of federally

Table 4. Elements of transportation bill, by market, 1978.

Market	Revenues and Private Expenditures ($ millions)	Subsidy by Governments ($millions)	Total Transportation Bill ($ millions)	Percentage of Total Bill Paid by Subsidy	Private Share
U.S. International	9 419	892	10 311	8.65	0.913
Freight	5 693	829	6 522	12.7	0.873
Water	4 928	761	5 689	13.4	0.866
Air	765	68	833	8.16	0.918
Passenger	3 726	63	3 789	1.66	0.983
Air	3 445	62	3 507	1.77	0.982
Water	281	1	282	0.35	0.996
Intercity	159 137	8 756	167 893	5.21	0.948
Freight	69 517	2 962	72 479	4.09	0.959
Truck	47 272	1 667	48 939	3.41	0.966
Regulated	22 000	NA	NA	NA	
Other	25 272	NA	NA	NA	
Rail	16 509	282	16 791	1.68	0.983
Water	2 434	768	3 202	24.0	0.760
Domestic ocean	1 136	NA	NA	NA	
Inland waterway	950	NA	NA	NA	
Great Lakes	348	NA	NA	NA	
Pipeline	2 229	26	2 255	1.15	0.988
Oil	1 317	NA	NA	NA	
Gas	912	NA	NA	NA	
Aviation	1 073	219	1 292	16.9	0.831
Passenger	89 620	5 794	95 414	6.07	0.939
Automobile	71 933	4 361	76 294	5.72	0.943
Aviation	16 315	1 115	17 430	6.40	0.936
Carriers	11 581	NA	NA	NA	
General	4 734	NA	NA	NA	
Rail	340	308	648	47.5	0.525
Bus	1 016	0	1 016	0.00	1.000
Water	16	10	26	38.5	0.615
Local	133 008	7 532	140 540	5.36	0.946
Freight, truck	47 790	209	47 999	0.43	0.996
Passenger	85 218	7 323	92 541	7.91	0.921
Automobile	82 732	3 397	86 129	3.94	0.961
Owner operated	81 150	NA	NA	NA	
Taxi	1 582	NA	NA	NA	
Transit	2 200	2 038	4 238	48.1	0.519
Bus	600	NA	NA	NA	
Rail	1 401	NA	NA	NA	
Commuter	199	NA	NA	NA	
School bus	286	1 888	2 174	86.8	0.131
Miscellaneous	3 973	263	4 236	6.21	0.938
Boats	1 754	263	2 017	13.0	0.870
Recreation	NA	NA	NA	NA	
Commercial fishing	NA	NA	NA	NA	
Other	2 219	0	2 219	0.00	1.000
Total	305 537	17 443	322 980	5.40	0.946

provided transport facilities is necessary to ensure fair competition. Of the 39 million h flown in general aviation in 1978, more than 17 million h, 44 percent of the total of all hours flown, were in those categories where uneven federal expenditures might give one mode a competitive advantage over another mode. However, applying this basic principle of federal tax parity across modes to provide competitive equity ignores the fact that more than 9 million general aviation h (more than 24 percent of all hours) were for personal flying, not associated with a business or profession, and not for hire (22). There is no basis to recover federal expenditures on airports and airways from this segment of the general aviation community on the grounds that competitive equity among modes must be maintained fairly.

Fair Taxation

Another rationale to support taxes on general aviation to recover federal expenditures on the airport and airway system is that the costs of special services and facilities should be borne by those who use them and reap the benefit, rather than by the general taxpayer. Thus, where the persons benefited are fully able to pay, they should do so, unless there is some overriding justification provided by national policy for redistributing income from the general taxpayer to the users.

A recent tabulation was made for 1975 by the National Transportation Policy Study Commission, showing separately the revenues and private expenditures on transportation and government subsidy to transportation (23). As shown in Table 4 (23), the government subsidy varies widely as the share of the total transportation bill: in the extreme, from 86.6 percent in the case of school buses to 0 percent for intercity passenger transportation by bus. Virtually no one else in the transportation community operates without some subsidy from government. The costs of intercity freight movements by air were borne 16.9 percent by government subsidy, the cost of intercity passenger movements by air 6.4 percent by government subsidy, and the cost of intercity passenger movements by rail 47.5 percent by government subsidy.

A recent study of taxes imposed by states and local communities on general aviation shows a similar deviation among taxing sources (24). Some 90 percent of the states were found to impose three or more taxes (sales tax, fuel tax, and aircraft registration fee). Some 24 states have a special "aviation fund" into which some or all of the taxes collected flow, and 10 states allocate all aviation tax receipts to general state funds. The study estimated that on the order of $147 million was collected by state and local governments from general aviation users.

Conclusion

Fair competition, fair taxation, and, to a limited extent, economic efficiency provide the rationale to recover some of the federal expenditures on the airport and airway system by taxing general aviation users of that system. To correctly determine how much should be recovered by taxes under the principle of fair competition requires further development of the competitive situation between general aviation and other modes of transport. To correctly determine how much should be recovered under the principle of fair taxation requires a more complete explication of national transportation policy. This is undertaken in the next two sections. Presented first is a profile of general aviation and, second, a review of national transportation policy as it pertains to the issues at hand. Certainly, general aviation should not pay less than its fair share; nor should it be required to pay more, comparatively, than the other beneficiaries of federal expenditures on transportation.

Table 5. General aviation number of aircraft and hours flown, by type and primary use, 1978.

Type	Number of Aircraft	Percent of Total	Hours Flown (000s)	Percent of Total	Average Hours per Aircraft
Aerial application (total)	7 418	3.75	2 066	5.25	278
Piston one-engine	6 335		1 800		284
All other piston	281		46		163
Turbine	12		1		69
Rotorcraft	785		219		279
Other	1		-[a]		-
Air taxi (total)	7 936	4.01	4 423	11.3	557
Piston one-engine	2 770		1 210		437
All other piston	3 314		1 684		508
Turbine	614		683		1111
Rotorcraft	1 215		828		682
Other	19		2		94
Business transport (total)	42 809	21.6	8 014	20.4	187
Piston one-engine	31 548		5 613		178
All other piston	10 074		2 089		207
Turbine	362		155		428
Rotorcraft	641		138		215
Other	181		13		75
Executive transport (total)	12 666	6.40	4 882	12.4	385
Piston one-engine	3 214		1 253		390
All other piston	4 764		1 575		331
Turbine	4 166		1 784		428
Rotorcraft	487		267		549
Other	32		2		54
Industrial-specialist (total)	2 059	1.04	702	1.79	341
Piston one-engine	1 388		411		296
All other piston	242		74		307
Turbine	17		5		303
Rotorcraft	402		211		525
Other	7		-[a]		-
Instructional flying (total)	14 742	7.45	5 009	12.75	340
Piston one-engine	13 438		4 693		349
All other piston	533		123		230
Turbine	22		11		486
Rotorcraft	269		100		373
Other	476		86		180
Personal flying (total)	96 209	48.6	9 601	24.4	100
Piston one-engine	89 847		9 040		101
All other piston	2 908		352		121
Turbine	56		14		249
Rotorcraft	512		27		53
Other	2 881		171		59
Rental aircraft (total)	8 189	4.14	3 284	8.36	401
Piston one-engine	7 419		3 024		408
All other piston	348		120		345
Turbine	35		23		663
Rotorcraft	130		73		566
Other	255		45		177
Other (total)	6 749	3.41	1 308	3.32	194
Piston one-engine	4 687		717		153
All other piston	700		97		139
Turbine	318		102		322
Rotorcraft	869		365		420
Other	173		18		103
Active (total)	198 778	100.0	39 290	100.0	198
Piston one-engine	160 651		27 857		173
All other piston	23 171		6 186		267
Turbine	5 610		2 801		499
Rotorcraft	5 315		2 228		419
Other	4 028		338		84
Inactive (total)	35 169				
Piston one-engine	28 289				
All other piston	2 866				
Turbine	498				
Rotorcraft	2 365				
Other	1 148				

[a]Less than 1000 h.

PROFILE OF GENERAL AVIATION: PAST AND TRENDS

Definition of General Aviation

General aviation is what economists would call a "residual"--that which is left over after specific items have been subtracted from a larger group of items. It is all aircraft in the U.S. civil fleet except those operated under Federal Aviation Regulations Parts 121 and 127. These two parts cover the operations of fixed-wing aircraft and rotorcraft, respectively, that (a) have been issued a certificate of public convenience and necessity by the Civil Aeronautics Board authorizing the performance of scheduled air transportation over specified routes and a limited amount of non-scheduled operations and (b) are used by large aircraft commercial operators. The FAA has classified this diverse collection of aircraft into eight categories of primary use plus "other" (25). (Enactment, in 1980 of Part 125, Certification and Operation Rules for Certain Large Airplanes, further codified a segment of general aviation activity.)

General Aviation in 1978 and Trends

The number of aircraft by type and hours flown by primary use in general aviation are shown for 1978 in Table 5 (22). In 1978 about one-half the aircraft (48.6 percent) in the general aviation fleet provided about one-quarter (24.4 percent) of the hours flown in personal flying. On the other hand, 4 percent of the aircraft produced 11 percent of the hours flown in air taxi, 6 percent of the aircraft 12 percent of the hours flown in executive transport, and 22 percent of the aircraft 20 percent of the hours flown in business transportation. The highest utilization (average hours flown per aircraft) was achieved by turbine-powered airplanes (499 h/aircraft) and rotorcraft (419 h/aircraft) in air taxi, business, executive, and industrial use.

An analysis of the general aviation fleet and its use for the years 1973 through 1978 shows that the total active aircraft count and total hours flown grew at about the same annual rate 5.33 percent/year and 5.63 percent/year, respectively, but that significant deviations from these mean fleet values occurred among the individual aircraft types (25). The fastest growth of any type in terms of total hours flown occurred with the turbine-powered rotorcraft with an average annual growth rate of 55.51 percent/year (starting, however, from a small base). Most of these rotorcraft are used commercially and in business--for aerial application, air taxi, business and executive transport, and industrial-specialist use. They are highly utilized. The 1075 turbine rotorcraft in air taxi were used 733 h in 1978 on the average (22), four times the total fleet.

Twin-engine turbojets and twin-engine turboprops (1-12 seats) also experienced almost double the average of total hours flown from 1973 through 1978, with average annual growth rates of 11.36 percent/year, and 10.91 percent/year, respectively. In contrast, single-engine piston airplanes experienced very little growth over the period, whether measured by total hours flown (0.79 percent average annual growth) or aircraft count (2.93 percent average annual growth).

In general, therefore, from 1973 through 1978, the larger, more sophisticated aircraft in the general aviation fleet were increasing both in numbers and total hours flown than other components of the fleet.

Impact of Higher Fuel Prices

The steadily increasing price of petroleum fuels since the 1973 embargo has had serious impacts on the greatest user of these products, the transportation industry, and general aviation is no exception.

Increases in fuel prices have had the effect of decreasing travel, as their impact has been to raise travel costs. This impacts most heavily on discretionary travel, which can be either postponed or canceled.

The effect of increasing fuel costs of general aviation, therefore, will be to reduce the established growth rate in hours flown for primary uses, but to disproportionately reduce the hours flown in non-business and discretionary use such as personal flying. This effect has already been felt in aircraft sales. In January 1981, a representative of the General Aviation Manufacturers Association reported that "today, at least 90 percent of the industries' sales are for business purposes" (26).

Impact of Airline Deregulation: Airline Deregulation Act of 1978

A basic objective of the Airline Deregulation Act of 1978 was to increase competition between the trunk, local service, and regional certificated air carriers. It was thought that load factors were too high and that there was too much service competition and not enough price competition. Greatly simplifying the Civil Aeronautics Board's restrictions on rates and routes for these carriers should raise load factors and lower the price of airline tickets because the competitive forces of the private market system would then be free to operate. To a considerable extent this has happened (28,29), but there has been a side effect favorable to some general aviation primary uses.

Higher load factors mean lower seat prices, but it also means it is harder to get seats. This has had its greatest impact on the on-demand business traveler who often cannot plan a trip very much in advance. The effect has been to stimulate general aviation in the air taxi, business, and executive use categories.

The legislation has had an additional favorable impact on general aviation. The Airline Deregulation Act of 1978 introduced a new policy regarding service to small communities: "The maintenance of a comprehensive and convenient system of continuous scheduled airline service for small communities and for isolated areas, with direct Federal assistance where appropriate..." was declared to be in the public interest (27). The legislation backed up the policy statement by guaranteeing essential air service to 555 eligible points, by providing a new federal subsidy program directed toward helping the communities not the carriers, and by making federally guaranteed loans available to commuter air carriers to purchase equipment.

Service to small communities is what general aviation is all about. In 1978 there were 14 746 airports of record in the United States--4651 with runway lights, 5618 with paved runways, and 499 with airport traffic control towers (22). The FAA has identified 147 air traffic hubs (which enplaned 96.1 percent of all air carrier traffic) and, together, the air carriers and commuters provide service to but 880 airports (30).

Air service at the great majority of airports, mostly in small communities, is provided by general aviation. As of February 1, 1981, commuter air carriers were being relied on exclusively to provide essential air service to 201 small communities outside Alaska (31) and to provide replacement service for trunkline and local service carriers at an additional 78 airports (29). Where plants have been located at small towns to diversify in the national interest or to develop particular local resources efficiently, general aviation is most often the only form of air transportation available.

Conclusion

General aviation is in a period of transition. The rise in popularity of private aircraft among business-oriented users, whether the aircraft ownership rests in the hands of the company or an individual within the business firm, is strong and continuing. The great increase in fuel prices over the past few years will contribute to this trend and against personal flying. The Airline Deregulation Act of 1978 will stimulate further growth in air taxi, business, and executive transportation.

CONTRIBUTION OF NATIONAL TRANSPORTATION POLICY

Statements of national transportation policy abound (23). The most comprehensive, mandated by the Congress, is the final report, National Transportation Policies Through the Year 2000, of the National Transportation Policy Study Commission (NTPSC), issued in June 1979 (23).

NTPSC

The NTPSC study addressed regulation; ownership and operations; finance, pricing, and taxation; planning and information; and government organization, calling these functional categories representations of instruments of policy. As did the earlier Doyle study (32), it, too, found that the United States had no unified national transportation policy. "Instead, there is an assortment of policies and programs which have been developed in an ad hoc fashion to achieve sundry goals or resolve various issues. The sheer bulk of federal transport policies and programs (64 federal agencies that implement approximately 100 policies and programs) is enough evidence to convince many observers of the ad hoc nature of Federal transportation policymaking" (23).

A number of specific policies were addressed and recommendations were made by the NTPSC. On the need for uniformity in national transportation policy, NTPSC reported "that there is no uniform set of policies to guide federal actions, or to improve the performance of the private sector. Most policies or programs are individually directed at particular problems. Although most are well-meaning, both individually and collectively they have at times tended to frustrate the effective functioning of competitive markets (23).

The NTPSC was heavily oriented toward using economic techniques to make government more efficient. Thus, on the requirement that users and those who benefit from federal actions should pay, it re-

Table 6. Cost-allocation and recovery proposal for general aviation based on 1978 data.

Primary Use and Recovery Basis	Private Share	Percent of Hours Flown	Weighted Private Share
Aerial application Local freight truck[a]	0.957	5.25	0.0502
Air taxi Intercity passenger rail[a]	0.525	11.3	0.0593
Business transportation Intercity passenger rail[a]	0.525	20.4	0.107
Executive transportation Intercity passenger aviation[a]	0.936	12.2	0.114
Industrial-specialist Local freight truck[a]	0.957	1.79	0.0171
Instructional flying Local passenger school bus[a]	0.132	12.7	0.0168
Personal flying Recreational boating	0.00	24.4	0.0000
Rental aircraft Intercity passenger rail[a]	0.525	8.36	0.0439
Other Unweighted average of the above	0.570	3.32	0.0189
Total		100.0	0.4272

Notes: Method 1: No credit for payment

Allocated costs (1978 FAA study, see Table 3)	$368.8 million
Recoverable costs ($368.8 x 0.4272)	157.5
Present recovery (1978 FAA study)	$ 91.5 million
Recoverable costs (%)	58.1

Method 2: Credit for payment to states

Allocated costs (1978 FAA study, see Table 3)	$368.8 million
Less one-half of tax payment to states	(73.5)
Adjusted allocated costs	295.3
Recoverable costs ($295.3 x 0.4272)	126.1
Present recovery (1978 FAA study)	$ 91.5 million
Recoverable costs (%)	72.6

[a]See Table 4.

ported: "Free markets operate on the principle that those who benefit must pay for the costs. When government provides costly facilities, benefits, or services, it too should assess charges that recover costs against users and others who benefit. In some cases, such as urban and rural transit and air traffic control, where benefits are widespread, it may be appropriate to assess a general tax to recover federally incurred costs" (23).

Similarly, in the discussion on finance, pricing, and taxation, NTPSC policies were focused on creating private "market like" efficiencies in the operation of the government. For example, it was suggested that congestion tolls might be employed during peak periods of facility use (23).

Conclusion

This review of national transportation policy makes three suggestions that are applicable to an analysis of general aviation cost allocation and recovery of federal expenditures on the airport and airway system. First, absent some well-defined benefits that are widespread, the users and those who benefit from federal actions should pay for the benefits they receive. Second, there is no uniform set of policies to guide federal action in transportation. Third, uniformity and consistency in the application of policy are a desirable end. A recent study offers a suggestion to find transportation policy: "There is a loose programmatic policy which must be inferred from currently existing Congressional legislation and agency regulations" (33).

COST ALLOCATION AND RECOVERY: AN ANALYSIS FOR GENERAL AVIATION

The eight categories of primary use that make up general aviation cover a wide spectrum of diverse aviation activity. Because of this, no single tax, or the combination of taxes imposed by the Airport and Airway Revenue Act of 1970 to recover part of the federal expenditures on airports and airways (see Table 1), can be equally fair and equitable to each general aviation primary user. The National Business Aircraft Association, Inc., has adopted the following policy position (34):

> Consideration of aviation user tax levels must first establish the value to be imputed to the air transportation system in terms of national public benefit, and of national military-defense benefit. Only after such determination is made should attention be given to the remainder of system costs to be recovered by user taxes. Whatever specific forms user taxes may take, they should be predicted on certain equity principles....

Systems of taxes other than the one imposed by the Congress in 1970 have been considered on several occasions and rejected, usually on the basis that they are too costly to administer, or that they would compromise the safety of the airport and airways system (5).

No attempt is made here to reopen the question of how to collect the tax. The issue addressed is how much should be collected--what is a fair and equitable overall tax burden for general aviation to bear. The procedure is to weight by total hours flown estimates of the private share paid for other activities in transportation, comparable to the eight categories of primary use comprising general aviation. This is in line with a national transportation policy that seeks uniformity and consistency in charging taxpayers who receive the benefits of goods and services provided by the government. The weighted private share, so determined, is applied to costs allocated to general aviation (from Table 3), and the recoverable costs are then compared with the estimated recovery under the tax structure enacted in 1970. The data base used is the 1978 FAA study, which, along with the calculations, is shown in Table 6.

Thus, the private share for local truck from the NTPSC report is applied to aerial application and industrial-specialist primary general aviation users. The comparability is the short-haul transportation of goods that all of this transportation involves. For air taxi, business transportation, and rental aircraft, the NTPSC private share for intercity rail passenger service is used. The comparability is short-haul passenger service. However, for executive transportation, the private share for intercity passenger aviation was selected because this general aviation primary-use category makes up the largest share of multiengine piston and turbine aircraft. These provide longer-haul air passenger service comparable to that offered by the air carriers.

Instructional flying serves two purposes--education, learning to fly--and maintaining flight proficiency as required by FAA regulation. The latter purpose is principally to enhance safety that the FAA study determined to be a public (nonuser) cost, so assigning the NTPSC local passenger school bus private share to all instructional flying is probably conservative. Personal flying was treated the same as recreational boating, which at the present time makes no payments for use of the navigation aids and other services provided by the U.S. Coast Guard, nor for the use of the inland waterway system.

Finally, there is the question of credit for the payment of like taxes to the states. Income tax laws typically allow the deduction, in computing net income subject to tax, of certain types of state and local taxes paid or incurred by the taxpayer (35).

Accordingly, the position may be advanced that some, if not all, of the $147 million paid by general aviation users to the states should be credited to the share of allocated costs based on federal airport and airway expenditures. The data readily available do not permit the detailed analysis that will be required to determine which, if any, state taxes paid should be so credited. However, crediting one-half of taxes paid to the states serves to provide an upper bound in estimating the percentage of full recovery now paid by general aviation users. This example is based on crediting state taxes against taxable income for a taxpayer in the 50 percent tax bracket.

Under the assumptions made and the methods applied, the costs to be recovered by federal taxes from general aviation users range from a low of $126.1 million to a high of $157.5 million. Comparing these values with estimated revenues of $91.5 million (under the 1970 tax system) suggests that general aviation was paying between 58 and 72.6 percent of its fair share of federal expenditures on airports and airways in the 1978 study year; the range was determined by whether or not credit against general aviation's fair share of federal expenditures is given for taxes paid to states. The foregoing does not take into account any public (nonuser) benefit that Congress may assign to general aviation activities and is based on cost data supplied by FAA.

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