

FACTORS INFLUENCING AIR TRANSPORT RATES AND FARES.

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Introduction.

Three primary choices face every transport operator: the choice of his field of operations, of a vehicle or vehicles suitable for this field, and of a rate structure that will ensure the maximum return on his activities. A secondary choice is that of the schedule to be operated, i.e., the practical application of the vehicle to the field of operations at the fare structure in force at any time. This is the scope of transport economics.

Choice of Rate Structure.

Only one of these choices is primarily economic—that of the rate structure. The others are mainly technical, with economic aspects. The rate structure, however, is determined by the application of economic principles to a particular set of circumstances, and the problems involved in applying these principles in air transport may be of some interest.

This paper outlines the principal factors influencing the general level of air transport rates and fares and discusses the economic basis for some of the many variations from the normal level. Factors likely to influence the future level of air transport rates are also considered.

Factors Influencing Rate Level.

Clearly the primary factor influencing the rate level is the level of costs. Three cost elements have to be considered: the overheads that have to be covered by the surplus of revenue over variable operating costs, the variable operating costs themselves, and the *load factor*. (The load factor, or proportion of load carried to available space, is a very important element in the cost level because it, together with the total cost per unit of available space, governs the cost per unit of space sold, and it is the cost per unit of space sold that influences the rate or fare that has to be charged.) It must, however, be mentioned that the influence of costs on the rate level is sometimes disturbed by important rigidities which, because they occur with exceptional frequency in air transport, deserve close attention in any study of the economics of this branch of transport.

On the revenue side the most important influences in the rate level are the elasticity of the traffic and the element of competition between airlines. The general rate level is also frequently modified through the application of rate discrimination with a view to the maximisation of profit—a procedure for which air transport, with its relatively small number of routings and severe limitations on competition, is especially suited.

1. INFLUENCE OF COSTS ON RATE LEVEL.

A. OVERHEADS.

Overheads are, of course, those costs which do not vary *directly* with production but only in a general way with the level of the Company's activities.

It is always a problem to distinguish overheads from variable costs in any particular instance and, as air transport is a new industry, final agreement has not yet been reached on the allocation of some items. Furthermore, a number of different costing systems exist for different purposes, in each of which the boundary between overheads and variable costs is different. We are concerned here with Budgetary Costing, i.e., the estimation of an airline's costs for a period of a year ahead with a view to the control of these costs during the year.

(It will be understood that the terminology of airline costing may depart in some respects from standard costing practice owing to its very recent development, and some of the terms used in this paper, which are those that have received temporary acceptance in airline costing, may on this account need to be revised in due course.)

Other kinds of costing used in air transport are: Aircraft Type Costing, designed to compare the performance of different aircraft types on different routes; Marginal Flight Costing, designed to provide a substantially accurate estimate of the added cost of extra flights on routes already operated; and Marginal Route Costing, designed to throw up the cost of operating each of the Company's routes, and thus the saving that would be effected if any of them were suspended.

In Budgetary Costing the following items may be considered to form part of the variable expenditure:

Marginal Flight Costs:—

- Fuel and Oil.
- Maintenance Materials.
- Overhaul.
- Handling Charges or Station Costs.
- Landing Charges.
- Catering.
- Ground Transport.

Other Variable Costs:—

- Direct Labour.
- Air Crew and Cabin Service Staff Salaries, etc.
- Aircraft Standing Charges (Depreciation and Insurance).

There is some disagreement as to the allocation of the last two items to variable costs. This is due to the fact that while aircraft standing charges and crew costs are incurred on an annual basis and will tend to be increased or decreased in proportion to variations in the annual volume of flying this relationship is affected by a number of rigidities. In the present stage of the industry's development these rigidities prevent this relationship between the

number of aircraft and crew and the flying hours operated from becoming in any way automatic and many airlines consequently prefer to treat these items as overheads, even when considered on an annual basis.

All other items of expenditure must, from a Budgetary point of view, be considered as overheads.

While airline overheads are not as heavy as those of rail companies, they are, nevertheless, heavier than might be expected in view of the fact that in air transport there is no need for any "way," for aircraft, like ships, travel through a medium which requires no capital or maintenance expenditure by airlines.

Among the reasons for the relatively high proportion of overheads in air transport are the following:—

In the first place the industry is of its nature geographically widespread—offices and stations have to be manned at a large number of widely-dispersed points, often outside the country in which the home base is situated. Secondly, the fact that much of the traffic is international involves a great increase in administrative costs because of the multifarious government regulations affecting every form of international travel. Thirdly, the much higher standard of personal service that is required as a result of the relatively small volume of total traffic travelling by air, is more costly than the lower standard normally provided by surface transport. While some of these passenger service costs are Variable others fall into the Overhead category.

With overheads as defined above generally forming from 40% to 60% of total airline costs the industry is operating under conditions of increasing returns which, in view of the high elasticity of air traffic, dealt with below, provide a considerable incentive to expansion even at the cost of reductions in the average level of the rates and fares.

Historically, air transport is now in its third stage of development. In the early stages overheads were negligible but variable costs were extremely high. These variable costs fell very rapidly during the first two decades of the industry's existence. Then, in the immediate post-war period there was a world-wide tendency to set up airline administrative organisations out of proportion to the requirements of the industry at that time. This led to a situation in which overheads, having previously been negligible, suddenly became disproportionately large. In the third stage of development which has taken place during the last four or five years the volume of production has caught up with the overheads which have remained reasonably steady and thus a balance between the two is now being achieved. As this third stage of development proceeds the proportion of overheads in the total cost diminishes and with it falls the incentive to further expansion which is naturally not now as great as it was four years ago. Nevertheless, with overheads forming roughly half of the total costs this incentive still remains an important feature of the industry and will continue to play its part in the development of the air transport rate structure for some years to come.

The overhead element in air transport costs must, therefore, be accepted as an important influence on the level of air transport rates and fares.

AIRCRAFT STANDING CHARGES AND AIRCRAFT UTILISATION—INCENTIVE FARES.

At this stage it may be of interest to digress for a moment to consider the particular impact of Aircraft Standing Charges on the expansion of aircraft utilisation, a problem analogous to that which we have been discussing. While aircraft standing charges may be considered as Variable Costs for the purpose of Budgetary Costing, their impact on aircraft utilisation is similar to that of overheads on the general expansion of a Company. ("Aircraft Utilisation" refers only to the number of hours flown by the aircraft and *not* to the proportion of space occupied within the aircraft).

The problem of aircraft utilisation arises from the fact that air transport is a service and that consequently its production and consumption must coincide. Where consumption is variable—unevenly spread throughout the day, the week or the year—wastage of costly equipment and manpower becomes unavoidable. To meet these three types of variation in the level of demand special incentive rates and fares are introduced by air companies.

1. OFF-SEASON "VALLEY."

Virtually all airlines suffer from a seasonal problem although its seriousness varies from one company to another. Some airlines avoid it altogether through their good fortune in being endowed with bi-seasonal routes. Others, particularly in North America, arrange to exchange their equipment with other companies whose traffic has its peak when theirs is at its lowest ebb. Most airlines, however, are unable to do this and are faced with a very serious problem in the form of a wide disparity between winter and summer traffic. For instance, the total of sea and air traffic between Ireland and England is approximately seven times as heavy in the peak summer month as in the valley winter month.

To meet this seasonal problem airlines introduce reduced fares in winter which make possible the achievement of a higher utilisation of aircraft during the off-season and, when allowance is made for aircraft overhaul and for staff training and leave requirements in the off-season, may even make possible almost as high a utilisation of *available* resources in the off-season as in the peak.

It is not surprising in view of the extremely seasonal nature of Anglo/Irish passenger traffic that Aer Lingus was one of the first airlines in the world to introduce off-season fares.

2. MID-WEEK "VALLEY."

The mid-week valley in air traffic is also very common—indeed, almost universal. Peak days of travel are Monday, Friday and Saturday, but Sunday services can, especially in the peak period, be easily filled with the overflow of traffic from these three days. The low traffic on Tuesday, Wednesday and Thursday is, therefore, the most serious problem, especially in the case of airlines operating tourist routes.

It is, indeed, rather surprising that so few airlines have attempted to meet this problem by introducing incentive fares for mid-week travel. These fares have proved extremely successful on Aer Lingus services, where on several routes, including the very important

Dublin/London route, the traffic is now fairly evenly spread throughout the week, with three minor peaks on Tuesday, Thursday and Saturday instead of one major one on Saturday and a minor one on Monday. Aer Lingus was the first air carrier to introduce mid-week fares in international air transport and its example has now been followed by a number of other companies faced with similar problems.

It should be noted that while the *diversionary* element in off-season fares is negligible, as very few people postpone their travel from summer to winter on account of these fares, it is a very important factor in mid-week fares. Passengers show a remarkable willingness to travel on Tuesday or Thursday instead of the week-end if this will result in any important financial saving. Indeed, there is good reason to believe that passengers are more willing to change their day of travel than to travel on an early morning flight on the day of their choice.

3. NIGHT AND EARLY MORNING "VALLEY."

The third valley in passenger air traffic occurs during the hours of darkness. To a certain extent this valley in demand is an acceptable one because it is desirable that the aircraft should be available for maintenance at some period of the day or night. However, the period during which the demand is negligible is considerably longer than that required for the maintenance of the aircraft, and it is thus desirable that it should to some extent be reduced by the creation of new traffic by incentive fares.

Incentive fares of this kind were first introduced in the United States in the summer of 1948. Aer Lingus was the first European air carrier to introduce this type of incentive fare in the form of a discount for passengers travelling on early flights, which was put into force in the spring of 1949. It was found from experience, both in the United States and in Europe, that passengers were more inclined to travel during the earlier part of the night than in the early morning, and virtually all incentive fares of this kind are now applicable to night services. Aer Lingus replaced the discount on early flights by a night service at substantially reduced fares in the summer of 1950.

Since its inauguration in 1949 the system of cheap night services in Europe has grown rapidly and the forthcoming summer will see further extensive developments in this field, with night services operating between virtually all the countries of Western Europe.

Aer Lingus, being a shorthaul carrier operating for the most part what might reasonably be termed "local routes," has been faced with exceptionally severe peak/valley problems of all three kinds and it is not surprising, therefore, that it should have pioneered the three types of incentive fare required in order to meet these problems. The Company is probably unique, however, in having set about the introduction of this three-fold incentive fare programme as part of a coherent plan, and even to-day, three years later, there are very few airlines in the world which make use of all three kinds of incentive fares.

These incentive fares, which play a very important part in achieving a high utilisation of costly equipment and staff, also represent a form of rate discrimination and will be mentioned again in this connection in a later section of this paper dealing with this aspect of the subject.

B. VARIABLE OPERATING COSTS.

Variable operating costs are especially important in the early stages of a new industry as has been pointed out above. However, as with technical advances the vehicle develops towards its optimum efficiency, the emphasis shifts from the production side of the industry to the sales side. Air transport is now reaching this stage.

In the early years of development variable operating costs fell very rapidly as the size and speed of aircraft grew—for size and speed are the two most important factors in variable operating costs. Now the size of commercial aircraft has reached a point beyond which it can develop with difficulty, if at all, and the diminishing utility of higher speed is beginning to affect the urgency of further development in this field which, in any event, is likely to be retarded by the Sonic Barrier when commercial aircraft reach the 600 m.p.h. stage as they will in the not very distant future.

The diminishing utility of speed from the operators' point of view is governed by the fixed turn-round time of the aircraft on the ground and the relatively fixed time of the landing and take-off cycle. The effect of these two factors is best illustrated by the table below, which shows how small is the increase in the number of round trips per day that can be operated over varying stage lengths up to 1,400 miles as a result of increases in cruising speed. An important factor in this is, of course, the effect of scheduling rigidities. The minimum unit is a half-round trip, and as it will be seen that the maximum number of round trips per day on some stage lengths below 1,400 miles is two, it is obvious that improvements in speed will often fail to produce any increase in the amount of flying that can be done within the limits of the working day, which for the purpose of this table is taken at 15 hours.

TABLE 1

Maximum Number of Round Trips per day.

(Turn-round time 45 minutes at each landing, i.e., 1 hr. 30 mins. per Round Trip)

Cruising Speed	NUMBER OF ROUND TRIPS						
	200 Mile Stage Length	400 Mile Stage Length	600 Mile Stage Length	800 Mile Stage Length	1000 Mile Stage Length	1200 Mile Stage Length	1400 Mile Stage Length
700 m.p.h.	5½	3½	3	2½	2½	2	2
600 m.p.h.	5	3½	3	2½	2	2	2
500 m.p.h.	5	3½	3	2½	2	2	1½
400 m.p.h.	4½	3	2½	2	2	1½	1½
300 m.p.h.	4½	3	2	2	1½	1½	1
200 m.p.h.	3½	2½	1½	1½	1	1	1
200 m.p.h.	3½	2½	1½	1½	1	1	1

FREQUENCY RIGIDITIES.

Rigidities of this kind affect the impact of variable costs on fares in a number of other ways because, quite apart from the limitations on the number of round trips which an aircraft can perform in a day, it also follows from the general long-haul nature of air transport that the frequency of the service on each route tends to be fairly low, although it is nearly always higher than that of competing surface transport services on the same route. (This distinction

between the low frequency of air transport services as compared to transport services generally, and their high frequency as compared to surface transport services *on the same routes*, is very important.)

The disparity between air and surface frequencies on the same routes arises from the fact that in the early stages of air transport the size of the vehicle was technically limited to such an extent that, even in order to carry the very small proportion of the traffic at that time travelling by air, the frequency of the service had to exceed that of surface transport. This established a tradition of high frequency air services which became one of the major attractions of air transport. As the size of aircraft grew so did the popular demand for air transport, thus maintaining the need for a higher air frequency. Limitations on the further development of aircraft size will tend to cause an increasing disparity between air and surface frequencies as the proportion of traffic travelling by air continues to grow rapidly.

The establishment of this tradition of relatively high frequency air services has meant that when airlines came to inaugurate services on routes where the volume of traffic was relatively small, they experienced a public demand for a relatively high frequency of service and considerable consumer resistance to the operation of services at a frequency even similar to that of surface transport on the same routes. As the operation of small aircraft is inherently uneconomic it frequently follows that the capacity that has to be offered on such routes in order to provide the minimum acceptable frequency exceeds by a considerable margin the required capacity.

These frequency rigidities are important because they distort the influence of variable costs on the economic level of fares and rates in a number of different ways, of which the following are examples:—

1. In certain cases, as a result of rigidities both in the minimum frequency and in the size of the aircraft, it may prove more profitable to introduce fare reductions with a type of aircraft theoretically less economic than with a plane whose operating costs per unit of production are lower. For instance, on a route where the average traffic is 20 passengers per day it is suggested that a 26-seater aircraft, with slightly lower operating costs per ton-mile or per seat-mile, should be substituted for a 17-seat machine at present operating twice daily. If the fare were retained at its present level the new aircraft might carry the traffic with one flight daily, which would obviously produce a considerable reduction in expenditure, possibly accompanied by some loss of revenue due to the reduction in the frequency. If, however, the fare were reduced by 15% on the grounds that a more economical type of aircraft had been introduced, the traffic might be expected to increase by, perhaps, one-third—which would necessitate the operation of an additional daily service with the new type and, consequently, the doubling of the expenditure. In these circumstances the fare reduction would almost certainly lose money for the company.

On the other hand, if the fares had been reduced by this amount while retaining the older and more uneconomic type in service no additional flights would have been required, as virtually all the new traffic could have been carried in the many vacant seats available. Consequently, expenditure would have remained unaltered and the fare reduction would have proved well worth-while. A further

factor favouring the retention of the older and theoretically less economic type of aircraft is the fact that, being smaller, it provides a higher frequency and would, consequently, tend to attract more traffic.

Thus, a fare reduction with the less economic type of aircraft would have proved a paying proposition, while with the introduction of a new and theoretically more economical plane this fare reduction would become a source of loss.

While this example has been especially chosen to illustrate this point it frequently happens that on low frequency air routes rigidities of this kind may exercise an important influence over the choice of equipment, and great care must always be taken to ensure that general economic principles are not applied without a careful study of the circumstances of the particular case.

2. As was mentioned above, on many air routes there is a substantial volume of surplus capacity—at least at certain times of the year, caused by the combination of a high minimum frequency and a high minimum aircraft capacity. Where this happens there is a powerful incentive to a fare reduction which must prove profitable whenever elasticity exceeds unity, as additional traffic can be carried at virtually no extra cost. The operation of this factor may be seen in the introduction of especially low winter bargain fares on Aer Lingus provincial routes this winter.

3. When a route is being operated at a minimum frequency, i.e., at the lowest frequency that will satisfy substantially the traffic demand, increases in costs may not affect the rate level. This is true because the justification for increasing rates in the face of rising costs is the fact that, as a result of the increase in costs, the amount of the saving in production costs that will follow the drop in demand caused by the rate increase will come to exceed the loss of revenue caused by the fare increase. An example will make this concept clear:—

TABLE 2

Price	Demand	Revenue	Overheads	Variable Cost per Unit	Variable Cost	Total Cost	Profit
£		£	£	£	£	£	£
8	1,400	11,200	3,000	5	7,000	10,000	1,200
9	1,200	10,800	5,000	5	6,000	9,000	1,800
10	1,000	10,000	3,000	5	5,000	8,000	2,000
11	800	8,800	3,000	5	4,000	7,000	1,800
12	600	7,200	3,000	5	3,000	6,000	1,200

TABLE 3

Price	Demand	Revenue	Overheads	Variable Cost per Unit	Variable Cost	Total Cost	Profit
£		£	£	£	£	£	£
8	1,400	11,200	3,000	6½	9,100	12,100	—900
9	1,200	10,800	3,000	6½	7,800	10,800	—
10	1,000	10,000	3,000	6½	6,500	9,500	500
11	800	8,800	3,000	6½	5,200	8,200	600
12	600	7,200	3,000	6½	3,900	6,900	300

It will be seen that in this example the optimum rate (i.e., the rate which produces the biggest profit) rises with the increase in variable costs from £5 to £6 10s. per unit. When the variable costs are £5 per unit the optimum fare is £10, but when these costs increase to £6 10s. the optimum fare is somewhere in the region of £11.

This movement in the optimum fare is determined by the increased value of the saving in variable costs which would follow an increase in the fare. In both cases the loss of revenue following the increase in the fare from £10 to £11 would be £1,200, but in the first case where the variable unit cost is £5 the decrease of 200 in the number of passengers constitutes a saving of only £1,000 in the variable costs. When the variable cost per unit rises to £6 10s. this saving becomes £1,300, and thus more than covers the loss of revenue.

It follows from this that if the volume of production cannot be reduced in response to the fall in demand caused by the higher fare, the increase in the fare will not be justified. Air transport being a service with an element of wastage within each unit of production, it is not always possible to reduce production following the fall in demand, and this is particularly true in the case of low frequency services such as are operated on the great majority of world air routes.

Thus an increase in variable costs on the Aer Lingus Dublin/Glasgow route in winter could not justify an increase in the fare unless the cost increase were exceptionally large, because this route is operated at a minimum frequency of one service on weekdays, and any reduction in this frequency would have a disproportionately large effect on the volume of traffic demand. Consequently, as no saving in variable costs could be effected on this route following the drop in demand that would be caused by the introduction of this higher fare, its introduction could not be justified unless, of course, the fare increase would have been justified independently of the increase in costs.

It will also be noted from an examination of the above table that increases in overhead costs cannot justify increases in the fare level, although they can, of course, turn the overall profit into a loss and thus make it uneconomic for a company to continue operating. The impact of overheads on the rate level is thus limited to their influence on increasing returns.

It is clear from these examples of the impact of frequency rigidities on the optimum level of fares and rates that the relationship between variable costs and fares is by no means automatic in the air transport industry, partly because of the nature of the industry—a service whose product is non-homogeneous, the unit of production comprising a number of units of sale which may be disposed of in varying proportions—and partly because of the relatively undeveloped state of this industry which involves the operation of a very large number of routes at minimum frequencies.

As the industry develops, and with it the frequency of services on air routes, it may be expected that the impact of these rigidities on the fare structure will tend to diminish.

C. LOAD FACTORS.

It has already been pointed out that the load factor in air services, i.e., the proportion of available space sold, plays a vital rôle in determining the cost per unit carried. In transport, as in the

entertainment industry, the fact that the units of production and sale do not coincide means that the wastage inherent in any kind of service is not due solely to a gross error in the prediction of demand but occurs rather within the unit of production which is usually only partly consumed.

It has already been pointed out that load factors are low in some cases because the combination of the minimum frequency and the minimum economic size of the vehicle produces a capacity in excess of that required on the route in question. A low load factor of this kind will cause the cost per unit carried to be higher than on other services where a larger proportion of the total space is utilised.

It is rarely desirable, however, to achieve a very high load factor such as 90 to 95 per cent., because, owing to the day to day variations in traffic demand, it will nearly always be impossible to achieve such a load factor without turning away a considerable volume of traffic owing to lack of adequate capacity at certain times and on certain days. Recognising the undesirability of a situation in which a company is permanently unable to cater for the demand on its services, it has until recently been generally accepted among airlines that a load factor of 65 per cent. represents the optimum figure. More recently, however, a closer study of this problem has shown that in most cases it is possible to achieve substantially higher load factors than 65 per cent. on routes where the total frequency exceeds, perhaps, three services per day.

It is, in fact, true to say that the level of the optimum load factor varies with, and increases with, the frequency of the service on the route in question. On a route where one service a day is operated the addition of an extra service involves an increase of 100 per cent. in the capacity offered. Where ten services a day are operated however, the addition of an extra service involves only a 10 per cent. increase in capacity. It is obvious from this that the higher the frequency the greater the possibility of a more delicate adjustment of the capacity to meet the demand and consequently the greater the possibility of achieving a higher load factor without turning away any traffic.

Aer Lingus is particularly well placed in this connection as the frequency of its routes is exceptionally high for the Eastern Hemisphere. Three of the eight European routes with the highest frequency of services are operated by the Irish company. As a result of very careful scheduling of the aircraft and a constant control over the day to day operation of the services, Aer Lingus has achieved an average passenger load factor on all its services of 75 per cent. in the first ten months of the current financial year, and it seems likely that it will even be possible to achieve a slightly higher load factor without the loss of any traffic except in the peak weeks of the summer, through further developments in the technique of scheduling and subsequent schedules control.

The importance of this development can best be measured by the fact that an airline whose revenue and expenditure are equal at the 65 per cent. passenger load factor—the target originally accepted by most companies—could achieve a 15 per cent. profit on its turnover by increasing this optimum load factor to 75 per cent., as Aer Lingus has done.

Apart from the frequency of the service on any particular route another important influence on the optimum load factor is the number

of units of sale in each unit of production, i.e., seats per aircraft in the case of air transport. The larger the number of seats in an aircraft, the more difficult it will be to achieve a high load factor. On the other hand, as variable unit costs tend to be lower with larger machines, a high load factor is in these cases less vital to economic operation.

As has already been mentioned, the aircraft capacity is often unsuitable for the route operated, with the result that it is not possible to achieve the optimum load factor. This can be due either to the minimum aircraft size, in combination with the minimum frequency, being too large for the route in question, or to the total aircraft capacity available for the route being inadequate for its requirements. In either case the fact that the load factor is not at the optimum level must be considered in any economic study of the route, as a load factor below the optimum level will tend to encourage higher fares, and one below the optimum level will, as has already been mentioned, tend to encourage a reduction in the fares.

RATE AND FARE VARIATIONS BASED ON COST OF SERVICE CONSIDERATIONS.

Hitherto we have been examining the impact of cost considerations on the general level of rates and fares, except in the special case of incentive fares used to increase aircraft utilisation. Mention must now be made of certain special discounts and surcharges whose existence and operation is governed by considerations of the cost of service. Among these cost of service discounts and surcharges may be mentioned: Sleeper and Luxury surcharges; Common Interest Group Travel Discounts; Directional Fares; and, most important of all, Tourist Class Services.

(1) *Sleeper and Luxury Surcharges.*—The surcharges for sleepers on particular aircraft and for certain luxury flights on trunk routes are governed by considerations of the cost of the service provided, although in the case of the sleeper service, where the number of passengers that can be carried may be reduced by as much as half, the additional revenue from the surcharges may be quite inadequate to cover the additional unit cost involved, because sleeper competition between airlines is extremely severe and has forced rates down below the economic level.

(2) *Common Interest Group Travel Discount.*—This type of discount, which is available on all international air services and most domestic routes, is designed to encourage groups, such as football teams, schools, etc., to travel by air. This group travel ensures higher load factors and lower unit costs of operation.

(3) *Directional Fares.*—Passenger traffic is frequently heavier in one direction than in another on certain routes at certain times of the year, and in many cases cargo traffic is permanently unbalanced in this way. The jointly produced space thus created on these routes justifies the introduction of cheaper directional fares and rates for both passengers and cargo. Fares and rates of this kind apply on many trunk routes between Europe on the one hand and Africa and Asia on the other.

(4) *Tourist Class Services.*—Tourist fares, which will be introduced on trans-Atlantic routes next May, are lower fares charged on flights

operating with a higher seat density and, consequently, with a lower unit cost and a lower standard of comfort. More frequent refuelling stops may be made on these services than on normal flights and free meals, "give-aways," etc., will be eliminated, thus further reducing the cost. Finally, owing to the higher load factors which it is hoped to achieve on these services as a result of the lower fares, unit costs will be further reduced. These tourist fares are thus based primarily on cost of service, consideration, the aim being to maintain virtually the same relationship between expenditure and revenue on these services as on normal flights.

2. INFLUENCE OF REVENUE FACTORS ON RATE LEVELS.

On the revenue side the most important influences on rates and fares are the Elasticity of Demand and Competition from Surface Transport and Other Airlines.

A. ELASTICITY.

Elasticity of demand is high in air transport because of the existence on virtually all air routes of a cheaper substitute offering, in general, a lower standard of service, and because air transport creates a new type of travel demand which can be satisfied to an increasing extent as fares are reduced.

While at present, and for some time to come, a very large proportion of new air traffic must take the form of a diversion from existing surface transport facilities, it is probable that in the long run the new travel created by air transport will tend to exceed the volume of diverted traffic, particularly on long-haul routes. For example, on the North Atlantic trunk route, which is perhaps the foremost long-haul route in the world, a completely new type of holiday traffic has been created because air travel makes it possible for Americans with limited periods of holiday leave to visit Europe and see something of the Continent during the short time available to them. On the other hand, businessmen who cannot afford to spend ten days to a fortnight in crossing and re-crossing the Atlantic make the journey by air because they lose less than two days in the process. So far as the first category—holidaymakers—is concerned, elasticity is exceptionally high because of the general correlation between the length of the individual's annual leave and the size of his income. Passengers who, owing to the limited extent of their annual leave, are unable to make long holiday journeys except by air, also tend to attach great importance to the level of the fares charged and they consequently react sharply to variations in the fare level.

It is very difficult to determine the true level of elasticity on any air route because of the seasonal nature of the traffic and the extreme sensitivity of air transport to variations in the general level of economic conditions. No satisfactory calculation of the effect of an alteration in the fare on the volume of the traffic can be made until a year has passed and the cycle of traffic has returned to the point at which the fare alteration was introduced. Unfortunately by this time the whole level of air traffic may have been altered by 20 per cent. or 30 per cent. as a result of a change in general economic conditions.

(The effect of economic conditions on the level of demand for air

transport is a subject that requires considerable study because the response of traffic to inflationary or deflationary conditions is by no means straightforward or automatic and there are many unexplained patches of prosperity and depression in the industry which cannot easily be connected with general economic conditions as measured by any of the accepted indices.)

The estimation of the degree of elasticity is thus largely a matter of guesswork. Years of experience with the workings of the industry will be required before it can be accurately estimated and forecasted. It is known, however, that it varies considerably as between different air routes and as between different seasons of the year, tending to be higher on summer services and on holiday routes, and lower in winter and on routes where the traffic is predominantly of a business nature. It is also affected by the proximity of the air fare to the rates charged by the substitute—surface transport. Where surface transport rates are very much lower than those charged on air services, elasticity will tend to be low, rising as the air fares themselves are reduced.

Although "void for uncertainty," an estimate of the elasticity on Aer Lingus services may be of some interest. It is no more than a guess based on experience in a limited period, during which economic conditions have undergone a number of sharp fluctuations which have been aggravated in the case of transport to and from Ireland by the imposition or withdrawal of currency restrictions. The best guess that can be made is that on most Aer Lingus routes the elasticity appears to be between 2 and $2\frac{1}{2}$ —that is to say, a 10 per cent. reduction in the fare would, it is estimated, produce a 20 per cent. to 25 per cent. increase in the number of passengers carried.

The relatively high elasticity of air traffic, and the fact that the industry as a whole is operated under conditions of sharply increasing returns, suggests that the general rate structure might profitably be further reduced, but shortage of aircraft and air crews, in the face of a growing demand for air transport, makes it impossible for this to be done at this stage. Other factors keeping air fares above their probable natural level are the virtual absence of competition between airlines, so far as rates and fares are concerned, and the psychological impact of increasing costs on airline executives, even when the rigidities outlined above make costs and fares independent in many cases.

B. SURFACE TRANSPORT COMPETITION.

Proportion of Traffic Travelling By Air.

Quite apart from the impact of the surface transport substitute on the level of the elasticity of demand for air transport, the level of surface rates and fares is one of the most vital *direct* influences on air fares and rates. Before discussing this in detail something should be said, however, of the general proportion of air and surface transport traffic on various kinds of routes.

The proportion of traffic travelling by air depends upon a number of factors. In general it may be said that the proportion is highest on routes crossing water where surface transport offers a slow, though

comfortable, alternative, and that trans-oceanic routes on which holiday traffic predominates tend to have an exceptionally high proportion of air traffic owing to the influence of the limitations on annual leave mentioned above.

If the total volume of trans-oceanic traffic is small it is possible that air transport can capture all of it, because its attractions may be sufficient to draw a large enough proportion of existing passengers away from the shipping services to put these out of business. This has actually happened on the trans-Pacific route between North America and Australasia, where the pre-war surface transport operator has had to suspend its services in the face of competition from three air carriers.

A holiday route on which virtually all the traffic now travels by air is that between New York and Puerto Rico, where the proportion of air traffic in 1950 was 96 per cent. It is interesting to note that in this case a substantial volume of non-tourist traffic, largely consisting of Puerto Rico emigrants, is catered for by non-scheduled carriers operating at extremely low fares with very high load factors and a low standard of service.

On the trans-Atlantic route almost half of the total traffic now travels by air and it is anticipated that, with the new air tourist fares, this proportion may come to exceed 50 per cent. this year.

On short-haul cross-Channel routes the proportion of traffic travelling by air is generally between 15 per cent. and 25 per cent. Across the English Channel approximately 25 per cent. of the passengers travel by air owing to the high surface transport fares, which are, in fact, exactly twice as high as those in force across the Irish Sea. (The fare between London and Paris, 2nd class, works out at 6d. per mile, whereas that between London and Dublin, saloon on the boat and 3rd class by rail, is only 3d. per mile.) Across the Irish Sea the proportion of air traffic has been in the region of 15 per cent., owing to the relatively unfavourable relationship between air and surface fares caused by the exceptionally low surface rates on these routes. Another factor is the existence of a number of surface transport routes, those from Cork, Waterford and Rosslare to Fishguard, with which no air transport service is in competition. Thirdly, the extreme seasonality of the traffic favours the surface transport carriers, whose vehicles are both large and relatively flexible so far as capacity is concerned. Finally, there is the relatively low earning power of the majority of the passengers, most of them originating in Ireland and the North of England. On routes across the English Channel the bulk of the traffic originates in London and the South of England, where the standard of living is much higher.

The type of route on which the proportion of traffic travelling by air is lowest is that competing with overland forms of transport. Thus, on routes within the Continent of Europe the proportion of air traffic sometimes falls as low as 4 per cent. or 5 per cent. and rarely exceeds 10 per cent.

Direct Influence of Surface Fares on Air Fares.

As was mentioned above, an examination of the air fare structure on different kinds of routes in various parts of the world indicates that one of the most important influences on the level of air fares

and rates is the level of surface transport fares. For example, on routes between the Republic of Ireland and Great Britain, where one company has a virtual monopoly of all air services, the fares and rates are 30 per cent to 50 per cent lower on a rate per mile basis than those between Great Britain and the Continent, where a number of different airlines are competing against each other for the traffic.

However, the relationship between air and surface fares does not tend to be constant. The lower the surface fare the wider the gap between them and the lower the proportion of the total traffic travelling by air. Thus on the North Atlantic route, where 2nd class surface transport fares are in the region of 5½d per mile, air fares are competitive and, owing to the long distance involved, a very large proportion of the traffic goes by air. At the other extreme on intra-European routes, where the 2nd class surface transport fare is in the region of 2d to 2½d per mile, air fares fail to be competitive and the proportion of total traffic travelling by air is consequently small.

C COMPETITION BETWEEN AIRLINES

As has already been mentioned the element of competition between airlines has a relatively small effect on the level of fares and rates. This is because competition between airlines is carefully controlled and, so far as rates and fares are concerned, is in fact virtually non-existent.

The virtual absence of fares and rates competition in air transport is the result of a number of different factors. More than in any other form of transport Governments have felt it necessary to intervene here in order to protect the public against cut-throat competition. Secondly, airlines are strategically and economically important to States. This brought about State intervention during the early development period when the industry was uniformly uneconomic and many private companies were in danger of financial failure. Finally the air transport industry developed at a time when private speculation and investment was, perhaps, less widespread than in earlier periods, and when the theory that public utilities should be controlled and owned by the State was gaining widespread acceptance.

State intervention caused by these factors has led in many countries to the formation of "chosen instrument" airlines, generally wholly or partially owned by the State, and thus to the elimination of competition between air companies on domestic routes.

However, air transport has, particularly in Europe, been predominantly international in character owing to the relatively long-haul nature of the routes operated and the small size of States in Europe and many other parts of the world outside the U.S.A.

It is inevitable that Governments should also seek to control competition on these international routes in order to avoid excessive losses by their "chosen instruments" and the restriction of competition in regard to fares and rates during the post-war period has been achieved by the partial delegation by Governments of their authority over international fares to the organisation of air carriers.

known as the International Air Transport Association, each Government retaining, however, the right to disapprove any fare agreed, a right which most Governments exercise sparingly, if at all, because of the initial element of control involved in their ownership of many of the airlines concerned

This formula for the agreement of fares and rates was devised at a conference at Bermuda in 1946 which sought to reconcile the opposing views of the United Kingdom and the United States, whose disagreement on the issue of free enterprise v economic control of air transport had caused the failure of the earlier conference at Chicago in 1944 to reach agreement on this subject

I A T A is, in fact, a kind of Cartel in which, however, there is a right of free entry for new members. This right of free entry is, however, sometimes vitiated in practice by the fact that virtually every country in the world is already represented in this organisation, and the Governments of these States are often reluctant to permit additional carriers based in their territories to operate new international air services competitive with those of their "chosen instrument"

It is virtually certain that the existence of I A T A has led to a relaxation in the rate of fall of air fares—a fall which has continued since the industry was founded 30 years ago. However, there seems to be no alternative to this type of economic regulation of fares and rates, which is in the public interest in so far as it ensures both the safety of air transport operations and the financial stability of the world's airlines

If I A T A did not exist air fares and rates would in all probability oscillate very widely as the market sought its natural level, just as air charter rates have in recent years varied enormously from time to time with the entry into this type of business, and subsequent liquidation, of a large number of companies. Such instability would obviously be undesirable. The problem remains, however (as in every other form of nationalisation) of establishing some kind of independent tribunal which could protect the public interest in cheap air transport from the natural anxiety of Governments owning air companies to minimise their losses, both in these concerns and in the provision of technical and meteorological facilities for air transport

It is only fair to state at this stage that Aer Lingus's monopoly of cross-Channel air services has had the opposite effect to what might have been anticipated. Owing to the extremely low cost of surface travel on these routes air fares have been forced down to a very low level, and the absence of any air competition has made it possible for the Company to obtain acceptance from I A T A for these fares and rates which, if the routes had been shared with any other operator, might have been very difficult to achieve

Other factors favouring the introduction of lower air fares across the Irish Sea have been the country's geographical position at a corner of Europe (as a result of which the air fares and rates charged by it have relatively little impact on through fares and rates that might be of interest to other companies) and the willingness of successive Irish Governments to give the company freedom in management—a freedom which, it may reasonably be claimed, has been used with some imagination.

D. TEMPORARY INFLUENCE OF AIRCRAFT AND CREW SHORTAGE.

It has already been mentioned that a factor deterring air companies from reducing their fares at present is the shortage of equipment and air crews. This shortage is due to the current re-armament programme which has slowed down the production of aircraft, reduced the number of crews available for service in civil airlines, and increased the volume of demand for air travel.

This, it may be hoped, is a temporary influence which will work itself out as conditions return to normal.

RATE DISCRIMINATION.

Mention must now be made of some of the variations in the level of fares and rates introduced by airlines with a view to maximising their profits or minimising their losses, i.e., variations determined by considerations of value of service. The use of incentive fares in order to divert passengers from peak to valley periods has already been mentioned and it has been pointed out that these fares have a secondary function—discrimination between different classes of air passengers according to their ability and willingness to pay.

Rate discrimination is common in most industries operating under conditions of imperfect competition and many examples of it are to be found in other forms of transport. It is, however, exceptionally widespread in air transport owing to the relatively small number of points served, which makes it feasible to introduce a complex rate structure without producing an inordinately large total number of fares and rates.

The difficulty in applying rate discrimination in passenger air transport is the homogeneity of the human race which makes it impossible to distinguish accurately between the financial status of individuals except in certain parts of the world where racial and economic differences coincide. In order to get round this problem a variety of discounts are introduced, each designed to apply to some group of individuals who, on the whole, are less likely to be able to pay the full fare. The following are examples of some of these discounts:—

(1) *Round Trip Discounts.*—A discount of 10 per cent. (5 per cent. on inter-State services within the United States) is offered by airlines on return tickets. This represents a form of discrimination in favour of persons returning to the point from which they began their journey.

(2) *Maximum Validity Return Tickets.*—Excursion fares with maximum validities of 17, 23 days, etc., discriminate against passengers remaining away for long periods, who are assumed to be better able to pay a higher fare than those staying away for a shorter time. A special form of maximum validity return fares are “Special Event Fares”—reduced fares with very limited validities available to passengers attending trade fairs, congresses, etc.

(3) *Minimum Validity Return Tickets.*—These exist only on a few routes where much of the traffic consists of people travelling for long periods of annual leave. This type of fare represents a discrimination in favour of annual leave traffic and against short validity business travel.

(4) *Student Fares*.—These fares, available only to persons attending full annual courses at recognised schools or universities, are a form of discrimination in favour of students, who are generally unable to afford the higher normal air fare and whose parents are often in the same position.

(5) *Family Fares*.—These fares enable a man to bring his wife with him at a reduced rate. Men who already have to pay their own fare might find difficulty in paying the full normal fare for their wives as well. This type of fare is not generally available.

(6) *Inclusive Tour Fares*.—These are reduced fares offered to travel agents for the construction of Inclusive Tours which, it is hoped, will attract passengers who would not face foreign travel independently.

(7) *Class B Fares*.—These fares, which exist in South-Eastern Europe, the Middle East and in the French Union, are an extension of the principle of class of travel employed in rail transport, but they differ from the tourist fares now being introduced across the Atlantic in that they are not based on the cost of service but rather on the value to the passenger of the standard of service provided. Class B fares are reduced fares available on less advanced types of aircraft. Their introduction is designed to protect the interests of local carriers against competition from through carriers operating long-haul services with first-class equipment through the areas involved.

(8) *Value of Service Cargo Rates*.—Among cargo rates governed at least partially by the application of rate discrimination are the surcharges for valuable consignments, the higher rates for small consignments and the commodity discounts for various types of cargo travelling regularly on different routes. These commodity rates are an interim measure designed to attract a reasonable volume of cargo to air transport while a complete classification system, similar to that employed by the railways, is being drawn up.

Mention has already been made at an earlier stage of directional fares as applied both to passenger and cargo services. These are especially important in the case of cargo traffic owing to the fact that, while passenger traffic is rarely consistently uni-directional in trend, cargo traffic frequently suffers from this tendency.

The justification for directional fares is the joint production of part of the space on the light "leg" of the journey. Another form of Joint Production also occurs in air cargo transport, however, i.e., the joint production of freight space on board passenger aircraft. No solution has yet been found to the problem of integrating the jointly produced cargo space on passenger aircraft, limited both in total quantity and in capacity on each aircraft, and the cargo space on all-cargo aircraft, unlimited in quantity and to a large extent unlimited in capacity per aircraft, but having to bear the full cost of the operation of the aircraft. It is difficult to envisage a rate structure in which cheap rates are available for small quantities of space in limited supply with dearer rates for larger capacities available in unlimited quantities. Possibly some form of priority air parcel post will, in the future, help to solve this problem.

THE FUTURE.

It is difficult at this stage of development to forecast future trends because the industry is in the throes of entering on a new period of development, both technical and commercial.

On the commercial side the introduction of turbine aircraft will involve a much wider disparity than hitherto between the speed, comfort, etc., of different aircraft types, and will encourage differentiation between the fares and rates charged for travel on different aircraft types on the same route. Even before these new technical developments appear on the scene we have already begun experiencing on the commercial side the development of a system of rate differentiation based on the seat density of the aircraft, viz., tourist services. A further major factor on the commercial side has been the development during the last few years of reduced fare night services designed to increase aircraft utilisation.

It remains to be seen how these different factors will eventually be combined to provide a co-ordinated and stable fare structure and how, on the air cargo side, a rate structure can be devised which will integrate jointly produced cargo space on passenger aircraft with cargo space on freighter aircraft which must bear the full burden of the cost.

So far as air services are concerned it seems probable that the general level of fares, at least outside the United States and Australia, where air transport is most fully developed, will fall still further, although whether this further reduction will take the form of an actual reduction in the cash price of air transport, or of the maintenance of the existing fare level under inflationary conditions, in which the cost of other forms of transport is rising, will, of course, depend upon the rate at which prices rise and the value of money depreciates in the years ahead.

On low frequency routes it is possible that further developments in the rate structure may be largely limited to such a general reduction in the fare level, but on routes where the frequency is high enough to justify a more complicated system it is likely that normal tourist and night services will operate together, possibly competing in certain cases against long-haul carriers operating through the area and offering a higher standard of service for which, however, a surcharge might be payable.

Whatever the ultimate solution to the problem of creating a stable and economic rate structure, it seems certain that the years immediately ahead will see commercial developments in the air transport industry of equal importance to the technical developments that have taken place during the last decade.

CONCLUSION.

In this paper I have tried to outline the principal factors influencing the general level of air fares and rates and the discounts and surcharges involved. The problems are complex and suffer from the fact that hitherto they do not appear to have attracted the attention or interest of economists, so that their solution has been left to the empiricism of airline officials who naturally find it difficult at times to take a broad view of a subject in which attention to detail is so vital.

This paper is designed, therefore, to draw attention to some of these problems and to elicit constructive criticism of the airlines' present approach to them.

DISCUSSION.

Mr. E. McCarron.—In proposing this vote of thanks I want to pay a tribute to the work which is done by Mr. FitzGerald and his colleagues in the Research Department in Aer Lingus. An accountant can tell whether we make a profit or loss, but it takes a skilled economist to tell why we make a profit or a loss, and it takes a more skilled one still to foretell the circumstances in which we will make profits or losses in new ventures or in new rates. In the Research Department the young economists of Aer Lingus have made a big contribution to the successful planning of operations, and if they had been consulted earlier and oftener very big sums of money might have been saved.

Aer Lingus has been the first to try making experiments with fares and rates with a view to filling the valley periods in traffic, in night valleys, mid-week valleys and winter valleys. As many of these experiments proved successful they were quickly tried in other companies with similar problems and so the Research Department in Aer Lingus has made a significant contribution to the world-wide attack on the valley problem.

In proposing this vote of thanks to Mr. FitzGerald I wish to call the attention of business people to the necessity for economic planning. The foundation for business success must be laid in planning of that kind, in the study and analysis of figures and trends and in the correct interpretation of them. Only the skilled economist has the training to advise the businessman in these matters.

Mr. Muldowney suggested that it should be possible to break down the overheads in order to distinguish between variable overheads and fixed or general overheads. The method of dealing with the mid-week valley problem by Aer Lingus was referred to, and it was mentioned that the same method might well be adopted by shipping companies. The reference in the Paper to the diminishing of the incentive to further expansion where balance of production had caught up with overheads was commented on, and it was suggested that in the national interest there should always be present the incentive to expand the tourist industry, as transport is one of the limiting factors in the expansion of the tourist industry in the peak season. The off-season valley problem was common to all sections of the Tourist Industry. In this connection reference was made to a large scale travel survey carried out in the United States to ascertain the seasonal travel habits of the general public. As a result of this survey it had been proved that it is possible to persuade an increasing number of people to travel for holidays in winter, spring and autumn. The survey revealed that of holiday trips taken 54 per cent. took place in summer, 23·3 per cent. in autumn, 13 per cent. in spring and 9·7 per cent. in winter. It was suggested that the months of April and May should merit first consideration in any campaign for this purpose. It was the concern of the Irish Tourist Board to develop a rational extension of the holiday season.

Mr. Stewart found little to criticise in the paper, which set out to outline the principal factors influencing the general level of air fares and rates, and admirably succeeded in doing so. The considerations

which Air Companies appear to take into account in fixing fares and rates are sound, and one could not fail to be impressed by the considerable statistical research made by Air Transport Companies to fix a level of fares to obtain the maximum use of the services with the optimum profits.

Mr. FitzGerald, however, having demonstrated that the primary factor in influencing the rate level is the level of cost, and having explained the various cost considerations taken into account, went on to say: "One of the important influences on the level of air fares and rates is the level of surface transport rates." This, in Mr. Stewart's view, was the kernel of the problem which had faced the Railways for the last 100 years, and particularly in the last 30 years when the development of alternative forms of transport had become more marked. What the sentence really meant was that the fares charged by Air Companies were what the traffic could bear, and operations are determined accordingly.

Mr. Stewart quoted Mr. Frank Pick, late Managing Director of the London Transport Underground Organisation, that "there is nothing more strange in transport than the fact that facilities create traffic", in support of Mr. FitzGerald's contention that in time new travel created by air transport would tend to exceed the volume of diverted traffic from existing alternative services.

With regard to Mr. FitzGerald's reference to cargo rates, where he suggested that the present commodity rates are an interim scheme only while a complete classification system, similar to that employed by Railways, is being drawn up. Mr. Stewart commented on the criticism which had been levelled against Railways from time to time regarding the inelasticity of their rates system, which, to some extent had been blamed on the classification system, and stated that while he thought the Air Companies were wise in adopting a classification system, care must be exercised that the value of the commodity factor should not weigh too heavily in fixing the rate level for different commodities.

Congratulating Mr. FitzGerald on the excellence of his paper, Mr. Stewart wished Mr. FitzGerald well in his further research into the problem of finding the level of fares and rates which would be an incentive to greater use of air transport, while yet maintaining the optimum profits to the operator.