BENCHMARK AIRPORT CHARGES

A. de Wit
Directorate General Civil Aviation (DGCA)
and
N. Cohn
Hague Consulting Group (HCG)

ABSTRACT

The Netherlands Directorate General of Civil Aviation (DGCA) commissioned Hague Consulting Group (HCG) to complete a benchmark study of airport charges at twenty eight airports in Europe and around the world, based on 1996 charges. This study followed previous DGCA research on the topic but included more airports in much more detail. The main purpose of this new benchmark study was to provide insight into the levels and types of airport charges worldwide and into recent changes in airport charge policy and structure. This paper describes the 1996 analysis. It is intended that this work be repeated every year in order to follow developing trends and provide the most up-to-date information possible.

INTRODUCTION

Objectives

The Netherlands Directorate General of Civil Aviation (DGCA) commissioned Hague Consulting Group (HCG) to complete a benchmark study of airport charges at twenty eight airports in Europe and around the world, based on 1996 charges. This study followed previous DGCA research on the topic but included more airports in much more detail. The main purpose of this new benchmark study was to provide insight into the levels and types of airport charges worldwide and into recent changes in airport charge policy and structure.

The 1996 Benchmark Airport Charges study was completed for a selection of important passenger and freight airports and included a wide variety of aircraft types. Airport charges as of July 15, 1996, were calculated for each aircraft type at each airport[1], based on one landing and one take-off from/to an international airport by a non-domestic carrier (one international turnaround). The calculations were performed using the Airport Charges Model (ACM), which was developed for DGCA.

The 1996 study does not include handling or fuel charges. DGCA and HCG intend to include these charges in a 1997 update.

The 1996 Benchmark Airport Charges report was used by DGCA for the following purposes:

- gaining insight into the competitive position of Schiphol in terms of airport charges;
- verification of the findings of other research into Schiphol's competitive position, both for parliamentary questions and as input for an international comparison of infrastructure;
- data input for research projects carried out by DGCA and other organisations;
- insight into the ways in which airports and governments in different countries include the environmental costs of aviation activities in their charging systems; and
- background information for the revision of charges at Schiphol.

This paper describes the 1996 analysis. More detail regarding input data and assumptions, as well as a comparison between 1995 and 1996 daytime airport charges in Europe, may be found in the DGCA publication Benchmark of Airport Charges 1996. It is intended that this work be repeated every year in order to follow developing trends and provide the most up-to-date information possible.

Background

The importance of determining and tracking airport charges across different airports has been made clear by recent developments in aviation.

- Due to the stiff competition in the aviation sector, airlines are constantly looking for ways of minimising costs. This includes minimising costs that are to a limited extent under the direct control of airlines, such as airport turnaround costs. The annual International Civil Aviation Organization (ICAO) report, Financial Data, contains information about the cost structure of a number of airlines. According to this source, airport charges make up about five percent of the costs of large, international airlines. For smaller, short-haul airlines the percentage can be as much as 15 percent.[2]
- The costs of negative externalities related to the environmental impact of aviation activities are increasingly being quantified and passed through to the airlines. Fees based on aircraft noise levels and night flight surcharges are examples of this.
- The phasing-out of a large share of duty-free shopping at many European airports may affect the structure and level of their airport charges.

The airport charges discussed in this report form only one part of the total turnaround costs at airports. Including handling costs and fuel costs would make

the analysis more complete; however, at this time, insufficient data are available to DGCA and HCG. Additional research is required in order to include them in the near future. Current information indicates that total handling charges are approximately 50 percent as large as total airport charges, and that fuel costs amount to more than the sum of airport charges and handling costs.[3]

AIRPORT CHARGES

The ACM processes several different types of airport charges to complete the comparison of airports and aircraft types. The types of fees included are based primarily on the information published in the *IATA Airport and En Route Aviation Charges Manual.* While ICAO also compiles airport charge information, IATA provides the most recent data. With further research it may be possible to expand the types of fees included in the ACM calculations, but at this time the list is limited to the charges described here.

Basic landing fees are usually based on the maximum take-off weight (MTOW). Some airports charge per tonne while others apply a fixed charge plus a variable charge based on MTOW. There are a few airports that vary these charges by time of day or season (peak/off-peak) or by the frequency of a given carrier's operations. Some airports include lighting or terminal navigation aid in the landing charge.

Noise charges require special attention because they are sometimes complicated to calculate and are of increasing importance in public and political debates on airport infrastructure. In this paper, a distinction is made between noise-related landing charges and other noise taxes/charges.

Many airports have higher landing charges for noisier types of aircraft, for example Chapter 2 aircraft.[4] In the ACM, the additional landing charges assessed for these aircraft are calculated separately from the basic landing charge. For any given aircraft, the basic landing charge is calculated as the amount to be paid for the cheapest, most advantageous situation for example, Chapter 3 aircraft. The noise related landing charge is the difference between this basic landing charge and the actual landing charge that must be paid for the given aircraft. Several airports charge an extra tax based on aircraft noise levels that is independent of all landing charges. In the ACM, these noise taxes or charges are included as a separate category.

In some cases the tariff differentiation is based on airport- or country-specific aircraft acoustic group classifications (France, Belgium, Switzerland and Korea). At other airports the ICAO classification is used (i.e. Chapter 2, Chapter 3).

Passenger charges are usually levied for services provided to departing passengers, although some airports charge for both departing and arriving passengers. A number of airports charge lower rates for transfer passengers and infants than for other passengers, while others exempt these types of passengers from charges completely. Some passenger charges are paid by the airlines, some by

passengers themselves. For the purposes of this analysis, all passenger charges were included in the calculations as if they are paid by the airlines. This allows for consistent comparison between airports and avoids any second-guessing about how these charges are handled by each airline and each airport.

Security service charges are often calculated per departing passenger. In a few cases they are based on MTOW which is then a proxy for the number of passengers.

Runway lighting charges usually only apply to night flights, but may be charged incidentally depending on weather conditions. The charges are usually made per landing and several airports included in the study incorporate lighting charges in their landing charges.

Aircraft parking charges are based on the number of hours an aircraft is parked at the airport. In some instances these charges are also related to aircraft weight or wingspan. Most airports provide one to four hours of free parking time, which is usually enough to allow for a complete turnaround. Others provide free overnight parking or differentiate parking charges by location at the airport (e.g. remote stands).

Terminal navigation aid charges cover navigational assistance during arrival and departure. They are commonly charged per arrival and/or departure and are sometimes based on MTOW.

Aviobridge fees apply to the facilities used for passenger boarding and alighting. In some cases this is a bus service instead of an aviobridge. These fees could be considered handling charges, but in this study they were treated as airport charges.

Cargo charges are usually based on the weight of the loaded or unloaded cargo. Note that the passenger variants in the ACM do not include any passenger/cargo combi aircraft. The cargo charges are only included in the ACM cargo variants.

Other Charges

Fuel costs and handling costs are two important types of airport-related costs that are not currently included in the ACM calculations. Details concerning these charges are not reported by airports with any consistency and are rarely published. Such charges are also very difficult to generalise across airports and aircraft types because of specific contractual agreements that often exist between airlines, handlers, fuel vendors and airports. The prices agreed upon in these contracts could vary a great deal depending on the supplier and the size of the customer. There are a few other types of charges that are also excluded from the analysis because their interpretation was unclear or because no consistent data were available. These range from fire fighting service, aircraft cleaning, storage facility use and hangar charges to terminal and quarantine surcharges.

Assumptions

Although a good deal of detailed information is available about airport charges, quite a few assumptions are required in order to create a complete and consistent picture of these costs over all airports and aircraft types. These assumptions make comparisons between airports possible. An effort was made to base these assumptions on the most common or average situation. Three of the most important assumptions are given here.

- The total number of passengers in an aircraft is equal to the number of seats in the aircraft multiplied by a load factor of 0.65.
- The number of passengers that are transfer passengers depends on the flight destination and the aircraft type. For example, intercontinental (ICA) flights usually contain a higher percentage of passengers that must transfer to reach the final destination airports than intra-European flights. The same is true for larger aircraft used for longer distances between major hub airports when compared to smaller aircraft used for shorter distances.
- The number of airport parking hours required for a given flight depends on the flight destination and aircraft type (full freighter and passenger aircraft).

Table 1
Transfer Passengers and Parking Hours

Flight Destination Group	*Percent Passengers Transfer*	*Parking Hours*
Europe	20	1
Europe or ICA	30	2
ICA	40	3

In each variant, every aircraft type is assigned to a flight destination group. Table 1 shows how the flight destination group determines the assumed share of transfer passengers and required parking hours for each aircraft. Only flight operations with international origins or destinations are included in this analysis. Domestic operations are not included.

In the freight variants, there are two types of freight aircraft which require five parking hours (they are assumed to have longer turnaround times). Also important for the freight variants is the assumption that the amount of cargo carried is equal to 70 percent of the maximum payload of the given freighter.

All airport charges have been calculated in terms of Netherlands Guilders. Exchange rates have been used from July 15, 1996[5] (for the 1995 variant, July 15, 1995[6]).

It is important to note that there are significant differences among airports in which types of charges are levied and in how these charges are calculated. Any comparison or analysis requires interpretation and a number of assumptions. The expertise of a number of persons at the DGCA, Schiphol Airport and at other airports was essential for the completion of this report.

AIRPORT CHARGES MODEL

The Airport Charges Model (ACM), developed for the DGCA, is a flexible program designed to calculate the airport charges[7] to airlines for a turnaround, based on aircraft type. These charges can be calculated for any number of airports, limited only by data availability. This allows for comparison of airport charges among airports and aircraft types. The user can select the airports, aircraft types and fees which are to be included in the model calculations. The specification of the formulas for calculating the airport charges can be made for each airport and, if necessary, for each time period.

The most important data source for this work was the *IATA Airport and En Route Aviation Charges Manual*. This source is updated several times per year because airports regularly change both the levels of the fees charged as well as the charging formulas. The fees and formulas in the ACM are based largely on the information contained in this publication. The charges valid as of July 15, 1996 were used except for calculating charges for airports with seasonal peak and off-peak periods. In these cases the published rates for each season as of July 15, 1996 were used. Aside from the IATA manual, many airports and aviation authorities were contacted directly with specific questions and to verify that the IATA information was correct and complete. Additional information was provided by DGCA staff, various airport and civil aviation authorities and the Transportation Office of the Royal Netherlands Embassy, Washington, DC. The Airport Information Publication (AIP) was also consulted, as were several other studies of airport charges. The most important of these were the following:

- *Airport Charges in Europe*, Andre Wrobel, Institute of Air Transport, Paris, 1997 and
- *User Costs at Airports in Europe, SE Asia and the USA*, The Air Transport Group, Cranfield College of Aeronautics, February 1998.

While it would obviously be preferable to calculate charges based on, say, current 1998 tariffs, the data collection required for the update of the IATA manual is extensive and time consuming. In addition, in many cases it is necessary to consult airports or civil aviation authorities to clarify specific issues for individual airports, and this feedback process is quite time-consuming.

VARIANTS

The variants were designed to provide a picture of the relative competitiveness of airports in each of the following market contexts:

1. Europe 1995: daytime passenger operations at major European airports
2. Europe 1996: daytime passenger operations at major European airports

3. Europe Night 1996: night-time passenger operations at major European airports
4. Europe Freight 1996: daytime freight operations at major European airports
5. Europe Night Freight 1996: night-time freight operations at major European airports
6. Regional 1996: daytime passenger operations at regional airports in the Netherlands and a number of surrounding countries
7. World 1996: daytime passenger operations at major airports around the world.

A selection of airports and aircraft types was made for each of these variants. The selection criteria for the airports to be included in each variant were the following:

- Europe 1996: European airports with more than 4 million international passengers and dominated by scheduled air services;
- Europe Night 1996: the same airports as in Europe 1996;
- Europe Freight and Night Freight 1996: the same airports as in Europe 1996 but expanded to include a few other important freight airports;
- Regional 1996: a number of medium-sized airports were selected in the Netherlands and the five surrounding countries, as well as the main airports in these countries; and
- World 1996: this includes the largest airports in the world based on international scheduled passenger volumes (an effort was made to include airports on all continents).

The selection of aircraft types to be included in the ACM was based on information from the *1996 ABC Guide*. The aircraft types most frequently landing at and taking off from the selected airports in each variant were chosen. Also important was obtaining a mix of large and small aircraft types as well as both Chapter 3 and Chapter 2 aircraft. In the freight variants, a mix of the most commonly used freight aircraft was selected.

Table 2 and Table 3 list the airports and aircraft types for each of the 1996 variants. The Europe 1995 variant is also shown for comparison purposes and because it was revised for this report based on more recent data.

Many airports vary their charges by time of day or by season. Each time period is included in the ACM as a separate airport so that clear comparisons can be made. For example, airport charges at London Gatwick have been calculated three times for the Europe 1996 variant: once for the peak period, once for the shoulder period and once for the off-peak period. Averaging the costs across

Table 2
Airports by Variant

Europe 1995	*Europe 1996*	*Europe Night 1996*	*Europe Freight /Night Freight 1996*	*Regional 1996*	*World 1996*
London (Heathrow)	London (Heathrow)	London (Heathrow)	Frankfurt (Main)	Brussels (Zaventem)	Johannesburg (Jan Smuts)
Frankfurt (Main)	Frankfurt (Main)	Frankfurt (Main)	London (Heathrow)	Charleroi	Sydney (Kingford)
Paris (Charles de Gaulle/Orly)	Paris (Charles de Gaulle)	Paris (Charles de Gaulle)	Amsterdam (Schiphol)	Antwerpen	London (Heathrow)
Amsterdam (Schiphol)	Amsterdam (Schiphol)	Amsterdam (Schiphol)	Paris (Charles de Gaulle)	Luik	Frankfurt (Main)
London (Gatwick)	London (Gatwick)	London (Gatwick)	Brussels (Zaventem)	Oostende	Paris (Charles de Gaulle)
Zurich (Kloten)	Zurich (Kloten)	Zurich (Kloten)	Zurich (Kloten)	Frankfurt (Main)	Amsterdam (Schiphol)
Manchester	Manchester	Manchester	Paris (Orly)	Bremen	Zurich (Kloten)
Copenhagen (Kastrup)	Copenhagen (Kastrup)	Copenhagen (Kastrup)	Rome (Fiumicino)	Munster Osnabruck	Mexico City (Benito Juarez)
Brussels (Zaventem)	Brussels (Zaventem)	Brussels (Zaventem)	Copenhagen (Kastrup)	Nurnberg	Tel Aviv (Ben Gurion)
Rome (Fiumicino)	Rome (Fiumicino)	Rome (Fiumicino)	Luxembourg (Findel)	Erfurt	Cairo (Cairo)
Dusseldorf	Paris (Orly)	Paris (Orly)	Koln	Leipzig	New York (J.F. Kennedy)
Madrid (Barajas)	Dusseldorf	Dusseldorf	London (Gatwick)	Dresden	Miami (Miami)
Munchen	Madrid (Barajas)	Madrid (Barajas)	Madrid (Barajas)	Paris (Charles de Gaulle)	Los Angeles (Los Angeles)
Vienna (Schwechat)	Munchen	Munchen	Istanbul	Bordeaux	Toronto (Pearson)
Dublin	Vienna (Schwechat)	Vienna (Schwechat)	Milan (Malpensa)	Strasbourg	Chicago (O'Hare)
Athens	Dublin	Dublin	Athens	Toulouse	Hong Kong (Kai Tak)
Stockholm (Arlanda)	Athens	Athens	Manchester	Bale/Mulhouse	Tokyo (New Tokyo/Narita)
Milan (Linate)	Stockholm (Arlanda)	Stockholm (Arlanda)	London (Stansted)	Luxembourg	Singapore (Changi)
Geneva	Milan (Linate)	Milan (Linate)	Stockholm (Arlanda)	Amsterdam (Schiphol)	Bangkok (Bangkok Int.)
Helsinki (Vantaa)	Geneva	Geneva	Vienna (Schwechat)	Eindhoven	Seoul (Kimpo)
Lisbon	Helsinki (Vantaa)	Helsinki (Vantaa)	Lisbon	Maastricht	Buenos Aires (Ezeiza)
	Lisbon	Lisbon	Helsinki (Vantaa)	Rotterdam	
			Dublin	London (Heathrow)	
			Milan (Linate)	Belfast (Int)	
			Geneva	East Midlands	
			Munchen	London City	
			Barcelona	Stansted	
			East Midlands	Prestwick	
			Dusseldorf		
			Oslo (Fornebu)		

Table 3
Aircraft by Variant

Europe 1995	*Europe 1996*	*Europe Night 1996*	*Europe Freight/Night Freight 1996*	*Regional 1996*	*World 1996*
Boeing 747 400 passenger	Boeing 747 400 passenger	Boeing 747 400 passenger	Boeing 747 freighter	McDonnell Douglas DC 10 passenger	Airbus Industrie A320 200
McDonnell Douglas DC 10 passenger	McDonnell Douglas DC 10 passenger	McDonnell Douglas DC 10 passenger	McDonnell Douglas MD 11 freighter	Boeing 757 200 passenger	Boeing 737 300
Boeing 767 300/300ER	Boeing 767 300/300ER	Boeing 767 300/300ER	McDonnell Douglas DC 10 freighter	Airbus Industrie 320 200	Boeing 747 400
Airbus Industrie A300 passenger	Airbus Industrie A300 passenger	Airbus Industrie A300 passenger	Ilyushin IL 76	Boeing 737 300	Boeing 767 300/300ER
Boeing 757 200 passenger	Boeing 757 200 passenger	Boeing 757 200 passenger	Boeing 707 freighter	Boeing 737 400	Boeing 757 200 passenger
Boeing 727 200 passenger	Boeing 727 200 passenger	Boeing 727 200 passenger	McDonnell Douglas DC 8	Boeing 737 200 passenger	Airbus Industrie A300 passenger
Airbus Industrie A320 200	Airbus Industrie A320 200	Airbus Industrie A320 200	Boeing 757 freighter	Fokker 100	McDonnell Douglas MD 81
McDonnell Douglas MD 81	McDonnell Douglas MD 81	McDonnell Douglas MD 81	Tupolev TU 154	Fokker F28 Fellowship	McDonnell Douglas MD 11 passenger
Boeing 737 500	Boeing 737 500	Boeing 737 500	Boeing 727 freighter	Saab 2000	McDonnell Douglas DC 10 passenger
Boeing 737 200 passenger	Boeing 737 200 passenger	Boeing 737 200 passenger	Lockheed L100 Hercules freighter	Canadair Regional Jet	Fokker 100

Table 3 – continued
Aircraft by Variant

Europe 1995	*Europe 1996*	*Europe Night 1996*	*Europe Freight/Night Freight 1996*	*Regional 1996*	*World 1996*
McDonnell Douglas DC 9 30 passenger	McDonnell Douglas DC 9 30 passenger	McDonnell Douglas DC 9 30 passenger	Boeing 737 200 freighter	Fokker 50	Boeing 727 200 passenger
	Fokker 100	Fokker 100		Aerospatiale/Alenia ATR 42/72	Boeing 737 400
	Canadair Regional Jet	Canadair Regional Jet		de Havilland DHC 8 Dash 8	Airbus Industrie A310 passenger
	Fokker 50	Fokker 50		Saab SF 340	Boeing 737 500
	Aerospatiale/Alenia ATR 42/72	Aerospatiale/Alenia ATR 42/72		Embraer EMB 120 Brasilia	Boeing 737 200 passenger
	Saab SF 340	Saab SF 340		Fairchild(Swaeringen)Metro/Merlin	McDonnell Douglas DC 9 30 passenger
				British Aerospace Jetstream 31	Aerospatiale/Alenia ATR 42/72
				Beechcraft super king air 200	

these periods would not allow for realistic comparisons between Gatwick and other airports. Note that peak and off-peak periods can refer to either time of day or season. Note also that in the variants Europe Night 1996 and Freight Night 1996 there are fewer airport entries for which charges are calculated than in the corresponding daytime variants. This is because certain time periods, such as Athens airport peak period, are not applicable for night flight charges.

INTERPRETATION ISSUES

Any review of airport charges between airports has inherent comparison and interpretation problems. While it is clear that there are many common elements across airports in terms of the types of charges they levy and how they calculate these charges, there are more exceptions than consistencies. The analysis completed by HCG and DGCA dealt with as many of these as possible while preserving a comprehensible overview across all the airports and aircraft types included. However, there are a number of differences between airports that are important to consider when making international comparisons of charges.

U.S. Airports

The previous section reviewed the types of charges which airlines are required to pay for airport use. The overall structure of these charges is quite similar at most of the airports included in this study, but the structure of the airport charges at American airports is quite different. Some of the charges made at many European airports, such as lighting, security and parking, are not made at American airports. Likewise, an extra passenger tax is charged for all passengers at American airports (US$6 per international passenger in 1996) which is not levied at most European airports. The question is how to include these airports in a comparative study. Some sources argue that because this passenger tax is eventually reinvested in the U.S. airport and airspace system (by way of the Airport Improvement Program, or AIP), it should not be included in the calculation of total charges.[8] The reasoning is that the level of airport subsidy in the U.S. is such that the airlines eventually obtain benefits approximately equal to the additional passenger tax they pay.

There are several other differences between U.S. and European airports that make any comparison even more difficult.

- U.S. airport operators are involved in fewer activities than many of their European counterparts, such as handling or air traffic control, and their financial structures in general are quite different.
- Some U.S. airports levy a passenger facility charge (PFC) which goes directly toward financing improvements at that airport. Airports that levy a PFC have their AIP funding reduced.

- At many U.S. airports, airlines participate directly by participating in the financing of new facilities or even by building their own terminals. The financial agreements between airlines and airports vary a great deal among the U.S. airports.
- There are many sources of financing for aviation facilities aside from airport bonds, such as state governments, essential services grants and specific funding for intermodal facilities.

The aim of this study is to calculate the nominal (face-value) charges to an airline for an international turnaround at each airport. The government passenger taxes and any PFCs are therefore included in the calculations because they are part of the total charges. The analysis of the financial structure of U.S. or European airports is beyond the scope of this study. Furthermore, it is not possible to measure the return of this tax to specific airlines at specific airports.

In order to provide some indication of the relative importance of the government passenger tax, we have calculated the U.S. air transportation tax separately from other passenger charges. It is included in the ACM totals but shows its relative share of total charges separately from that of other passenger charges.

Similar government passenger taxes are charged at British, French and Norwegian airports. The U.K. tax is not earmarked for specific investment in aviation facilities, but it is also shown separately in Figure 2. The French tax, which is referred to as the air transport cross-subsidization tax,[9] is not included in the 1996 ACM calculations because it was not included in the IATA charges manual. It will be included in the 1997 ACM report. The Norwegian tax is used to subsidize domestic rail operations, but is not applicable in the ACM since Fornebu is only included in the freight variants. Other factors

The airport charges contained in this paper are based on published rates from different sources, in some cases modified or calculated according to additional interpretation provided by airports and aviation authorities. It is important to note that the actual charges paid by an airline could differ significantly from the figures shown here. Some negotiation takes place between airlines and specific (usually smaller) airports that can result in individual agreements and different charges on a case-by-case basis. As discussed in the section above, direct or indirect subsidies are not quantified or included in the ACM in any way. Results Some notable results of the 1996 analysis are the following:

- There are large differences in the composition and calculation of airport charges among the airports (and sometimes even within the countries) included in this study. Airport charges in the United States show the biggest difference compared with those at other airports.
- The charges at Schiphol airport are in some cases different in composition than those at many other airports. The Schiphol charges that are somewhat different from those at many other airports include lower passenger charges for transfer passengers, landing surcharges for Chapter 2 aircraft

and a specific noise charge (for financing noise insulation costs).

- Approximately one half of the airports included in the ACM variant in which 1996 European airport charges for daytime passenger operations were calculated have no form of explicit noise charges (noise related landing charges or noise taxes). Of the airports included in the 1996 worldwide variant, two-thirds have no such charges.

- Tables 4-7 show the five airports with the highest average charges and the five airports with the lowest charges for each variant, for all aircraft types and specifically for Chapter 2 and Chapter 3 aircraft. It is evident from these tables that airports in the UK and Germany as well as the Vienna and Geneva airports are the most expensive in Europe. The German airports are not among the five most expensive when only Chapter 3 aircraft are considered. Helsinki and Stockholm stand out as very expensive for night operations.[10] On a worldwide basis, New York JFK and Tokyo Narita have the highest charges, followed by other U.S. airports, Frankfurt, and London Heathrow. When passenger taxes are excluded from this comparison, London Heathrow appears much less expensive in both its peak and off-peak periods. The lowest airport charges are found in Southern Europe and, for non-peak periods, in the UK. The regional airports in Belgium and Luxembourg also have relatively low average charges. Also notable is the fact that Singapore has low average charges compared to other large airports around the world.

- About half of the airports included in the ACM variants have higher airport charges for night-time operations than for daytime operations. In most cases, the differences in charges have to do with lighting, noise and navigation aids.

- Smaller, regional airports do not always have lower charges than large mainports. For example, the regional airports in the UK, such as London City Airport and East Midlands, have higher charges than some of the large UK airports.

- The turnaround costs of a freighter are as little as one-half those for a comparable passenger aircraft at airports which do not explicitly apply cargo charges. This is largely because passenger, security and aviobridge charges do not apply. For airports which do have cargo charges, the total turnaround costs of a freighter are more comparable to those of a passenger aircraft, depending on aircraft type and the actual cargo rate.

- The average change in airport charges between 1995 and 1996 for the airports and aircraft included in the ACM was between +five percent and +nine percent.

- The competitive position of Schiphol is just below the ten most expensive airports and is comparable with the Paris and Brussels airports (see Table 7: Schiphol rankings in the ACM variants, below). Schiphol charges for Chapter 2 aircraft are higher than for Chapter 3 aircraft. Between 1995 and 1996 Schiphol became relatively less expensive overall but by a small margin.
- The position of the regional airports in the Netherlands is generally in the medium range compared to airport charges at other regional airports.

Figure 1 shows the charges for a daytime turnaround of a B747-400 at twenty[11] major international airports, world-wide. In Figure 2, the same charges are shown with the government passenger taxes split out of the passenger

Table 4
Airports With the Highest and Lowest Average Total Charges Across All Aircraft Types Included in the ACM Variants

	Europe 1995	*Europe 1996*	*Europe Night 1996*	*Europe Freight 1996*	*Europe Night Freight 1996*	*Regional 1996*	*World 1996*
Highest:							
1	Heathrow Peak	Heathrow Peak	Helsinki	Dusseldorf	Helsinki	London City peak	JFK
2	Manchester peak	Vienna	Frankfurt	Cologne	Cologne	London City off-peak	Tokyo Narita
3	Frankfurt	Manchester peak	Manchester peak	Frankfurt	Dusseldorf	East Midlands peak	Chicago
4	Vienna	Frankfurt	Dusseldorf	Munich	Stockholm	East Midlands off-peak	Heathrow peak
5	Dusseldorf	Dusseldorf	Vienna	Geneva	Frankfurt	Belfast	Frankfurt
Lowest:							
1	Rome	Rome	Madrid off-peak	Athens	Athens off-peak	Luxemburg	Mexico City 'A'
2	Milan Linate	Milan Linate	Rome	Athens peak	Athens peak	Liege	Singapore
3	Madrid	Madrid	Milan Linate	Gatwick off-peak	Gatwick off-peak	Charleroi	Mexico City 'B'
4	Madrid peak	Madrid peak	Dublin	Gatwick shoulder	Gatwick shoulder	Ostende	Johannesburg
5	Dublin	Dublin	Lisbon low	Stansted off-peak	Stansted off-peak	Stockholm	Seoul

Table 5
Airports With the Highest and Lowest Average Total Charges for Chapter 3 Aircraft Included in the ACM Variants

	Europe 1995	*Europe 1996*	*Europe Night 1996*	*Europe Freight 1996*	*Europe Night Freight 1996*	*Regional 1996*	*World 1996*
Highest:							
1	Heathrow Peak	Heathrow Peak	Helsinki	Geneva	Helsinki	London City peak	JFK
2	Manchester peak	Vienna	Manchester peak	Zuirch	Stockholm	London City off-peak	Tokyo
3	Vienna	Manchester peak	Vienna	Vienna	Geneva	East Midlands peak	Chicago
4	Gatwick peak	Manchester off-peak	Stockholm	Munich	Zurich	East Midlands off-peak	Heathrow Peak
5	Manchester off-peak	Gatwick peak	Manchester off-peak	Dusseldorf	Cologne	Belfast	Los Angeles
Lowest:							
1	Rome	Rome	Madrid	Athens off-peak	Athens off-peak	Luxemburg	Mexico City 'A'
2	Milan Linate	Milan Linate	Rome	Athens peak	Athens peak	Liege	Singapore
3	Madrid	Madrid	Milan Linate	Gatwick off-peak	Gatwick off-peak	Charleroi	Mexico City 'B'
4	Madrid peak	Madrid peak	Dublin	Gatwick shoulder	Gatwick shoulder	Ostende	Johannesburg
5	Dublin	Dublin	Lisbon low	Stansted off-peak	Stansted off-peak	Antwerp	Seoul

charges for the U.S. and UK airports. Figure 3 shows charges for a B737-500 daytime turnaround at twenty-two European airports, and Figure 4 contains the night-time charges at these airports for the same aircraft. Figure 5 shows the charges at European airports for a Chapter 2 aircraft turnaround (DC9-30). Note the sizeable noise-related landing charges at several airports. Figure 6 is an example of freighter aircraft turnaround charges in Europe. Airport codes for Figures 1-5 are shown in Table 8.

Table 6
Airports With the Highest and Lowest Average Total Charges for Chapter 2 Aircraft Included in the ACM Variants

	Europe 1995	*Europe 1996*	*Europe Night 1996*	*Freight 1996*	*Night Freight 1996*	*Regional 1996*	*World 1996*
Highest:							
1	Dusseldorf	Dusseldorf	Dusseldorf	Dusseldorf	Cologne	Numberg	JFK
2	Frankfurt	Frankfurt	Frankfurt	Cologne	Dusseldorf	London City peak	Tokyo Narita
3	Munich	Munich	Helsinki	Frankfurt	Frankfurt	London City off-peak	Frankfurt
4	Heathrow Peak	Heathrow Peak	Munich	Munich	Helsinki	Frankfurt	Chicago
5	Manchester peak	Manchester peak	Stockholm	Geneva	Stockholm	Bremen	Heathrow peak
Lowest:							
1	Rome	Rome	Madrid	Athens off-peak	Athens off-peak	Charleroi	Mexico City 'A'
2	Milan Linate	Milan Linate	Dublin	Athens peak	Athens peak	Liege	Singapore
3	Madrid	Madrid	Rome off-peak	Gatwick	Gatwick off-peak	Luxemburg	Mexico City 'B'
4	Madrid peak	Madrid peak	Milan Linate	Gatwick shoulder	Gatwick shoulder	Ostende	Johannesburg
5	Dublin	Dublin	Lisbon low	Stansted off-peak	Stansted off-peak	Antwerp	Seoul

Table 7
Schiphol Rankings in the ACM Variants

	Europe 1995	*Europe 1996*	*Europe Night 1996*	*Europe Freight 1996*	*Europe Night Freight 1996*	*World 1996*
Number of airports in ACM variant	28	29	25	37	37	27
Schiphol rank all aircraft (1=highest charges)	12	14	13	11	15	15
Schiphol rank Chapter 2 aircraft	12	12	12	11	15	10
Schiphol rank Chapter 3 aircraft	11	14	14	15	20	15

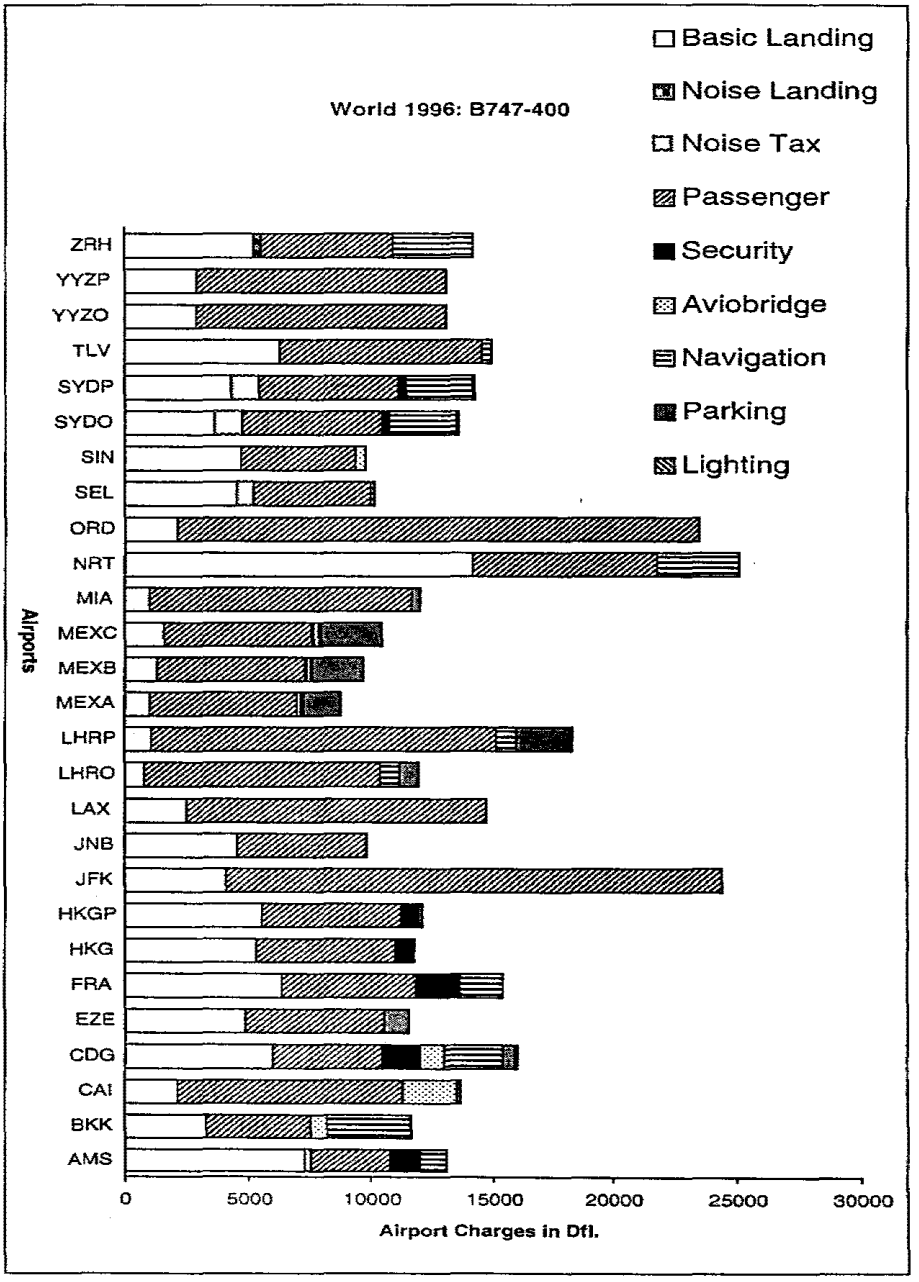

Figure 1. Airport charges for B747-400 daytime turnaround

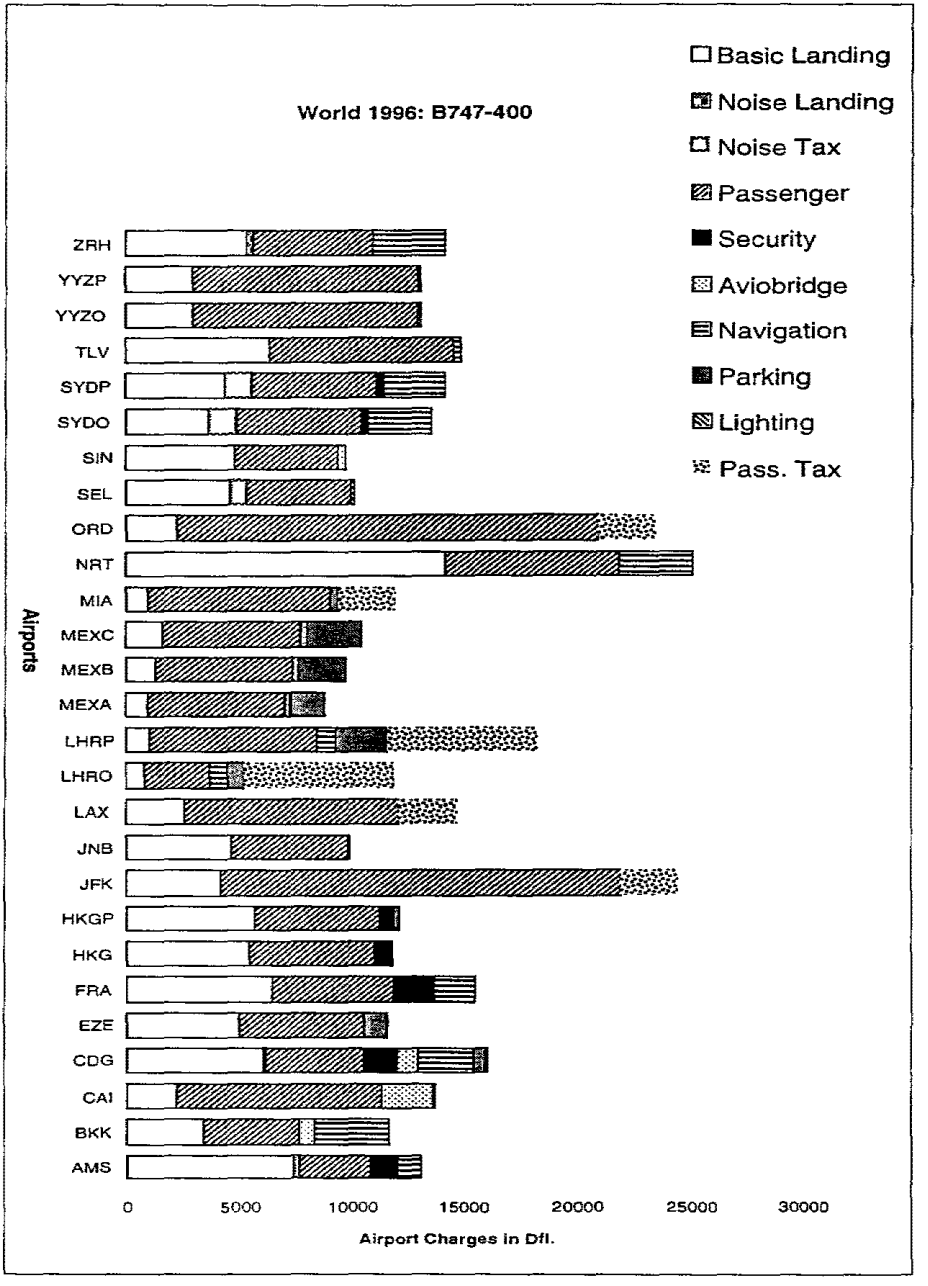

Figure 2. Airport charges for B747-400 daytime turnaround without government passenger charges

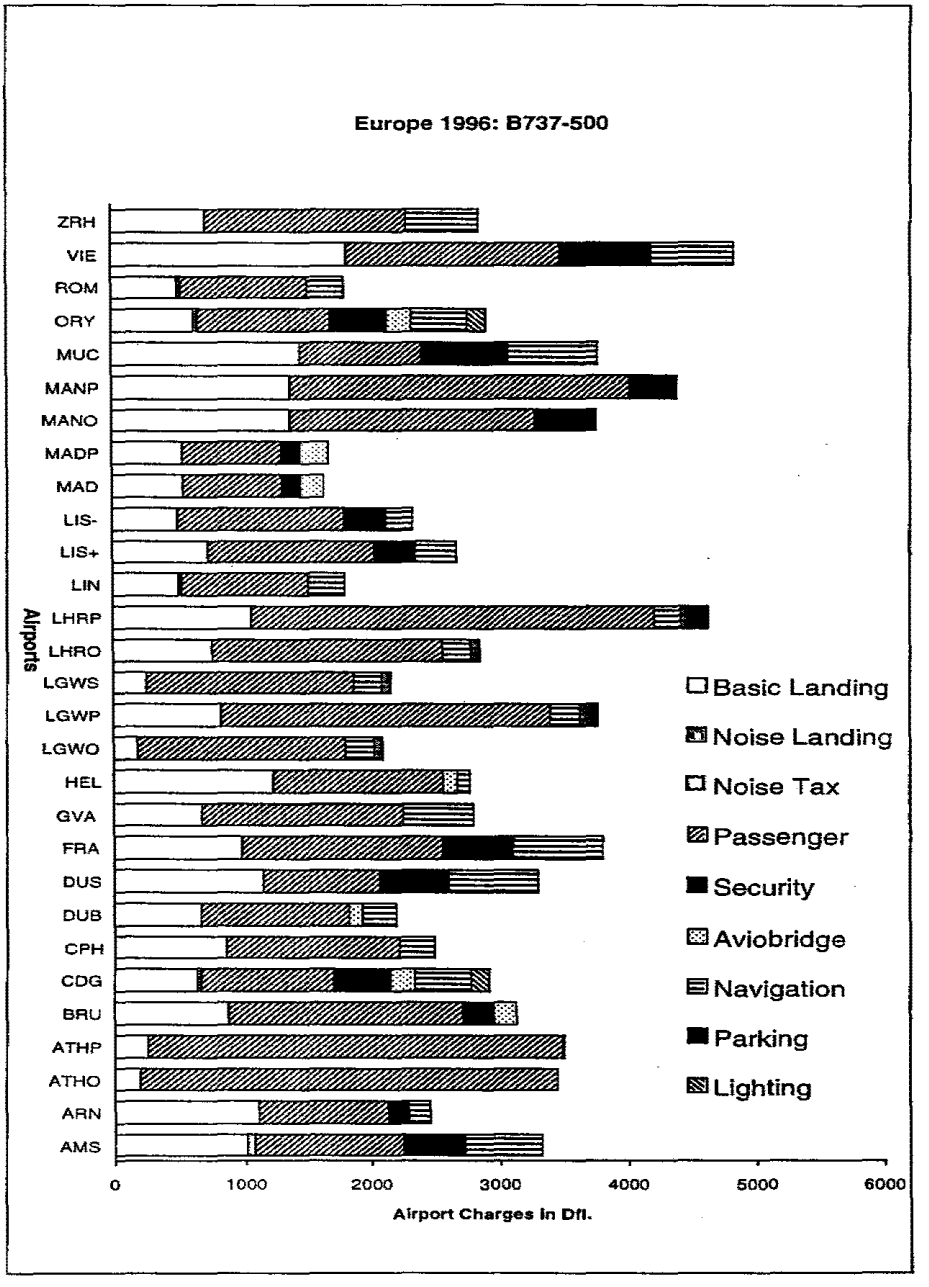

Figure 3. Airport charges for B737-500 daytime turnaround

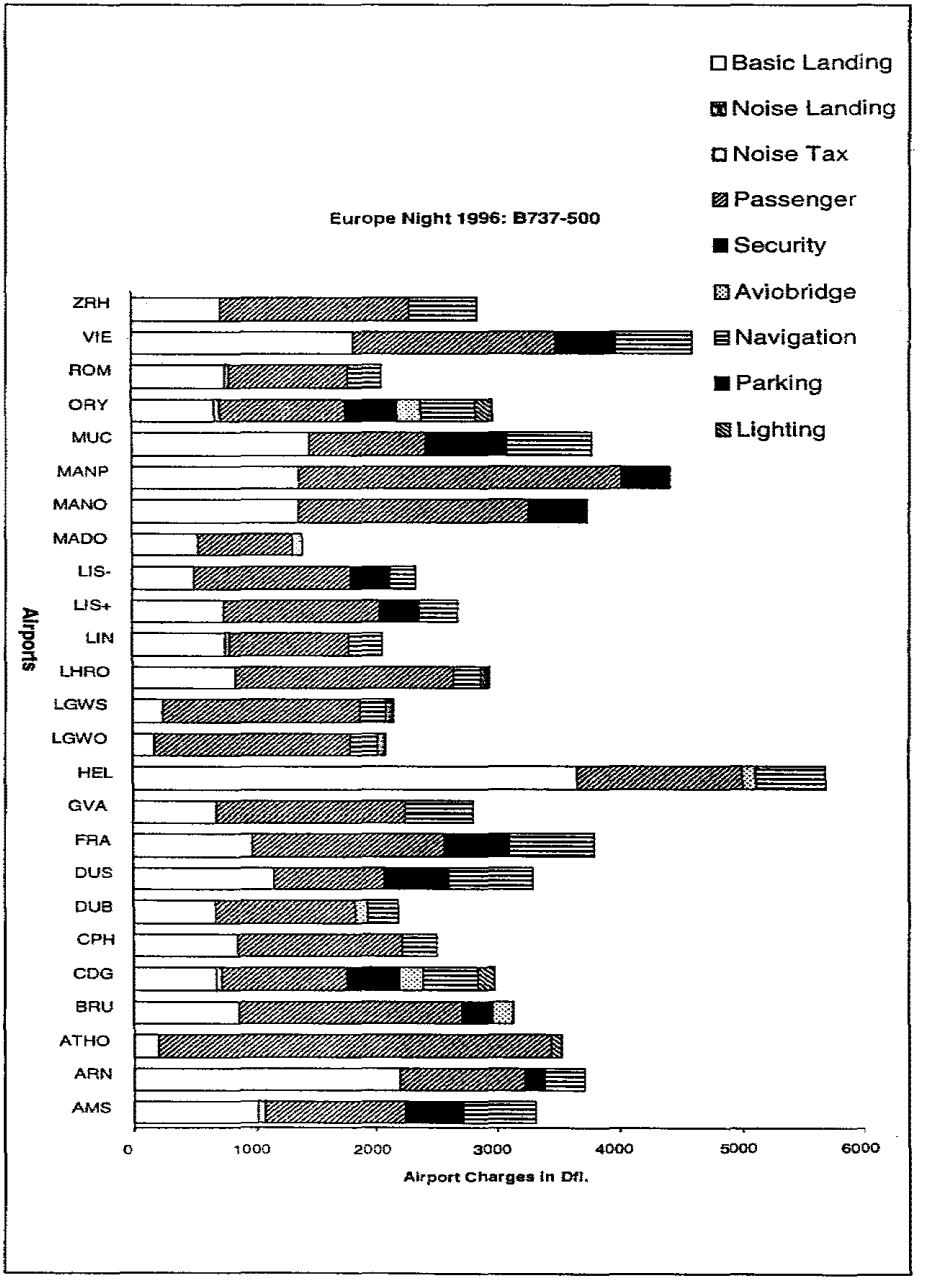

Figure 4. Airport charges for B737-500 nighttime turnaround

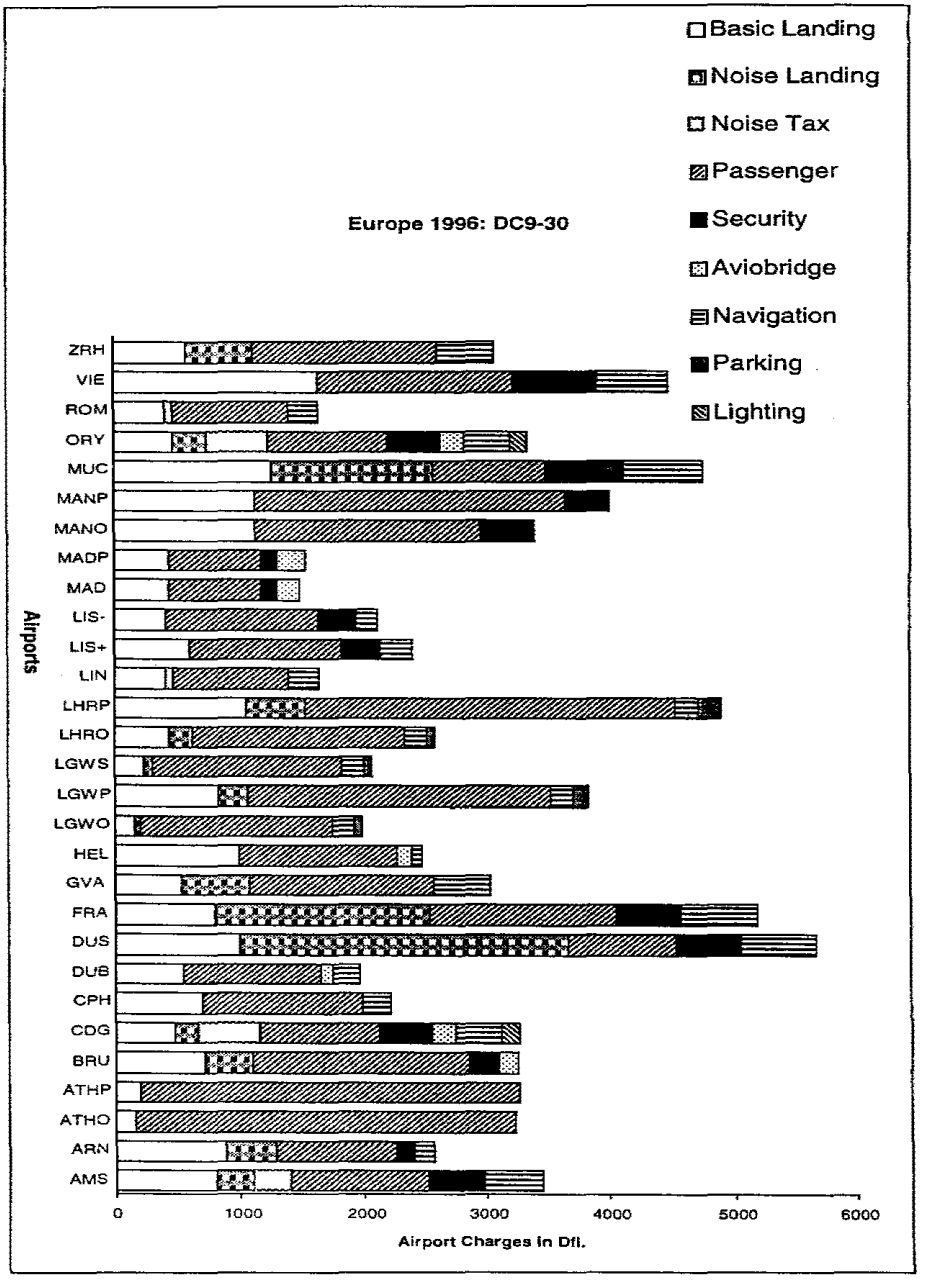

Figure 5. Airport charges for DC9-30 daytime turnaround

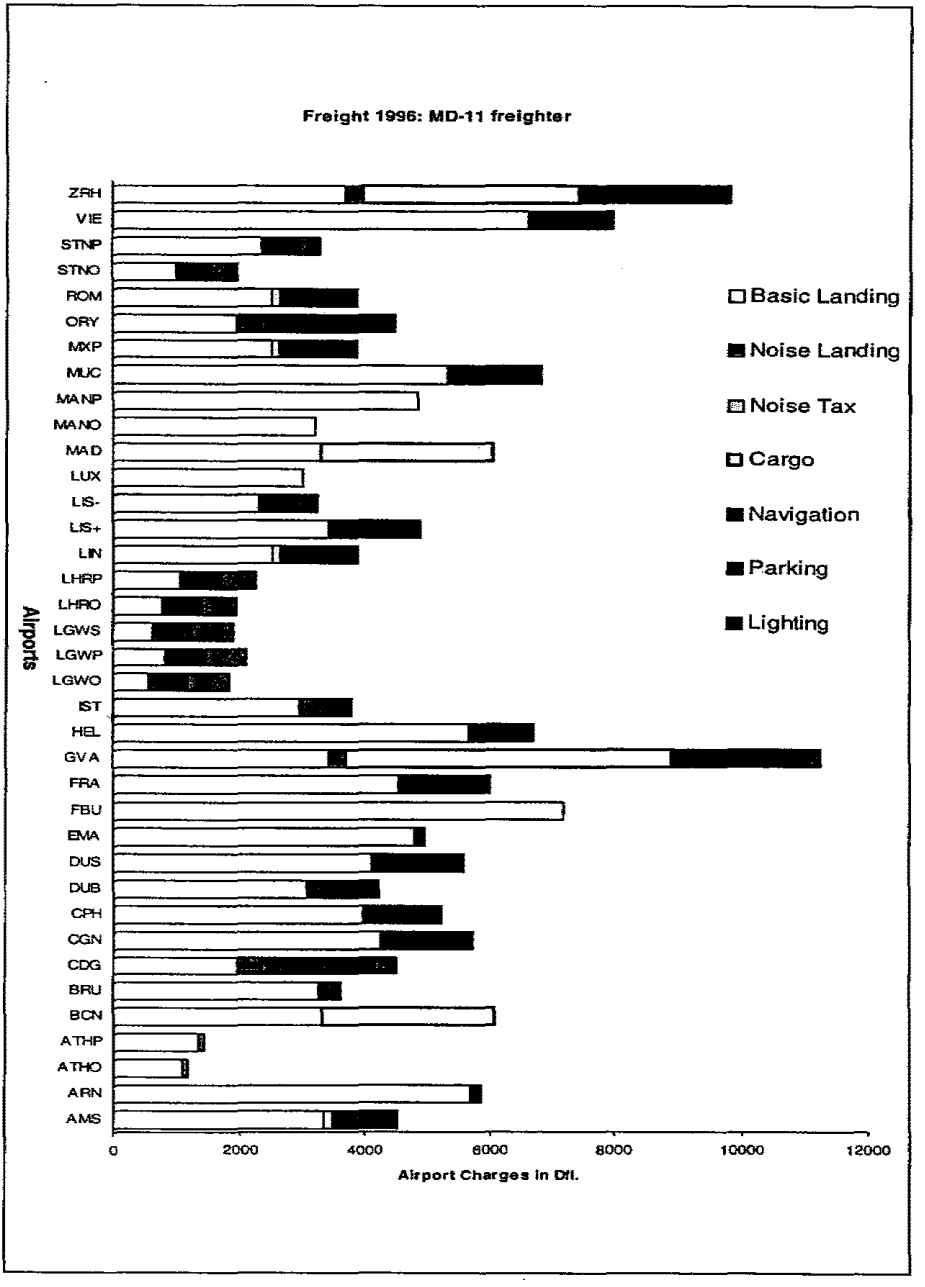

Figure 6. Airport charges for freight aircraft

Table 8
Key to Airport Codes

ZRH	Zurich, Switzerland
YYZP	Toronto, Canada
YYZO	Toronto, Canada
TLV	Tel Aviv, Israel
SYDP	Sydney, Australia
SYDO	Sydney, Australia
SIN	Singapore
SEL	Seoul, South Korea
ORD	Chicago, Illinois
NRT	Narita, Tokyo, Japan
MIA	Miami, Florida
MEXC	Mexico City
MEXB	Mexico City
MEXA	Mexico City
LHRP	London Heathrow
LHRO	London Heathrow
LAX	Los Angeles International Airport, California
JNB	Johannesburg, South Africa
JFK	John F. Kennedy Airport
HKGP	Hong Kong
HKG	Hong Kong
FRA	Frankfurt, Germany
EZE	Buenos Aires, Argentina
CDG	Paris, France
CAI	Cairo, Egypt
BKK	Bangkok, Thailand
AMS	Amsterdam, Netherlands

RECOMMENDATIONS FOR FURTHER RESEARCH

This paper contains a thorough and highly detailed inventory and comparison of standard airport charges within Europe and throughout the world. The market positions of a wide variety of airports in different contexts can be seen in terms of these airport charges. However, an analysis of airport charges alone does not provide a complete picture of either the costs faced by airlines when using a given airport, or the overall competitive position of that airport. In particular, the costs of fuel and handling are significant and probably at least as important to airlines as airport charges. These and possibly other costs should be further researched and in some form included in the ACM in order to provide a more complete comparison of the costs to airlines of using Schiphol with other airports. This will not be a simple task due to lack of data and the complexity of contracts and agreements between airlines, airports, handling companies and fuel companies.

ENDNOTES

1. A small number of exceptions were made for airports with seasonal peak charges.

2. R. Doganis, 'The Airport Business,' 1992, p. 63.

3. 1993/1994 handling and fuel costs for a Boeing 747-400 at Amsterdam Airport Schiphol, taken from *A Comparative Study of User Costs at Selected European Airports*, Cranfield University, Department of Air Transport, College of Aeronautics, February, 1994.

4. As defined by the International Civil Aviation Organization (ICAO) in 'Environmental Protection, International Standards and Recommended Practices, Annex 16 to the Convention on International Civil Aviation, Volume I: Aircraft Noise,' Third Edition, 1993.

5. Exchange rates were obtained from the Olsen & Associates Currency Converter on Internet. These rates were also checked against rates published in the NRC Handelsblad.

6. Exchange rates obtained from NRC Handelsblad.

7. Excluding handling and fuel charges.

8. 'A Comparative Study of User Costs at Selected European Airports,' Cranfield University, Department of Air Transport, College of Aeronautics, February, 1994, pp. 17-18.

9. According to the ITA study, 'Airport Charges in Europe', this passenger tax at French airports was instituted in 1995 and was FRF3 per embarking passenger in 1996 (pp. 40).

10. The night charges at Helsinki and Stockholm are incorrectly specified in the IATA manual. They are actually somewhat lower and as a result are overestimated in this study. The 1997 study will rectify this problem.

11. The ACM calculates charges separately for peak and off-peak periods if specified at a given airport. In such cases, the airport appears more than once in the figures, i.e. 'LHRP' and 'LHRO.'

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