Rail shippers' costs per hundredweight are presented in the table below (note that for 1979 the weighted averages are from rates reported in the survey, for 1980 the numbers in parentheses show the weighted average by hundredweight per car, and the averages for 1979 and 1980 show the total rail shipping bill divided by total rail shipments):

	Cost per Hundredweight ($)		
Destination	1979	1980	Increase (%)
East	3.70	4.11 (1226)	11.1
Gulf	3.00	3.14 (1261)	4.7
West	0.99	1.05 (1200)	6.4
Avg	2.39	3.04	27.2

The cost per hundredweight of rail shipments to the East, Gulf, and West increased by 11.1, 4.7, and 4.4 percent, respectively. These cost increases were much smaller than the 20 percent increase for railroads in per car revenue. The increased efficiency of larger volumes loaded per car contributed to lowering the cost impact on shippers.

CONCLUSIONS

Rail transportation of dry peas and lentils was deregulated for less than one year at the time of this study. Consequently, the conclusions drawn about the impacts of deregulation are certainly initial and preliminary. Yet, some specific findings should be emphasized.

Rail rates increased to all destinations after deregulation. The change in rail rate quoting from a per hundredweight basis to a per car basis resulted in smaller effective rate increases than anticipated by shippers. This was accomplished by increasing the rail-car-loading volumes for shippers, thus allocating the higher per car charges over a larger number of hundredweights. The inducement for shippers to load more units per car allowed railroads to move more product with fewer cars.

Cancellation of rail transportation privileges had a direct impact on firms that had previously used rail as a product collection tool. These shippers, who had previously benefited from or been subsidized by the availability of rail transportation, now must compete equally with the rest of the processors. As a result, the competitive environment within the dry pea and lentil processing industry changed because of rail deregulation.

To summarize, the effects of deregulation of dry pea and lentil carriage on railroads are as follows:

1. Total revenues increased largely because of per car rates higher than the former volume-based rates and the concentration on longer hauls and larger movements;
2. Per car rates induced shippers to load more units per car, which allows rail carriers to more efficiently use their rolling stock (capital equipment);
3. Railroads appeared to emphasize long hauls, for which they are more cost efficient, and deemphasize inefficient short-haul carriage; and
4. Railroads cancelled the transit privilege; by the speed with which the transit privilege was phased out of operation, it was apparently an undesirable service to provide from the point of view of the railroads.

Changes in marketing patterns had a larger impact on the shipping bill than on the rate changes that occurred after deregulation. The demand for peas and lentils changed from 1979 to 1980. Quantity demanded changed, and also the geographical distribution of markets, which was reflected by shipments being allocated to different ports. More shipments went to Gulf destinations--a more distant and more expensive movement.

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Airline Deregulation and Service to Small Communities

YUPO CHAN

Although the Airline Deregulation Act of 1978 was heralded at its introduction as a positive step, there were fears that small communities would likely be abandoned by local-service and trunk carriers in preference for denser, more profitable routes. To ensure adequate service to low-density markets, a rather extensive set of regulations was worked out under the essential air service clause of the Act, which granted direct subsidy (through 1988) to commuters to serve inherently uneconomical routes. Thus, commuters who provide a majority of the service to low-density markets were actually more regulated after deregulation than before. Statistics gathered over the three years after deregulation show that the initial concerns over small-community service were by and large unfounded. In fact, service to the low-density market has increased and in many cases has improved as commuters enter new markets or replace markets previously served by locals, which continues a trend that has been established long before formal deregulation took place. Thus, commuters have been assuming the roles of the locals in the 1970s, in much the same way as the locals relieved the trunks of many of their thin-density routes in the late 1950s and early 1960s. Although there are temporary disruptions of service to selective, medium-sized communities during the transition, the process is expected to work in the long run as more newly designed flight equipment suitable for the commuter markets is further developed. Such calculated optimism is obviously predicated on the satisfactory resolution of congestion, safety, and energy problems, barring major disruption of the economy.

Although airline deregulation was heralded in 1978 as a positive step toward improving the air transportation system in the country, there were significant reservations about its impact on service to small communities (1), many of which were expected to be abandoned by trunk carriers as a result of deregulation. This paper reviews the air service to small communities before and after deregulation and tries to answer some of the following questions:

1. To what extent has service to small communities changed as a result of deregulation?
2. What factors are responsible for this change in low-density service pattern, and how is it related to the airline-industry profile and the economics of airline route structure?
3. What is the likely future of air service to small communities based on our understanding of the explanatory factors identified in 2 above?

AIRLINE DEREGULATION ACT OF 1978

The salient features of the Airline Deregulation Act of 1978 (P.L. 95-504) that have direct bearing on air service to small communities are as follows:

1. Increased flexibility for certificated airlines in entering and abandoning markets; their abandonment of smaller markets results in increased market opportunities for commuter airlines;
2. Enhanced opportunities for commuter operators by making them eligible for subsidy to provide essential air service, by making them eligible for aircraft loan guarantees, and by their inclusion in joint-fare agreements with certificated airlines; and
3. Authorization to use larger aircraft with capacities up to 60 seats, thereby enabling a commuter to serve larger markets.

It should be noted that the Act did not deregulate the commuter industry as it did the remainder of the air-carrier industry. It did just the opposite. The commuter airlines now operate in a much more constrained regulatory environment than before deregulation, as the reader can gather by reviewing the following detailed provisions that govern service to small communities.

Essential Air Service

The Civil Aeronautics Board (CAB) encourages and fosters the continuation of safe and reliable scheduled air transportation for small communities and isolated areas, establishes new subsidy programs, and makes payments to eligible air carriers for the provision of essential air transportation. Markets that generate no more than 40 passengers/day are places where subsidy is contemplated. Once the minimally required number of airline seats is determined for an essential service point, a tiered system is established to convert the seats to a frequency that depends on the size of the aircraft. Thus, lower frequencies are specified for larger aircraft and higher frequencies for smaller equipment. Although a final definition for essential air transportation service is very much determined on a case-by-case basis, this aspect of the Act could have a substantial impact on services to the 555 small communities under consideration by CAB.

Subsidy

Air carriers eligible for subsidy are to be those that either hold a certificate of convenience and necessity under the Federal Aviation Act of 1958 (as amended) or those that provide essential air service. Air carriers that hold authority issued by the State of Alaska to engage in essential air transportation are eligible to receive compensation under CAB's new subsidy program. The existing subsidy for local-service airlines remains in effect until 1985.

Eligible air-service points to receive subsidy are those points in any state, the District of Columbia, or the Commonwealth of Puerto Rico that on July 1, 1978, have been listed on the route certificate of any carrier. Minimal provisions are made for the addition of new points. All eligible points are guaranteed essential air service for a period of 10 years after October 1978 (the date of the Act).

Termination of Service

Coincidental with the development of new routes and service through the above legislation, the Act has provided somewhat liberal provisions concerning the termination of service by commuter air carriers. A commuter carrier may terminate service to nonsubsidized points after reasonable notice, but not less than 30 days. On subsidized routes a carrier may not suspend or reduce service on less than 90 days notice to CAB, the communities affected, and the state. CAB has the power to require the incumbent air carrier to continue service (with subsidy) until a replacement carrier is found.

Market Entry

The legislation allows automatic entry by a carrier at a rate of 1 route/year through 1981, with each carrier allowed to protect 1 route/year from such entry. All certificated carriers (scheduled, supplemental, and intrastate) that operate in excess of 100 million available seat miles/year (274 000/day) will be eligible for participation. Also, after January 1, 1983, a subsidized local-service carrier may be replaced on a route by a commuter or other short-haul, local-service carrier if such replacement will result in (a) a reduction in or removal of subsidy and (b) improved service.

Through Service and Joint Fare

The legislation requires that if CAB establishes a joint-fare formula for certificated airlines, this formula must be extended to joint fares between certificated air carriers and commuters. Prior to deregulation, the division (or apportionment) of the joint fare was mutually worked out on a case-by-case basis between the two participating airlines. Deregulation prescribes a more uniform allocation method based on cost prorates, i.e., an apportionment formula based on the cost of providing the service. Given the fact that the short-haul, low-density portion of the journey has a typically higher cost per seat mile than the long-haul portion, this new joint-fare formula tends to favor the commuter (compared with the previous straight mileage prorate formula). Commuters that have entered into joint-fare agreements with certificated carriers must give 90 days notice before terminating service in a market.

Larger Aircraft

Deregulation allows commuters to use larger aircraft. The freedom to use up to 60-seat aircraft--twice as large as the 1973 limit and more than three times as large as most of the aircraft in the current commuter fleet--is a very significant change. It will take time to realize the change, however, because the availability of suitable aircraft in the 20- to 60-seat category has been severely limited; the 50-seat, four-engine deHavilland Dash-7 (DHC-7) has been the only modern design in production. Deregulation has made this market much more attractive to aircraft and engine manufacturers around the world, and a substantial number of new possibilities are in various stages of commitment or serious consideration. However, it will take until the mid-1980s for new aircraft to become available.

Loan-Guarantee Program

The new legislation extends the current aircraft loan-guarantee program for five years and makes commuters and intrastate carriers eligible for the program. Congress has approved up to $650 million in loan guarantees for fiscal year (FY) 1980, with $150 million set aside for the exclusive use of commuter air carriers for up to 15 years duration toward new equipment purchases (according to L. Bond

Figure 1. Network structure paradigm.

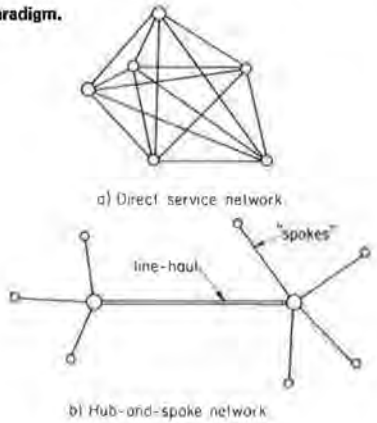
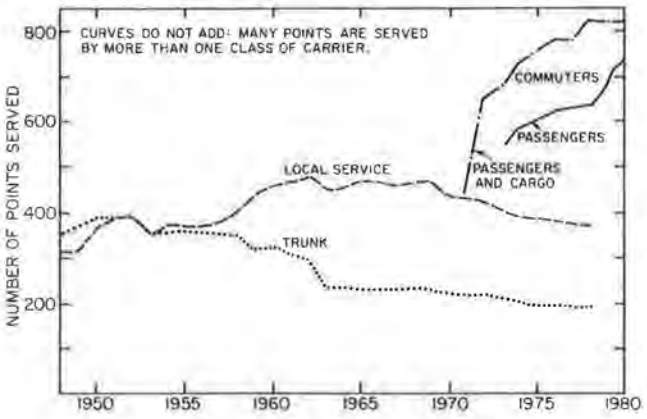


Figure 2. Points served by trunk, local, and commuter airlines.



in testimony concerning commuter airline safety and given before the Subcommittee on Oversight and Review, House Public Works and Transportation Committee, February 19, 1980). The Federal Aviation Administration (FAA), which administers the commuter-aircraft loan program, had $100 million for 1981 and has requested $100 million in the FY 1982 budget.

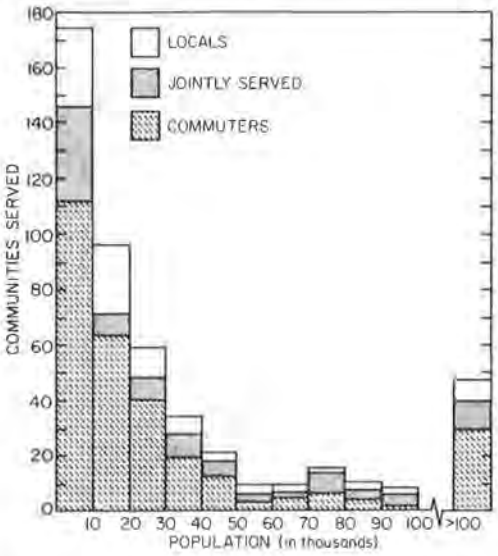
Sunset of CAB

In the spirit of deregulation, CAB regulatory authority will be reduced in stages. First, CAB domestic-route programs will be terminated at the end of 1981. Second, its regulatory authority over fares and charters will expire on January 1, 1983. Finally, CAB will cease to exist on January 1, 1985. Regulation of the small-community subsidy program will be transferred to the U.S. Department of Transportation (DOT).

NETWORK STRUCTURE AND SMALL-COMMUNITY SERVICE

It can be seen, therefore, that an elaborate set of procedures and guidelines has been put in place in the legislation to guarantee service to small communities through 1988. Are these requirements justifiable (for those who slight government regulation) or are they sufficient to ensure low-density service (for those who are concerned with service to small communities)? To answer these questions, one needs to review the dynamics of the air transportation network structure and the airline industry over the past decade in order to put the recent legislation into perspective.

Figure 3. U.S. communities served only by commuter and local-service airlines by population (Alaska excluded).



As shown in the paradigm of Figure 1, there are two idealized types of air transportation network structures: direct-service routes versus hub-and-spoke routes. Where the traffic density is heavy enough between all the origin-destination cities, direct routes are economically justifiable. In the idealized model, such service is typically provided by trunk carriers with larger equipment. In contrast, where the density is low between the origins and destinations, a hub-and-spoke network is likely to evolve, with the spokes covered by smaller equipment. This network structure allows for the aggregation (or bundling) of traffic at the line-haul link, thus allowing larger flight equipment to be used and achieving economy of scale as measured in cost per seat mile. In this latter network, the spokes are typically served by commuter airlines with the line-haul link provided by trunks. (Local-service airlines in the paradigm somehow fit in the grey area between the two idealized cases.)

Low-Density Air Service

Returning to the real world, Figure 2 (based on an internal report by J.D. Ward, Air Service to Small Communities, for the Office of Technology Assessment, U.S. Congress, 1980; and CAB Commuter Air Carrier Traffic Statistics, 1980) shows the relative points served by the commuter, local-service, and trunk airlines in North America. It also shows the relatively rapid rise in commuter service since the beginning of the decade.

Commuters typically operate on thin-density and short-stage-length routes, largely a consequence of the size of aircraft to which they have been limited by CAB rules. Eighty-seven percent of the commuter markets have stage lengths shorter than 250 miles.

Not only is the total ridership lower and the average stage length shorter compared with the trunks and most of the locals, but the traffic that moves through the airports they serve is dramatically less. The thin densities on the shorter routes also mean that the only economical aircraft would be those with relatively small seat capacity (in order to maintain a reasonable frequency of service). This also explains why only 6 percent of the markets served by the trunks and locals, with their larger and longer-range aircraft fleets, had stage lengths of less than 250 miles in 1978. Of

the 2087 city pairs served by commuters in 1980, less than 500 generated more than 10 passengers/day.

Commuters pick up some 55 percent of their passengers at small-nonhub airports and 45 percent at medium and large-hub airports. These figures imply the extent to which the hub-and-spoke network system is operating; assuming balanced flows, only 10 percent of passengers are flying nonstop from nonhub to nonhub rather than spoke-hub-spoke. The successful hub-and-spoke network facilitates the flow of traffic from small communities through the air system to the destination of the traveler via connection at a hub airport. In fact, roughly 80 percent of commuter airline traffic does connect with other carriers at such hubs.

Small Versus Medium-Sized Communities Defined

In order to gain some general sense of the size of the communities that receive this low-density service, those communities that receive only service by the commuter airlines, the local-service airlines, or both are shown in Figure 3 (from the internal report by J.D. Ward).

The figure illustrates two primary points. First, local-service airlines (in addition to commuters) are providing a substantial amount of low-density service. Some 25 percent of points that receive only one class of service were getting it from local-service airlines. Second, the number of very small communities that are receiving service is surprisingly high. Two thirds of commuter-only and 62 percent of local-service-only points were less than 25 000 in population.

There is no simple characterization of the difference between a small and medium-sized community. Perhaps small points are those that generate little traffic, where profitable service is only marginal and only small aircraft (say, under 15 seats) are appropriate. On the other hand, medium-sized points are those that can usually support profitable operations, where larger aircraft are generally preferred. This boundary seems to be on the order of 10 one-way passengers/day--the situation on some 75 percent of commuter city-pair markets. Although the correlation between population and traffic generation is very poor, this crudely corresponds to the smallest city in the city-pair markets that have an approximate population of 10 000. This characterization is very rough; there are points both much smaller and much larger that generate 10 passengers/day. By this definition, the medium-sized category ranges somewhere between 10 000 and 100 000 in population.

Growth of Commuter Service

The number of passengers on commuter airlines grew at an annual rate of 11.3 percent from 1970 to 1978 (11.2 percent from 1970 to 1979 and 9.8 percent from 1971 to 1980). The rapid growth of commuters is also shown by the number of points they serve. For example, Figure 2 shows that while commuters dramatically served more markets in the past decade, the number served by trunk and local-service airlines has decreased steadily. Note that this trend began in years long before deregulation.

There are four reasons for the rapid growth of the U.S. commuter airline industry. First, a significant segment of the population lives outside of the urban areas served by trunk airlines. As incomes have risen and as more businesses have moved to smaller communities, demand has risen for air services into low-density areas. For example, the number of stations served by commuters has increased 83 percent over the past decade, mostly in the early portion.

Second, there has been a gradual withdrawal of the local-service and trunk airlines from smaller communities as they gravitate toward larger equipment and longer stage lengths. This began to occur before the implementation of the Airline Deregulation Act. Commuters often step in to fill the void created by the departure of larger carriers, thus resulting in a comparatively faster growth rate for commuter ridership. It is also interesting to review Figure 2 again to note the similarity between the commuters in the 1970s and the local-service airlines in the late 1950s. As the locals were replacing the low-density markets created by the evacuation of the trunks in the late 1950s (2), the commuters were replacing the locals and trunks in the 1970s.

Third, entry into the commuter air transportation business is relatively easy compared with the trunk and local-service airlines. Less capital is needed to acquire or lease the smaller, often second-hand, aircraft appropriate to this type of service. Until the Act, entry and exit were unregulated. As of 1980, there are about 300 commuter airlines that provide passenger service to small communities.

Finally, integration with the primary air transportation system has been improving in recent years as the symbiotic relation of the trunk and local-service airlines with the commuter airlines has been increasingly recognized and exploited to their mutual benefit. The commuters often feed passengers to the longer routes of the locals and trunks and in return they share ticket counters, gate space, baggage handling, and reservation services at reasonable costs. Under this arrangement the commuters bring business to the trunks and locals and, conversely, the long-distance leg can partly offset the cost disadvantage of the short, low-density trip segments, depending on the fare-apportionment formula between the commuters and the trunks and locals.

COMMUTER-AIRLINE INDUSTRY

In spite of its dramatic growth, statistics show the still relatively modest scale of operation of the commuter-airline industry. In 1977, the industry as a whole reported $381 million of gross revenue from passengers, freight, and mail, which represented only 2.6 percent of that year's total domestic air-carrier revenues.

The top 50 commuters carried 85 percent of the total passengers. The remaining 15 percent was carried by 217 smaller commuter airlines. The 50th carrier, by passengers carried, was 15 times smaller than the top carrier. The five largest commuter airlines carried twice as many passengers as the second largest five.

These numbers illustrate that the commuter industry is highly disaggregated and that even the largest does not make the Fortune 500. Although one can conclude that the commuters are largely made up of small-scale entrepreneurs, the biggest carriers are sizable enough that they require relatively sophisticated management that is growing closer in pattern and style to the trunk and local-service airlines. Most commuters, however, are quite small, and most of the experienced management personnel in the commuter-airline industry are largely persons who have entrepreneurial or equity interest in the success of the airline.

In the smaller airlines, one person generally runs the airline with a minimum of staff assistance. In fact, it is quite typical for the president of a commuter airline to also be the chief pilot, having the pilot group report directly to him or her. Most of the remaining employees of a typical small commuter airline are nonmanagerial or entry-level personnel with their management career ahead of them.

More and more of the larger commuters are becoming unionized. It is expected that efforts to unionize will grow as the industry grows and matures in the coming years.

Commuter-Aircraft Fleet

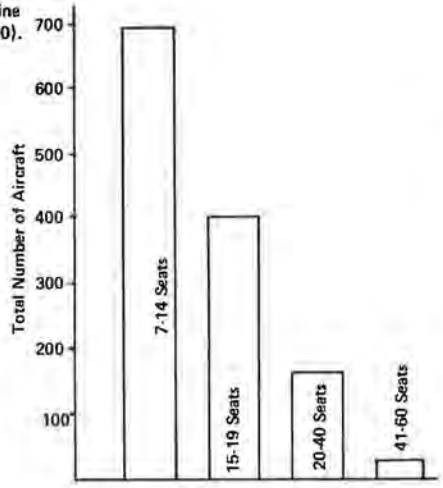
As had been pointed out, commuter airlines have been restricted since their inception as scheduled air taxis in 1952 to aircraft smaller than 12 500-lb takeoff gross weight--about 19 passengers. This restriction was for the express purpose of confining their operations to the routes that would not compete with the trunks and local-service airlines. Although the time that such competition would have been a threat to these carriers is long past, it was not until 1973 that this size limitation on the commuters was relaxed to 30-passenger aircraft.

Permission to fly aircraft up to 30 passengers--up from 19 passengers--was less significant than it might appear. First, there were no modern aircraft in this size range that have been specifically tailored to the duty cycles and requirements of the commuter market. Roughly a third of the 200 or more 19-plus-seat aircraft in the then-existing fleet were the venerable DC-3s; no other single model was represented by more than 20 aircraft. Second, FAA operating regulations require the addition of a cabin attendant at 20 seats or more, which represents an economic barrier to operate aircraft that exceed the 20-seat capacity.

Figure 4 (3) shows the nature of the 1980 commuter-airline fleet by aircraft size. It is clearly dominated by small aircraft--not a surprising circumstance given the regulatory history. Although the total number of aircraft represented in this figure is somewhat lower than the most recent fleet totals, the figure serves to illustrate the point.

The 1980 commuter-airline fleet gained 408 aircraft over 1978, of which the percentage of multiengine and turboprop in the fleet went up while the percentage of single-engine aircraft went down (4). The fleet is shifting toward larger aircraft. Given the new size freedom under the Airline Deregulation Act, this shift would probably be even more marked if suitably larger aircraft were available. In some ways, the bigger commuters are gradually evolving to become locals, many of which operate 40- to 60-seat aircraft.

Figure 4. Commuter airline fleet by aircraft size (1980).

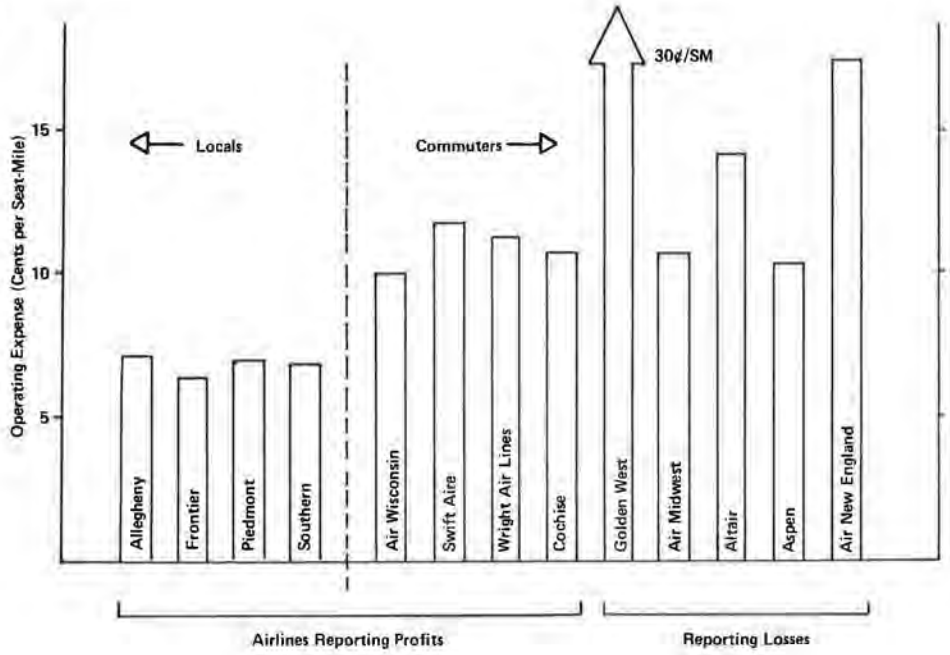


Profits and Finances

It is commonly recognized in the airline industry that as route densities and stage lengths decrease, costs per seat mile go up. It is to be expected, then, that commuter airline unit costs will be generally higher than those of either the local-service or trunk airlines and will be more sensitive to the particular route structure of individual airlines. The point is also made that costs are more variable with terminal-area delays at shorter stage lengths, so commuter costs are more variable in the face of changing operating conditions. With higher costs, the commuters' ability to make a profit at a reasonable average load factor depends on the ability to obtain higher revenue per passenger mile than the larger airlines.

The data in Figure 5 [(5), and from the internal

Figure 5. Comparison of passenger operating expenses (2nd quarter, 1979).



paper by J.D. Ward] are consistent with the above observations about costs. The figure shows the cost per seat mile for four profitable local-service airlines and nine commuter lines, four of which were profitable and five of which reported losses in the second quarter of 1979. With the costs shown, the locals were able to break even with load factors ranging from 53 percent for Southern (now Republic) to 61 percent for Allegheny (now U.S. Air). For all four, actual load factors exceeded the break-even load factors, so the airlines were profitable.

For commuter airlines there was much greater variation in revenues per passenger mile and in break-even load factors. The latter ranged from 43 percent for Air Wisconsin to 76 percent for Air New England. The very high cost of 30 cents/seat mile for Golden West was attributed to the very short stage lengths of its markets. Even with these high costs, they had the potential of being profitable: Revenues were 54.5 cents/passenger mile and the break-even load factor a reasonable 55 percent. Unfortunately, actual load factors were only 50 percent, so Golden West lost money.

The point of this is that high costs do not necessarily prevent profitability; it depends on whether reasonable load factors can also be attained at high revenues per passenger. It is true that the commuters are operating where both costs and revenues are more sensitive to external conditions than if they had longer and denser routes. The new freedom to operate larger aircraft under the Act will probably help profit stability by opening up this option.

The original investment in many commuters consists of the entrepreneur's equity position (averaging 50 percent or less of the total equity) and the investor's hard-money position. The hard-money equity investment quite often comes from a group of business people in the geographic region of the commuter airline's operation (rather than a financial giant at a remote big city) who feel that such a service will help their community grow and develop, thus helping their primary business.

J.W. Drake's paper, Estimates of U.S. Production of Light Transports for U.S. and Foreign Markets to the Year 2000 (working paper for Impact of Advanced Air Transport: Air Service to Small Communities, Office of Technology Assessment, U.S. Congress, 1980), reported an attrition rate of over 36 percent among the top 50 carriers from 1969 to 1979. The attrition rate is even greater among the smaller commuters. The dubious profitability of some commuters is both cause and consequence of typically shaky financing. As mentioned, most commuter air carriers today are capitalized on the basis of both equity investment and borrowing. In many cases, because of early losses and the comparatively capital-intensive nature of the fleet, the equity portion of the capitalization may be of negative net worth, particularly among the newer and smaller airlines.

Thus, a reasonably large proportion of commuter airlines go through one or more refinancing operations before they ultimately go out of the commuter business or become successful and stabilize their position. When such refinancing does take place, the usual pattern is for both the entrepreneur and the original investment-capital interests to subordinate their position to the new investors. The entrepreneur may lose control of the stock but in many cases may continue to have effective working control. In some instances, the new investors may simply guarantee additional loans for the company or may purchase and lease to the company more adequate or more efficient (or newer) flight equipment. In several instances, executives with extensive experience in the trunk or local-service airline business have organized as a group to purchase a controlling interest or substantially all of the equity of a commuter airline. As the Act permits larger aircraft on longer routes, this will probably improve profitability. The aircraft loan-guarantee provisions will also help financing.

SERVICE BEFORE AND AFTER DEREGULATION: LOOKING AHEAD

The new regulatory environment introduced by the enactment of the Airline Deregulation Act has permitted a readjustment over time of the market serviced by the trunks, locals, and commuters. The trunks, which receive no subsidy for low-density service, are abandoning what remains of their short-distance routes except where these short trips supply enough passengers to their high-density routes that it makes economic sense to maintain them as feeders. Although less rapidly, the still-subsidized local-service carriers are also moving away from short-distance, low-ridership service. To show why these trends are taking place, the list below gives the federal regulations that pertain to service to small communities:

1969 Birth of commuters
1972 Limit on aircraft size raised to 7500-lb payload or 30 passengers
1977 Air Cargo Deregulation (P.L. 95-163)
1978 Airline Deregulation Act (P.L. 95-504)
1979 Implementation of Federal Aviation Regulation (FAR) Part 135 (Safety Equipment) by FAA
1980 International Air Transportation Competition Act of 1979 (P.L. 96-192)
Aviation Safety and Noise Abatement Act of 1979 (P.L. 96-193)
1981 CAB Sunset Provision 1--domestic route program terminated
Prescription of FAR Part 24 (Certification Requirement) by FAA
1983 A subsidized local-service carrier may be replaced by a commuter on the basis of subsidy reduction or improved services
CAB Sunset Provision 2--expiration of authority over fares and charters
1985 Termination of subsidy to local-service carriers
Abolishment of CAB--small community subsidy program transferred to DOT
1988 Essential air service guarantee program terminates for subsidy-eligible commuters
Exemption of noise requirements terminates for two-engine aircraft (100 seats or less) service to small communities

Small-Community Service

In the two years after airline deregulation (1979 and 1980), overall passenger traffic increased 3.9 percent annually in spite of the economic recession (compared with an average annual increase of 11.3 percent from 1970 to 1978) (data from CAB Commuter Air Carrier Traffic Statistics, 1980). Meanwhile, flights become less circuitous, with more direct nonstop and one-stop flights to nearby hubs, often scheduled at more convenient hours (6). Nonhub airports experienced a 2.4 percent decline during the 1978-1981 period (compared with a 9.2 percent increase for 1977-1978). When one isolates the nonhub to large-hub market types, there was a 0.5 percent increase from 1978 to 1981 (CAB Report on Airline Service, Fares, Traffic Load Factors, and Market Shares, 1981). Considering the generally adverse economic climate during 1979 and 1980 and the air traffic controller strike in 1981, these figures speak for themselves about the effects of deregulation on air service to small communities.

Since October 1978 (and, as of June 1979), trunk and local-service airlines have proposed dropping service to 270 cities, 79 of which had no other scheduled service. At 57 of those 79 cities, commuter airlines have come in to provide service, but often with smaller planes and occasionally with less-reliable service. However, a number of medium-sized (nonsubsidized) cities find themselves abandoned by trunks and locals and are unable to attract commuters to replace the service that they have lost (7).

Based on CAB data ending December 31, 1980, there were 816 points receiving commuter-airline service (both passenger and freight) in North America. Of these points, 738 were receiving passenger service compared to 630 points in December 1979. Although such data are approached with caution, they do imply that the commuter system has expanded since the Airline Deregulation Act. In the full year from June 30, 1978, to June 30, 1979, the number of passenger markets served (i.e., city-pair combinations where direct service exists) increased about 10 percent to a total of 1888. This again increased by 10.5 percent through December 1980 to a total of 2087 (CAB Commuter Air Carrier Statistics, 1980).

Even though there is a time lag in implementing the subsidy program, the local-service airlines still have positive incentive to stay at the current number of communities because of the availability of federal subsidy. However, note that under the Act the subsidy will be eliminated by 1985. At that time, local-service airlines are expected to exit from the smaller communities in substantially larger numbers as they gravitate toward the more profitable long-haul, high-density markets. As commuters fill the void vacated by the locals, it is speculated that the subsidy paid to commuter carriers will be lower than that paid to the present locals. This is in part due to the fact that commuters will operate comparatively smaller flight equipment, which will require less subsidy to operate profitably. To date, a number of commuters have also been reluctant to obtain subsidy--in part due to their reservation about the accompanying federal regulations. On the other hand, if service expands and the commuters' attitude changes, then such a potential reduction in subsidy may disappear.

Although it is too early to judge the efficacy of the essential air service program, three facts can be identified. First, the community's desires for service have to be reconciled with the determination by CAB of essential service--a typical problem when the party that benefits is not the party that pays. Second, there have already been cases where commuter airlines have not wanted to offer service in particular markets, even with the subsidy mentioned above, partly because the subsidy level was not high enough to provide the profit they could make with the same aircraft operating in a different unsubsidized market. Third, the subsidy program for commuters is scheduled to terminate in 1988; it is unlikely that market forces alone will keep service in all these markets if that occurs.

Given that the larger commuter aircraft will be most profitable on longer and/or denser routes, it seems natural and likely that the advent of such aircraft will precipitate more commuter service on those routes. The only deterrent to such route strengthening is competition from the certified airlines that may already be operating on such routes. By the mid-1980s, however, most of the locals and all of the trunks will probably be operating all-jet fleets, so that the differences between the new 30- to 60-passenger turboprops of the commuters and 100-plus-seat jets of the locals and trunks will determine, in large measure, the relative route structures that develop for the two classes of airlines.

From the point of view of small-community service, the commuters' new ability to move to potentially more lucrative routes may be a mixed blessing in the long run. On one hand, it may improve service for some communities because they become an easy stop in an enriched route structure. Bigger aircraft are likely to improve the profitability and financial stability of the airlines simply because they can fly more profitable routes, thus improving their ability to offer good service throughout their route structure. However, it can also create a temptation for the successful commuter to abandon its less-lucrative routes and its smaller aircraft and, therefore, its service to smaller communities--particularly when the essential air service guarantee program ends in 1988. Although such action creates an opportunity for another operator to move in, it is likely to be a less experienced and less financially stable carrier.

Interline Arrangement

The joint-fare formula between major carriers and commuters has been formalized since deregulation. Based on a cost prorate basis rather than on a straight apportionment by mileage, the CAB uniform joint-fare formula has the potential of helping the commuter-airline industry. The problem that has existed between 1978 and the present is the perceived inequities in the division of the joint fare and other arrangements. Since the cost prorate method tends to be less favorable for the trunks and locals, it is anticipated that the joint-fare formula may be subject to review. There is pressure on Congress to change or eliminate the mandate. If this effort materialized, commuters could be driven out of some markets.

In spite of the unsettled status of the joint-fare program, one thing is clear: Interline cooperation is important because of the need of the major airlines to obtain the commuter feed and because the commuter enjoys the services provided by the major carrier (such as gate space, computer reservations, and baggage handling). Also, it is critical for the traveler who makes a through trip in an integrated air network from origin to destination. Interline arrangements will therefore remain as a cornerstone for small-community service provision.

Commuter-Aircraft Fleet

Commuter airlines apparently have less preference for smaller flight equipment than prior to deregulation. For example, there has been a large demand for 50-passenger turboprop aircraft (such as the Corvair 580s), the seat capacity of which is allowed under the new Act. Some of these 50-passenger aircraft (but not a sufficient number) are available on the market since they will no longer be used to serve smaller towns by the local-service airlines. Given that the Act allows for up to 60-seat equipment, traffic trends indicate there may even be newer, more efficient, and quieter types of 30- to 60-passenger turboprop flight equipment being developed and coming on the market.

Although commuters may tend to gravitate toward larger equipment in the long run, currently some of them are bound by the essential air transportation clause to serve small communities in order to receive subsidy. In the short run, with the more lucrative longer-haul markets saturated by local-service carriers, it is less likely that small-commuter airlines will be able to enter into these long-haul markets in full scale and to cross-subsi-

dize the thin-density markets with more lucrative ones. In the long run, however, this remains an area of uncertainty.

Loan Guarantees

During the two years after the enactment of the Airline Deregulation Act, an overwhelming number of commuters have not taken advantage of the FAA loan-guarantee program. In fact, the FY 1980 level of the loan-guarantee program--$150 million and $100 million for FY 1981--appears to be quite adequate in view of the number of applications. It is recognized, however, that if the loan guarantees were the only source of finance, a program of this magnitude (and the requested $100 million for FY 1982) might not be sufficient to provide the necessary incentive for a U.S. aircraft manufacturer to undertake the design and development of a 30- to 60-seat aircraft specifically suited for commuters. But a number of commuter airlines so far appear to have obtained private finance.

A consensus is shown (4) in the commuter-airline industry that the loan-guarantee program promises to be effective in upgrading the service by commuters to small and isolated communities. Loan guarantees encourage the aircraft manufacturer as well as the airline operator to serve these markets collaboratively. It enables both to make a favorable long-term commitment on new, well-designed equipment, which in turn can contribute to assuring an economically viable airline for these low-density communities.

Airline Industry Health

Compounded by an economic slowdown and the air controller strike, the airline industry has been reporting mixed performances since deregulation. As far as service to small communities is concerned, the picture is judged to be more optimistic. Local-service airlines have been performing well in the last two years. In the Brenner and Speas report (5), for example, all four local-service airlines--Allegheny, Frontier, Piedmont, and Southern--were profitable in the second quarter of 1979.

Until recently there have been doubts whether commuter airlines, with the disadvantage of low-density, short-haul markets, could be viable. Although there are too few commuter data to support sweeping industrywide conclusions, sample viability statistics such as net profit, revenue yield, unit cost, and load factor fall within a reasonable range. Let us review the example given earlier. Of the nine commuters surveyed by Brenner and Speas (5) since deregulation, the break-even load factor varied only five percentage points from the midpoint of 59 percent, with a low of 55 percent and a high of 64 percent (except for two cases that were the extremes) in 1979. The airline of highest profit performance achieved a break-even load factor of 48 percent; the airline of highest loss experienced a break-even load factor of 76 percent. Although such data cannot be generalized across the industry, they do provide some encouraging signs.

CONCLUSIONS

Air service to small and medium-sized communities is usually provided at a higher cost per seat mile than service to denser markets. Over the history of airline operations in this country, there has been a tendency for the mature airlines to depart from the low-density markets, preferring the denser routes. Thus, in spite of federal subsidy to low-density air service, this industrial dynamic has been going on for decades. For example, during the 1960s, the successful local-service airlines shed federal subsidy and graduated one class upward to become minitrunks while the successful commuters again graduated to eventually become mini-local-service carriers during the 1970s. At the very roots of the class structure were many owner-operators (third-level air-taxi services), some of which became commuter airlines. These industrial dynamics have been observed for years since the domestic airlines have been in place in the nation. They certainly have been going on long before the airline deregulation sentiments that culminated in the 1978 Act.

Although the Act is generally heralded as freeing the entrepreneurial operators from the weight of government regulation, note that it did not deregulate the commuter industry, which provides a substantial portion of the service to low-density markets. In fact, it did just the opposite. Commuters are more regulated in several ways, such as the following:

1. Commuters, which use to operate outside many of the regulations of CAB, are now subject to more scrutiny (particularly if they choose to become certificated carriers), and
2. An elaborate set of guidelines and regulations were drawn up to protect service to low-density markets under the small-community subsidized service program.

Perhaps the only relaxation of regulations is found in the freedom for commuters to operate up to 60-seat aircraft, which follows a trend set in 1972 to lift the limit of aircraft size to 30 passengers. Even this freedom often cannot be exercised by the commuters since there has been a scarcity of 30- to 60-seat aircraft in the country--particularly in view of the significant growth of commuter traffic over the last decade.

Although many of the factors that determine service provision to low-density markets were in place a long time before deregulation, a very positive step that came out of the Act was the aircraft loan-guarantee program. Even though the details and experiences of the recent loan-guarantee program have yet to be analyzed in depth, the availability of finance capital for a generally unstable commuter industry is significantly encouraging for the commuter operators at large.

The initial fear that low-density service would be severely jeopardized as a result of deregulation turned out to be unfounded, judging from the three years of postderegulation experience. The total service to small communities has remained steady amid economic recession and the controller strike, thus continuing a growth trend started almost a decade prior to the deregulation legislation in 1978. If there was a discontinuity of service, it often was found in the medium-sized (unsubsidized) communities. These communities are squeezed between the graduating classes of air carriers, in the sense that the locals and trunks desert them, thus leaving a void too large to be adequately filled by the commuters who are ill-equipped to assume the full roles previously played by the trunks and locals.

Thus, if history is to repeat itself, the industrial dynamics that govern the transition among commuters, locals, and trunks (by using increasing airplane sizes) will evolve. Perhaps a fourth level of air-taxi operators is lurking somewhere in the background as the successful commuters eventually gravitate toward large equipment (when it becomes available) and shed their unattractive thinner-density routes in the long run. It is conjectured that the void will be filled by the smaller owner-operators who, while financially not as proven as their bigger cousins, are nevertheless entrepreneurial.

On top of this, the essential air service provision of the Act will ensure service with subsidy through 1988, and the aircraft loan-guarantee program will also help to stabilize the financial picture of some commuters. Air carriers will come and go subject to the weeding process in the business world. This, together with the concomitant voids generated by graduating class dynamics, will introduce inconvenience to travelers at specific locations. But by and large, the process is likely to continue and the transition is likely be stabilized in the long run.

Major uncertainties that may discount my reserved optimism include the following:

1. Congestion at major-hub airports where commuters fly their passengers to connecting long-haul airlines, and
2. Safety regulations that govern commuters, which tend to be more stringent due to the accident records that accompanied commuter traffic growth over recent years.

The economy and the fuel-cost spiral are certainly significant factors, but they are not exclusive to low-density service alone and tend to affect all transportation modes. All these factors tend to put a damper on service to small communities if they are not taken into account in a timely fashion. It goes without saying that the provisions of the Airline Deregulation Act need to be monitored closely as time progresses. Among the key elements to be scrutinized is the essential air service program, particularly at the time when it is scheduled to terminate in 1988.

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The views expressed in this paper are strictly mine. They do not represent those of the U.S. Congress or the State University of New York at Stony Brook.

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Abridgment

Marketing Bicycle Transportation: A Critique of National Comprehensive Bicycle Transportation Program

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The U.S. Department of Transportation (DOT) bicycle transportation program, which emphasizes promotion of bicycling through advertising and education and which generally opposes separate bikeways or lanes, is reviewed. This paper finds no evidence in the existing literature and bicycle transportation experience to support the DOT position that such a program would shift substantial numbers of short-distance commuters to bicycles. This paper concludes with suggestions for DOT to improve its analysis and marketing of bicycle transportation.

In response to the National Energy Conservation Policy Act of 1978, the U.S. Department of Transportation (DOT) published Bicycle Transportation for Energy Conservation (BTEC) (1). BTEC presents a national comprehensive bicycle transportation program that strongly deemphasizes separate facilities for bicyclists and that strongly emphasizes promoting bicycling and educating bicyclists about sharing the road with motor vehicle traffic (1, p. 8; 2, pp. 33-34, 99). BTEC predicts that these policies will increase bicycle commuting from less than 0.5 million in 1975, which also included persons 14 years and older bicycling to part-time jobs, to between 1.5 and 2.5 million adult bicycle commuters by 1985 (2, pp. 83-84). This includes 15-30 percent of the 6.4 million car commuters aged 19 to 45 who do not need a car at work. Adjusting for environmental conditions further increases the proportion of the final target group shifted.

Attempting to capture such large percentages of short-distance car commuters represents an extremely ambitious marketing program that has a number of economic and social implications. This paper uses basic economic and marketing concepts along with the