

AIRPORT ECONOMICS AND MANAGEMENT

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1. CHANGING ATTITUDES TOWARDS AIRPORTS

Traditionally airports have been viewed as public utilities provided by local or central government for the use and benefit of air travellers and shippers of air freight. The costs of such airports were covered as far as possible by revenues from landing fees and other charges. Where such revenues were insufficient the state willingly covered any losses. Frequently the state also provided navigational aids, air traffic control and other ancillary services required by the airport or its users. Most airports in Europe and other parts of the world, except the United States, were owned and managed by government departments, usually the Department of Civil Aviation, or by municipal or local authorities.

But during the last fifteen years all that has begun to change. Governments in Europe and, more recently, governments elsewhere too, began to look upon airports as potentially viable commercial enterprises, rather than public utilities to be provided by the state. It was felt that airports, like airlines, were capable of generating sufficient revenue from their users to cover the costs imposed by those users. Airports could be financially self-sufficient. There was no justification for subsidizing them if that was the case.

As a result of this change in attitudes, the various links, financial and others, between many airports and their local or central governments have gradually been loosened. In numerous cases this has involved the creation of autonomous airport companies or corporations able to operate as independent commercial enterprises. The success of the British Airports Authority, set up originally in 1966 to run a group of airports around London, together with one in Scotland, led to similar developments elsewhere. The Nigerian Airports Authority, the Airports Authority of Thailand, the Indian Airports Authority and the Athens Airport Authority are all examples of this. Elsewhere, individual airport directors, while still nominally under central or local government control, have been given greater commercial freedom in operating their airports.

Yet, at the same time, there has been much uncertainty as to how such commercial freedom might be used. Hitherto airports had been thought of as little more than an insignificant arm of government and little attention had been paid to them. As the pressure to become commercially oriented grew, so it became increasingly apparent that little was known about airport economics. Independent airport managers had no body of public knowledge or economic theory to call on to aid them in turning subsidized airports into profitable companies.

This was surprising since airports were major industrial enterprises. Individual airports occupied vast areas of land, often of very high value, had complex and expensive buildings and other installations and employed directly or indirectly tens of thousands of workers.

To help establish a better understanding of airport economics, the Transport Studies Group of the Polytechnic of Central London in 1970 launched a major research programme into the economics of British airports. This interest has continued to the present and several articles and research reports have been published.⁽¹⁾

2. ECONOMIC CHARACTERISTICS OF U.K. AIRPORTS

The work done at the Polytechnic has begun to develop a "theory of airport economics" based essentially on empirical observation of the financial performance of U.K. airports over the past decade or so. The major conclusions from this work can be summarised as follows:

Airports exhibit quite marked economies of scale. As the output of an airport increases, in terms of passengers handled or Work Load Units (W.L.U. is one passenger or 100 kgs of freight handled) the unit costs go down quite dramatically until an output level of about 3 million W.L.U. is reached. Beyond this size unit costs are constant or show a tendency to decline only very gradually. Unit costs are average total costs per passenger or W.L.U.

The implications of this finding are quite crucial for airport economics and for airport authorities. If marked economies of scale do exist then small airports are inherently unprofitable because their unit costs per passenger or W.L.U. are very high. In other words, if airports are required to operate commercially and cover costs out of their own revenues, it would be better to concentrate traffic on fewer airports. Such concentration increases the throughput of individual airports and thereby reduces unit costs.

Where airports undertake major expansion and development programmes which are too large in relation to immediate traffic needs or which are undertaken too soon the short and medium term effect is to increase their unit costs. This is not only because the airport's depreciation and other capital costs go up but because operating costs go up too. A major new terminal has to be heated, lighted, cleaned, maintained and staffed even if the number of passengers using it are well below the design capacity.

As a result unit costs per passenger rise, often dramatically, and airports having undertaken major expansion schemes find themselves losing money. It is only when traffic builds up to make better use of the expanded facilities that profitability is likely to be restored. Unless, of course, the airport embarks on a further cycle of expansion too soon.

Conversely smaller airports that hold back on investment even though they may be heavily congested at peak periods may actually achieve profitability despite their smaller traffic throughput.

The implications for airports wishing to operate profitably are quite clear. Hold back on investments as long as possible and when eventually expanding avoid large grandiose schemes and go for stepped and piecemeal development.

The proportion of international passengers within its total traffic has an

(1) e.g. Rigas Doganis, Roy Pearson and Grahame Thompson, 'Airport Economics in the Seventies'. Research Report No. 5. Polytechnic of Central London, 1978

important effect on an airport's cost and revenue levels. Unit costs increase as the proportion of international passengers increases because such passengers need substantially more terminal space for customs, health, immigration etc than do domestic passengers and also because they spend on average more time in the terminal. This in turn means greater space and amenity requirements. But unit revenues increase more than in proportion to the increase in unit costs. This is because revenue from non-aeronautical sources jumps dramatically as international passenger throughput increases, while landing fees and other aeronautical charges may at many airports be higher for international than domestic flights. Thus the net effect is that an airport's chances of breaking even improve as the proportion of international traffic in its total traffic increases.

In short, airport managements should make very effort to develop international traffic not merely because it affects the prestige of their airport but more particularly because it improves that airport's financial results.

3. STUDY OF EUROPEAN AIRPORTS 1979

How typical were the above characteristics of airports in general? It was felt important to test the hypothesis that other airports exhibit similar characteristics. Thus, as a logical extension of the work previously undertaken by P.C.L. on the economics of U.K. airports, in 1980 a major investigation was initiated into the economics of major European airports. Previous attempts by I.C.A.O., other international airport organisations and the B.A.A. to compare airport financial data have not been successful because of the difficulties associated with getting airports operational and financial data on a comparable basis. Consequently an examination of comparability problems, such as those arising from the differences in financial policies, activities carried out and foreign currencies, formed an important early stage of the research programme.

Data on 13 European airports was obtained from airport annual reports and accounts, from airport authorities by means of a standard questionnaire and by personal contact with several airport managers. All the airports included in the study handled more than two million passengers in 1979. The distribution of airport sizes in the sample is somewhat uneven. The two larger airports, Heathrow and Frankfurt, handled two or three times more passengers than the third largest airport, Amsterdam, and five to nine times the passenger traffic going through the seven smallest airports, which form half of the sample. Although the discrepancies are somewhat reduced when airport output is measured by air transport movements or the volume of freight handled, care must be taken when attempting to establish general industry-wide trends from such a diverse sample.

More critical problems of comparability arise because of discrepancies between airports in the following areas:

- (i) The nature and extent of government involvement in airport activities particularly in the provision of airport services such as air traffic control.
- (ii) Variations in the functions or activities carried out by different airport authorities.
- (iii) Differences in the sources of finance.

- (iv) Differences in accounting practices in different countries particularly with regard to the treatment of depreciation etc.

Where possible, adjustments have been made to the reported accounts of airports to try and reduce major discrepancies. Nevertheless, in cross-country comparisons it is virtually impossible to achieve true comparability of data.

Another problem to be resolved is how to convert financial data into a common currency. Official exchange rates have a number of shortcomings, the most serious of which is that such exchange rates may not be a close reflection of relative price levels in the countries involved. To overcome this problem in the present study of European airports all currencies have been converted into £ sterling on the basis of purchasing power parities as calculated by the E.E.C. or the O.E.C.D. for 1979.

4. FINANCIAL RESULTS OF SELECTED EUROPEAN AIRPORTS IN 1979

As a first step in understanding the financial performance of the European airports studied it was felt important to consider how the airport authorities assess their own performance. This meant examining the airports' surplus or deficit as presented in the published accounts for public consumption. This has been done in Table 1.

The published results show that only three of the 13 airports produced a loss in 1979 and the losses were relatively small. Of the 10 airports that showed a surplus or profit several had substantial surpluses, notably Heathrow (£38.5m) and Frankfurt (£17.3m). Thus overall the financial performance of the selected airports appears reasonably satisfactory. As a group they produced a combined surplus of £75m.

It is not possible to draw conclusions about the relative performance of individual airports in Table 1 because of problems of data comparability discussed above. Not all comparability problems can be adjusted for. But where adjustments have been possible they have been made and a new table of adjusted surpluses or deficits has been produced (Table 2). The main adjustments made are shown in the footnotes to the table. This Table 2 shows the financial results of individual airports both before depreciation and interest have been charged and after. The main conclusions to be drawn are as follows:

First, all airports show an operating surplus. That is, revenues exceed costs if depreciation and interest are excluded.

Secondly, the total level of depreciation and interest charges for the 13 airports is very high and comes to £102 million. While all individual surpluses are reduced after depreciation and interest are charged, three airports are pushed into showing a deficit. These are Gatwick, Nice and Glasgow. The latter's deficit is over £2m.

Finally, it is evident that some airports have very high capital charges. This is particularly so of Frankfurt (depreciation and interest is £29.1m), Amsterdam (£16.2m), Heathrow (£15.3m) and Zurich (£13.1m). At the same time, capital charges at a few airports appear unusually low. In the case of Luton and Manchester this may be because assets financed out of revenue or government grants are not depreciated in the normal sense at all.

TABLE 1

REPORTED SURPLUS OR DEFICIT
SELECTED EUROPEAN AIRPORTS 1979
(in £ sterling based on Purchasing Power Parities)

<u>Airport</u>	<u>Surplus/Deficit</u> (including Depreciation & Interest) (£000)
Heathrow	38,507**
Frankfurt	17,334
Copenhagen	7,224
Dublin	5,466*
Luton	2,497
Manchester	2,272
Amsterdam	1,842
Nice	678
Geneva	500
Gatwick	258**
Zurich	- 486
Marseilles	- 944
Glasgow	-1,060**
TOTAL 13 airports	<u>+75,060</u>

*excludes Depreciation and Interest

**excludes Interest paid

All results are before tax.

Sources: Published annual reports or accounts except for Manchester where data published by the Chartered Institute of Public Finance and Accountancy (CIPFA) has been used.

TABLE 2

ADJUSTED SURPLUS OR DEFICIT
SELECTED EUROPEAN AIRPORTS 1979
(in £ sterling based on Purchasing Power Parities)

	Excluding Depreciation and Interest Paid (£000)		Including Depreciation and Interest Paid (£000)
Heathrow	57,271	Heathrow	42,016
Frankfurt	46,516	Frankfurt	17,371
Amsterdam	18,078	Copenhagen	7,224
Zurich	13,965	Dublin	3,534
Copenhagen	10,272	Luton	2,543
Gatwick	6,850	Manchester	2,273
Dublin	5,466	Amsterdam	1,842
Manchester	4,743	Zurich	836
Geneva	4,027	Geneva	499
Luton	3,525		
Marseilles	2,939		
Nice	2,801		
Glasgow	517		
		Gatwick	- 272
		Marseilles	- 584
		Nice	- 967
		Glasgow	- 2,150
TOTAL	177,671		+74,709
13 airports			

/footnotes

TABLE 2Footnotes

N.B. The following adjustments have been made to reported accounts:

- 1 Accounts for Zurich's airport authority and for FIG, the company operating the terminal, have been consolidated.
- 2 At Dublin only the profit on commercial activities has been included rather than the total costs and revenues of those activities. The same approach has been adopted with the bonded goods store at Luton.
- 3 Adjustments have been made at the 5 U.K. airports to avoid double counting of revenue and costs arising from the government's imposition of a security levy per passenger.
- 4 Costs and revenues associated with the provision of A.T.C. have been excluded.
- 5 B.A.A.'s total interest charges (i) on commencing capital debt have been allocated to airports on the basis of their share of interest payments in B.A.A.'s first year; and (ii) on subsequent loans allocated to Glasgow airport on advice from B.A.A.
- 6 For Frankfurt, Manchester, Marseilles and Nice management accounts used rather than published accounts, Marseilles depreciation based on revalued assets.
- 7 For Nice "Initial Stocks" taken out of revenues and "Stocks Remaining" taken out of costs and replaced on the cost side by "Stocks consumed during the year."
- 8 No attempt has been made to assess or compute depreciation costs on a standard basis for all the airports. Each airport's own depreciation charges have been used. The "loan repayments" of Luton and Manchester are treated as depreciation.

5. COST PERFORMANCE AND AIRPORT SIZE

In assessing cost performance one needs to look primarily at the unit costs of the different airports rather than at total costs, since the latter make no allowance for aircraft size or output. Airport output can be measured in terms of Work Load Units (W.L.U.) handled, where a W.L.U. is equivalent to a terminal passenger or to 100kgs of freight handled. It is then possible to measure unit costs in terms of costs per W.L.U. handled. This has been done for the 13 airports in the study and the results are presented in Table 3.

The table shows that before depreciation and interest are included U.K. airports as a whole tend to have much higher unit costs than European airports. This distinction is not so apparent when depreciation and interest are included.

TABLE 3ADJUSTED COSTS PER WORK LOAD UNIT 1979(£ based on Purchasing Power Parities)

	<u>£ per WLU Before Dep. & Interest</u>		<u>£ per WLU Including Dep. & Interest</u>
Copenhagen	0.87	Copenhagen	1.22
Nice	1.23	Marseilles	2.16
Marseilles	1.34	Luton	2.23
Zurich	1.43	Nice	2.55
Luton	1.81	Geneva	2.64
Geneva	1.83	Dublin	2.64
Amsterdam	1.85	Zurich	2.88
Dublin	2.04	Heathrow	2.89
Heathrow	2.43	Amsterdam	3.13
Gatwick	2.46	Gatwick	3.18
Glasgow	3.18	Glasgow	4.23
Frankfurt	3.48	Frankfurt	4.77
Manchester	4.84	Manchester	5.51

Costs have been adjusted as shown in footnote to Table 2 (page 7)

Marseilles costs are before revaluation of assets.

Of the airports studied three appear to have significantly higher unit costs than the rest. These are Manchester, Frankfurt and Glasgow. The reason for this is partly because all three, unlike other airports in the study, are heavily engaged in passenger and baggage handling and in the case of Frankfurt in freight handling as well. These activities are labour intensive and therefore high cost. Unfortunately, the costs of providing these services are not separately available to enable us to adjust unit costs downwards. But indications are that even if such adjustment could be made, Manchester would remain as the airport with the highest unit costs.

Attempts to show some correlation between unit costs and airport size or output measured in total annual Work Load Units proved disappointing. In other words, unlike U.K. airports, European airports taken as a whole do not seem to exhibit any marked economies of scale. Unit costs do not decrease as airport output increases. This was the first hypothesis arising from previous studies to be tested.

However, detailed breakdown of total airport costs into major cost categories (as shown in Table 4) produced an interesting conclusion. It became apparent that airports are relatively labour intensive. For all airports, except one, labour costs accounted for more than 30% of total costs and for about half of them the figure was over 40%. Conversely, capital charges, that is depreciation and interest, were in most cases less than 30% of total costs. Thus the traditional view that airports are very capital intensive needs some modification.

A minor point of interest is that U.K. airports, unlike most of their European counterparts, pay rates, a form of local taxation, which accounts for 4-7% of their total costs. This form of local taxation is considered as an operating cost rather than a charge met out of surpluses.

6. IMPACT OF MAJOR INVESTMENT PROGRAMMES

The second major cost hypothesis to be tested was that major expansion and development programmes adversely affect unit costs. Because airport investment, especially at larger airports, tends to be frequent and also phased over two or three years or longer, it was found difficult to establish which airports had undertaken major development programmes recently. As a development proxy it was decided to use the capacity utilisation of each airport. This is the percentage figure arrived at by dividing the assumed annual passenger capacity of each airport as stated by the airport management by its total passenger traffic in 1979.

Despite the fact that several airports were found to have capacity utilisation factors of over 80% - Heathrow 93%, Copenhagen 93%, Geneva 80%, Glasgow 80% - no close correlation was found between unit costs and whether or not an airport's capacity was being well utilised or not.

7. REVENUE GENERATION

Close examination of unit revenues per W.L.U. shows that, generally speaking, U.K. airports achieve higher unit revenues than their European counterparts (Table 5). This broadly mirrors what was observed to be the case with unit costs.

Manchester and Frankfurt have particularly high unit revenues. It has

TABLE 5

TOTAL ADJUSTED COSTS BY MAJOR CATEGORIES 1979

	<u>OPERATING COSTS</u>					<u>TOTAL</u>	<u>CAPITAL COSTS</u>		<u>TOTAL</u>
	<u>Staff</u>	<u>Rents</u>	<u>Utilities</u>	<u>Maint.</u>	<u>Other</u>		<u>Depreciation</u>	<u>Interest</u>	
	%	%	%	%	%	£	%	%	%
Manchester	34	4	15	28	6	88	4	8	100
Heathrow	41	7	20	7	10	85	14	2	100
Luton*	52	5	13	3	10	83	5	11	100
Dublin	54	-	24	-	-	78	9	13	100
Gatwick	41	5	14	9	8	77	21	2	100
Glasgow	48	7	12	5	3	75	15	10	100
Frankfurt	49	0.5	16	6	3	74	19	8	100
Copenhagen	48	-	11	10	2	71	17	12	100
Geneva	30	-	8	18	15	70	19	19	100
Marseilles	37	3	12	2	7	62	19	19	100
Amsterdam	35	-	7	8	8	58	30	10	100
Zurich	24	-	9	6	12	51	24	26	100
Nice	34	-	12	-	-	46	40	12	100

N.B. Airport ranked by proportion of Total Operating Costs (column 6)

Percentages have been rounded off so totals may not add up precisely to 100.

*Unadjusted percentages used, because it is not possible to allocate Luton's ATC costs to different categories.

TABLE 5

ADJUSTED TOTAL REVENUES PER WORK LOAD UNIT 1979
 (£ based on Purchasing Power Parity)

	£ per WLU	£ per WLU Excluding Ground Handling*
Manchester	6.13	5.40
Frankfurt	5.54	3.62
Heathrow	4.17	4.14
Dublin	3.75	
Glasgow	3.38	2.87
Luton	3.34	3.06
Amsterdam	3.27	
Gatwick	3.15	
Zurich	2.97	2.93
Geneva	2.75	
Marseilles	2.24	
Nice	2.21	
Copenhagen	1.88	

*Only given for airports where ground handling of pax or freight is major revenue source. For others figures in first column remain unchanged.

already been mentioned above that these two airports, together with Glasgow, are quite heavily involved in ground handling. In fact, in the case of Frankfurt, the airport authority does nearly all the passenger and freight handling. Revenue associated with these activities at these and one or two other airports could be identified and subtracted from their total revenues to produce revenue figures more directly comparable to those of other airports. These revised revenues were then used to calculate new unit revenues excluding revenue from ground handling. These are given in the second column in Table 5. As a result of this adjustment Frankfurt's unit revenue becomes comparable to that of some of the other airports, while that of Manchester still remains outstandingly high.

Earlier work on the U.K. airports had suggested that unit revenues showed a slight tendency to increase as airports grew in size and as the proportion of international passengers grew. Since there is a strong correlation in the U.K. between the larger airports and those handling a high proportion of international traffic it was not possible to establish which of these two factors had the most influence on unit revenues. Yet on 'a priori' grounds one would expect international passengers to spend much more at airports in the duty free and other shops since they are given access to facilities denied to domestic passengers. They also tend to spend longer at airports. At the same time, aircraft landing fees and passenger charges at some airports are higher for international services.

Thus the logical expectation would be that unit revenues should increase as the proportion of international passenger in an airport's total traffic increases. This hypothesis was tested for the European airports studied and a reasonable correlation was found between unit revenues and overall size, percentage international and a dummy variable for level of landing fees.

8. CONCLUSIONS

A major aspect of the research programme has been to assess whether cross-country comparisons of transport firms can be validly made. In this respect the pioneering work in terms of European comparisons was done by the University of Leeds in their comparative study of selected European railways.⁽²⁾ The current airports work has shown that many problems are involved in such comparisons. The first is producing comparable financial and other data for a large number of European firms, in this case, airports. The second is trying to make valid comparisons between firms which though in the same industry frequently carry out quite different activities in addition to the basic ones of providing runways and terminals. Some attempt has been made to resolve difficulties arising in these two major areas. Nevertheless, discrepancies do remain in the data for the airports studied.

Do such discrepancies invalidate any conclusions? It is our view that, despite any discrepancies, such conclusions may provide valuable pointers to possible economic relationships. It would be up to individual airport authorities to then assess the validity of these pointers to their own situation.

(2) A Comparative Study of European Rail Performance. K.M. Gwilliam and J. Pridaux. University of Leed and British Rail. 1979.

The major findings of the study to date can be summarised as follows:

1. That despite the high level of depreciation and interest charges, airports are less capital intensive and relatively more labour intensive than is generally thought to be the case.
2. Underutilisation of airport capacity does not appear to increase unit costs, though maintenance costs are higher. There is also evidence to suggest high capital expenditure tends to push up unit costs.
3. Unit revenues do seem to be positively influenced by airport size or throughput and also by the proportion of international passengers in the total traffic. But the relationship is not as strong as was the case with British airports.
4. Unlike U.K. airports, European airports do not manifest any marked economies of scale. This conclusion can only be very tentative because no small airports were included in the European sample.

Analysis of the data is continuing and these conclusions may in due course need further qualification. But if valid they have important implications for airport development and planning. For instance, if there are no economies of scale in airport operations then one major argument for concentrating air services on fewer airports no longer applies.