

CAA Airport Operating Expenditure Benchmarking Report 2012

CAP 1060



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Benchmarking Report 2012**

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Introduction

1. Benchmarking is widely used by regulators to understand the relative efficiency performance of regulated entities. Benchmarking involves the comparison of a peer group of such entities across a range of metrics, adjusting where possible for differences in uncontrollable factors.
2. Benchmarking can provide a useful insight into the relative efficiency of different airports against the efficient performance 'frontier'; however the results of benchmarking studies need to be interpreted carefully. Different airports have different business models and operating environments, which can make direct comparisons difficult.
3. Higher operating expenditure (opex) per passenger at an airport may reflect many factors including: higher service quality, higher security standards, higher factor costs, lower levels of capital substitution, a wider range of activities being undertaken, different accounting definitions, differences in exchange rates and local prices; economies of scale; as well as underlying efficiency which is usually the primary focus of such studies.
4. It is difficult to account fully for such issues without making strong assumptions over controllable and uncontrollable factors at each airport. Such assumptions can have a significant influence on the results of benchmarking studies. Despite these issues, a comparison of airport opex in cross section and over time can still provide some insight into relative levels of efficiency, although drawing precise conclusions may be difficult.
5. This report provides a review and assessment of the airport opex benchmarking evidence available to the CAA. The CAA has used this evidence to develop benchmarks of Heathrow, Gatwick and Stansted against comparators based on publically available data. This report provides further detail on the methodology and results of this benchmarking work, referred to in the Q6 Initial Proposals.

CHAPTER 1

Literature Review

- 1.1 The CAA has reviewed several benchmarking studies, each of which has used different data and methods to assess the relative level of efficiency of each airport. This chapter provides a high level review of the methodology and results of the following studies:
- Air Transport Research Society Airport Benchmarking Report 2011;
 - Leigh Fisher Airport Performance Indicators 2011;
 - Booz & Company 2012 European Benchmarking study; and
 - Steer Davies Gleave 2012 Stansted Mid Q Review.

Air Transport Research Society Airport Benchmarking Report 2011

- 1.2 The Air Transport Research Society (ATRS) publishes an annual benchmarking study examining the performance of airports across the world using a variety of indicators and econometrics. The study has been published since 2000, with the 2011 study based on data between 2000 and 2009.
- 1.3 The 2011 study includes 141 airports with an average size of 20 million passengers. The study contains information on several UK airports including: Heathrow; Gatwick; Manchester; Stansted; Edinburgh; and Birmingham.

Method

- 1.4 The study gathers data on airports from public sources such as company accounts and surveys on various airport inputs and outputs including passengers, cargo, employees, terminal size, gates and runways for example. These metrics are used to develop various partial performance indicators such as opex per passenger.
- 1.5 The study also assesses airport productivity using econometric analysis to assess the relationship between inputs and outputs. This analysis results in an overall measure of Variable Factor Productivity (VFP) which provides a more comprehensive measure of the airports productivity taking account of its specific inputs and outputs.

- 1.6 Gross VFP levels are affected by the external business environment and internal business strategies. As some of these factors are beyond the airport operator's control, regression analysis is used to identify the effects of these factors on gross VFP and to compute a residual VFP index adjusting for their effects.
- 1.7 The following factors were tested: average aircraft size, airport size, percentage of international traffic, percentage of air cargo in total traffic, capacity constraints; non-aeronautical business, airport connecting / transferring traffic and continent.
- 1.8 Of these factors the following were found to be statistically significant variables with a non controllable impact on airport productivity.
- % of international passengers;
 - Proportion of air cargo in total traffic handled;
 - Capacity constraint indicator;
 - Share of non-aeronautical revenue;
 - Average aircraft size; and
 - % of connecting passengers.

Results and Conclusions

- 1.9 Figure 1 on the next page summarises the key productivity indicators in the ATRS study for Heathrow (LHR), Gatwick (LGW) and Stansted (STN) and a range of other comparator airports. This figure only shows a subset of the airports within the sample.
- 1.10 The figure shows that variable opex per passenger¹ was £14.40 at Heathrow, £8.69 at Gatwick and £6.92 at Stansted. This compares with an overall average across the sample of £7.16.²
- 1.11 Overall the study indicates that Heathrow's productivity as measured by residual VFP is equivalent to 40% of the most efficient European airport (Copenhagen), Gatwick is 50% as efficient and Stansted is 64% as efficient. All three airports are below the sample average of 70% indicating relatively low levels of efficiency. In comparison, Edinburgh is

1 Variable opex per passenger is defined as labour costs and "soft input costs", which is a catchall term for all non-labour and non-capital costs.

2 The ATRS report uses US\$ as the unit of currency. The CAA have applied an exchange rate of 0.63 to convert the \$ into £. This is based on the average exchange rate over 2012.

shown to be relatively efficient with net VFP equal to 84%. Amsterdam Schiphol is one of the most efficient large European airports with a VFP of 76%.

Figure 1 Total Opex / Passengers ATRS Sample Indicators 2009

Airport	Terminal Size (m2)	Runways	Gates	Pax (k)	% International	FTEs	Pax / Terminal Area (m2)	Pax / Gate	Pax / Employees	Opex per Pax (£)	Net VFP
AMS	591,885	6	99	43,570	100%	2,241	74	440,105	19,442	13.35	0.76
ATL	538,837	5	186	88,619	10%	618	165	476,606	143,445	2.40	1.60
BHX	64,488	1	31	9,103	85%	641	141	293,642	14,201	6.67	0.67
CDG	542,595	4	124	57,907	77%	3,858	107	466,991	15,010	26.06	0.52
CPH	96,965	3	108	19,715	90%	1,852	203	182,550	10,645	8.38	1.00
DUB	40,000	2	71	20,504	97%	1,350	513	288,784	15,188	15.71	0.73
EDI	40,126	2	24	9,049	46%	413	226	377,056	21,911	5.58	0.84
FRA	800,000	3	147	50,938	87%	17,441	64	346,516	291	20.59	0.38
HKG	750,000	2	80	46,928	100%	1,100	63	586,600	42,662	5.53	1.00
LGW	195,000	1	118	32,397	89%	2,398	166	274,551	13,510	8.69	0.50
LHR	632,064	2	195	66,037	92%	5,407	104	338,651	12,213	14.40	0.40
MAN	136,400	2	103	18,265	88%	2,040	134	177,330	8,953	8.56	0.52
MUC	458,000	2	206	32,681	72%	4,373	71	158,646	7,468	22.19	0.36
SIN	1,046,220	2	102	38,611	100%	1,300	37	378,537	29,701	5.24	0.88
STN	39,000	1	65	19,957	91%	1,151	512	307,032	17,339	6.92	0.64
Average*	20,390	2.59	69	20,390	40%	1,124	124	306,771	31,919	7.16	0.70

Residual VFP numbers are relative to the most efficient airport which = 1 (Most efficient airports are Copenhagen in Europe, Hong Kong in Asia and Vancouver in North America)

*Average calculated over full airport sample – including airports not shown in the table. US\$ converted to £ at rate of 0.63. Source: (ATRS, 2011)

Key Findings

- 1.12 The key findings of the study in relation to opex efficiency are listed below:
- 'Variable cost' per passenger is twice the average of the sample at Heathrow and above average at Gatwick. Opex per passenger at Stansted is slightly below the average.
 - Heathrow, Gatwick and Stansted are found to be less efficient than the European benchmark 'frontier' (represented by Copenhagen) as measured using residual VFP.
 - Atlanta, Istanbul, Copenhagen, Oslo, Zurich, Hong Kong and Edinburgh are found to be relatively efficient based on residual VFP.
 - Cologne, Paris Charles de Gaulle, Tokyo, Ontario and Los Angeles are found to be relatively inefficient based on residual VFP.

Assessment

- 1.13 The study suggests that in 2009, opex per passenger was significantly higher than the average at Heathrow, around average at Gatwick and below average at Stansted. This relative performance is likely to be reflected by the type of passenger and aircraft using each airport. For example around 92% of passengers at Heathrow are travelling internationally. There are however several airports of similar size, with similar levels of international passengers that outperform Heathrow, Gatwick and Stansted in terms of opex per passenger (Amsterdam, Copenhagen, Singapore and Edinburgh for example) suggesting that the airports are not at the efficient frontier.
- 1.14 This conclusion is confirmed by the VFP analysis in the study, which indicates that Heathrow, Gatwick and Stansted are relatively inefficient when compared with frontier performance (as represented by Copenhagen) and are also below the average VFP performance across all European airports in 2009.
- 1.15 The sample used in the study is large, covering 141 airports across the world over nine years. This will tend to improve the reliability of the analysis relative to smaller studies. On the other hand it is unclear that the data for each airport has been collected on a like for like basis. Given the large sample size and different national standards in terms of security standards, accounting definitions etc. There are likely to be some differences in the definition of data used. Whilst some adjustments have been made it is unclear how comparable the airport

metrics are – for example there is no consideration of different security arrangements and the level of service quality at each airport. The results will also be sensitive to the conversion rates used.

Leigh Fisher Airport Performance Indicators 2011

- 1.16 The Leigh Fisher Benchmarking study provides benchmark comparisons of airports across key metrics including opex per passenger. The study sample is based on 50 airports including Heathrow and Gatwick, but not Stansted. The average size of the airports in the sample is 35 million. The study is based on financial reporting for 2009.

Method

- 1.17 The study collects data from financial accounts and separates opex into three separate categories including staff costs, non-staff costs and depreciation.
- 1.18 Several adjustments are made to the data to improve comparability between airports. This includes adjusting costs to account for core and non-core airport activities. Core airport activities are defined as:
- The provision of runway, taxiways and aprons for the use of airlines and their agents;
 - The provision and operation of terminals in which passengers pre and post flight formalities are completed;
 - The provision of space within terminals in which concessionaires in a variety of retail businesses may provide shopping, catering and amusements facilities for passengers' use; and
 - The development of space within airport boundaries for the provision of infrastructure necessary for the effective operation of the airport, both from a passenger and an airline perspective, including the provision of aircraft hangers, cargo handling facilities, car parking facilities, offices and other commercial real estate.
- 1.19 Non-core activities which are excluded from the analysis are defined as:
- Ground handling services;
 - Car parking;
 - Retail services;
 - Rail services;

- Hotel and catering services and;
- Air traffic control services.

1.20 Where possible non-core activities have been removed from the opex data so that the metrics are based on a comparison of core activities only. This includes removing the cost of Heathrow Express from Heathrow's opex costs for example.

Results and Conclusions

1.21 Figure 2 below summarises the relative performance of Heathrow and Gatwick against the maximum, minimum and average of the sample based on total opex per passenger, 'adjusted opex' per passenger (staff costs plus depreciation) and staff costs per passenger.

Figure 2 Relative Performance of Heathrow and Gatwick, 2009

£ nominal	Total Opex / Pax	Adjusted Opex / Pax	Total Staff Costs / Pax
Max	33.4	20.6	6.8
Average	10.5	6.0	2.8
Min	1.9	0.7	0.1
Heathrow	23.5	13.3	6.2
Gatwick	15.5	9.2	6.8

Source: CAA analysis based on (Leigh Fisher, 2011)

1.22 Total opex per passenger is over twice the average at Heathrow and around 50% above the average at Gatwick. Costs per passenger are also significantly above the average in terms of adjusted costs and staff costs per passengers.

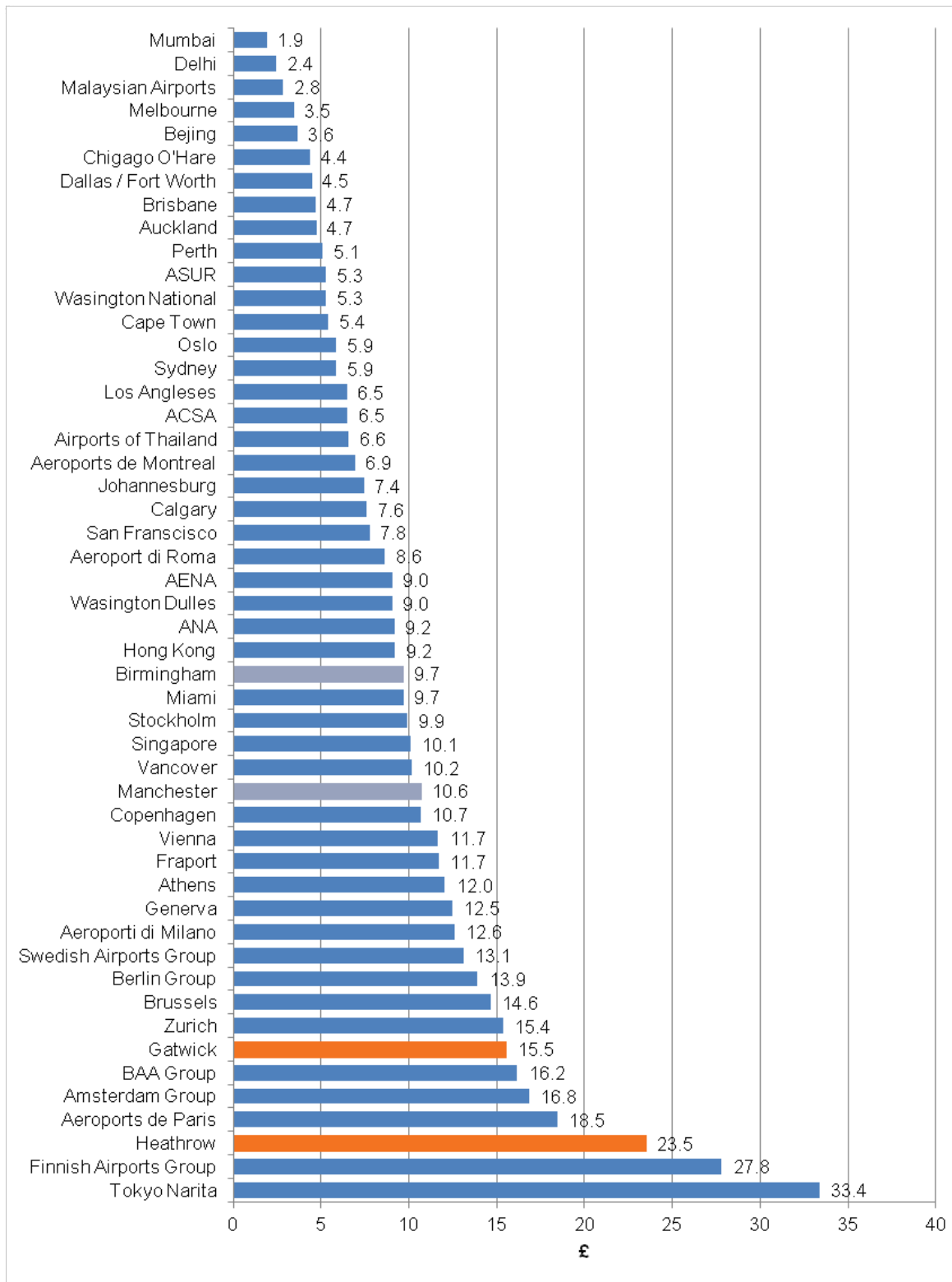
1.23 The relative position of Heathrow and Gatwick against the benchmark sample in terms of total opex per passenger is shown graphically overleaf. Both airports are within the top ten, with Heathrow third highest behind Tokyo Narita and the Finnish airport group.

Key Findings

1.24 The key findings of the study are that:

- In 2009, total opex per passenger was £23.5 at Heathrow and £15.5 at Gatwick, significantly higher than the sample average of £10.5 at both airports.
- Total 'adjusted opex' per passenger was £13.3 at Heathrow and £9.2 at Gatwick, significantly higher than the sample average of £6.0 at both airports.
- Total Staff cost per passenger was £6.2 per passenger at Heathrow and £6.8 at Gatwick, more than twice the sample average of £2.8 at both airports.
- Heathrow and Gatwick are amongst the most expensive airports in the sample in terms of total opex per passenger.

Figure 3 Total Opex / Passengers, 2009



Source: (Leigh Fisher, 2011) with CAA conversion to £ nominal based on annual average exchange rates

Assessment

- 1.25 The Leigh Fisher study provides an assessment of airport performance against a sample of 50 major world airports based on partial productivity metrics of opex per passenger. The data used in the study is adjusted in order to provide a consistent estimate of 'core' airport opex; however there are a number of factors which are not accounted for including for example; factor costs, service quality standards and geographic location.
- 1.26 The study indicates that Heathrow and Gatwick have amongst the highest levels of opex per passenger of the sample, significantly above the average and a number of specific comparators of similar size including; Amsterdam, Paris and Hong Kong (for Heathrow) and, Manchester, Copenhagen and Zurich (for Gatwick). This suggests that opex efficiency is relatively low and supports the results of the ATRS study.

Booz & Company European Airport Benchmarking Study 2012

- 1.27 BAA commissioned a study by Booz & Company to benchmark the opex performance of Heathrow against a variety of European comparators based on 2011 financial account data³.

Method

- 1.28 The study uses a selection process to identify several European airports that could be considered comparable to Heathrow on the basis of size, passenger mix, activities undertaken and other factors. On this basis the study selected the following airports and airport groups for inclusion in the sample:
- Amsterdam (AMS) (Group);
 - Athens (ATH);
 - Birmingham (BHX);
 - Paris Charles de Gaulle (CDG) (Group);
 - Copenhagen (CPH);
 - Dublin (DUB) (Group);

³ This report is not publically available. Extracts have been published with the permission of Booz & Company.

- Edinburgh (EDI);
 - Frankfurt (FRA);
 - London Gatwick (LGW);
 - Manchester (MAN);
 - Munich (MUC) and
 - Zurich (ZRH).
- 1.29 The study does not include any Asian or American airports, stating that such airports “face very different financial structures and are often managed to a different set of financial objectives.”
- 1.30 The study also makes several adjustments for group costs. This involves attributing costs to individual airports based on passenger numbers and ATM movements. The study also makes adjustments to account for rail, NATS and tenant utility costs at Heathrow. Following these adjustments, opex per passenger is compared across the benchmark sample directly and using wage and factor cost adjustments.
- 1.31 In addition to the partial productivity metrics, the study also uses an econometric model to account for differences associated with uncontrollable factors. This is based on a ‘residual’ approach whereby costs are separated into; Inherent, Structural, Systematic and Realised costs, which can then be defined as controllable and non-controllable.
- 1.32 The uncontrollable factors accounted for in the analysis include:
- Airport size;
 - Average aircraft size;
 - Share of international traffic; and
 - Share of air cargo services.
- 1.33 The residual productivity analysis, having taken account of these factors, is then used to estimate the relative efficiency gap of Heathrow against specific comparators.

Results and Conclusions

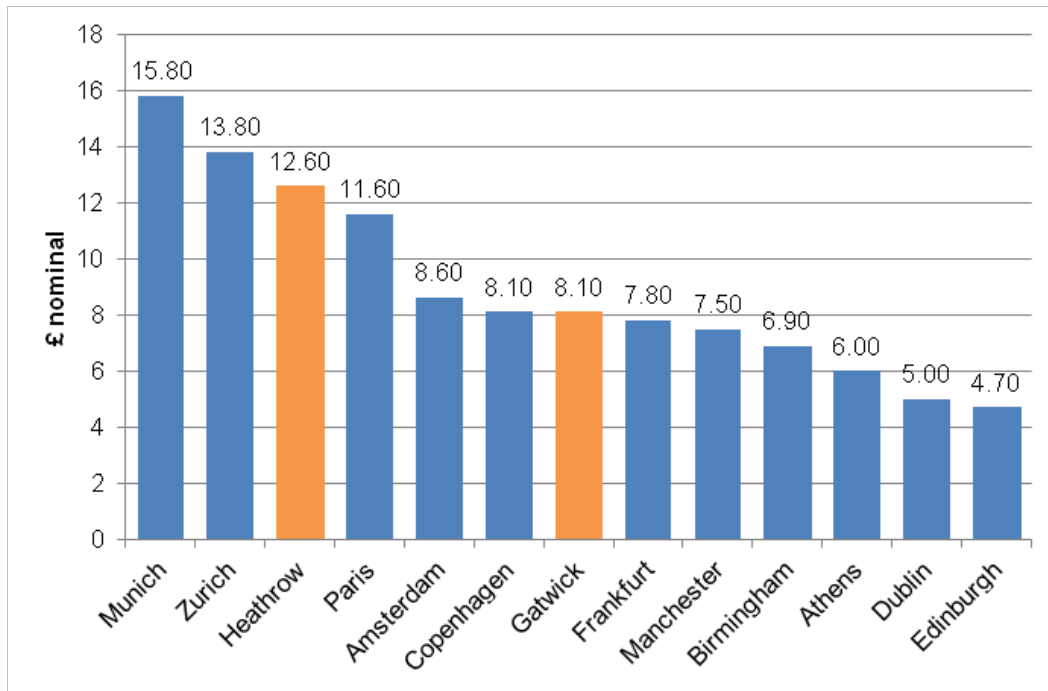
Total Opex per Passenger

- 1.34 The study estimates that total ‘adjusted’ opex per passenger at Heathrow was £12.30 in 2011, the second highest of the sample group,

although reduced from £12.60 in 2008. Opex per passenger at Gatwick was £9.10, the fifth highest in the sample and up from £8.10 in 2008. In comparison the sample average opex per passenger was £8.96 and £8.90 in 2008 and 2011 respectively. The relative position of the airports is shown below in Figure 4 and Figure 5 on the next page.

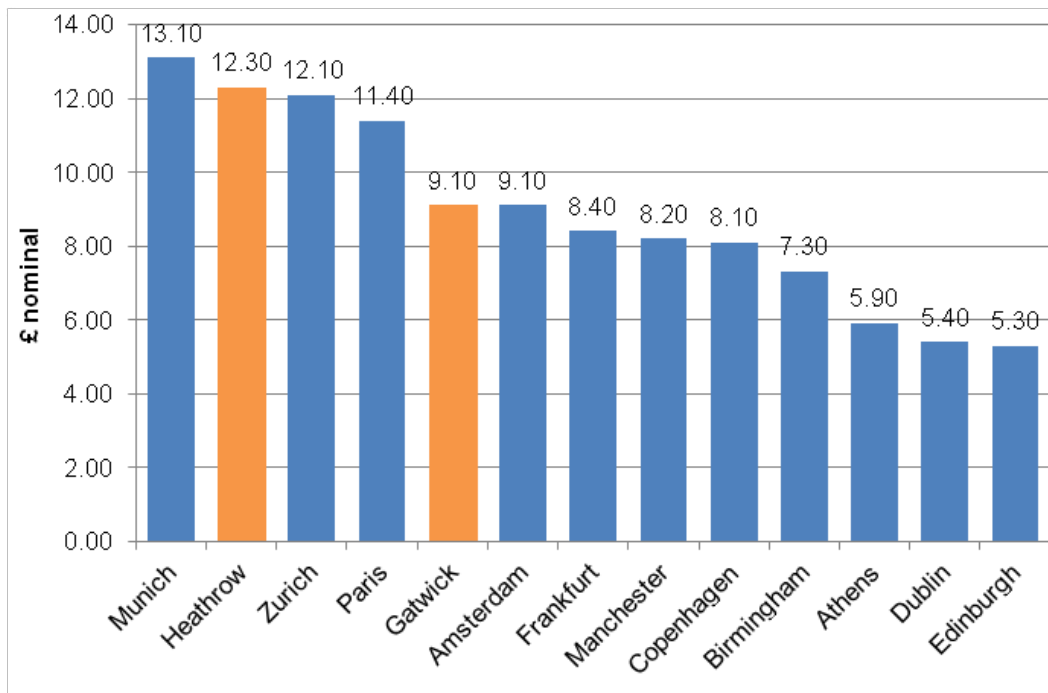
- 1.35 The study makes several observations about Heathrow's opex performance relative to the sample:
- "LHR moved from the third highest airport in 2008 to the second highest amongst the comparator group in 2011 as a result of ZRH reducing its costs by 10% over the time period."
 - "LHR was the only UK airport to decrease its per passenger operating costs in 2008-2011. All UK comparators experienced increasing operating costs (per passenger) in this same time period."
 - "MUC and ZRH are interesting examples of increased efficiency as they both decreased operating costs. MUC improved its efficiency as a result of a 17% decrease in costs per passenger from 2008 – 2011 while maintaining the same level of passengers over the years. However this might be due to MUC's extensive non-aeronautical activities which we have not been able to exclude from this analysis."
 - "ZRH increased the number of passengers by 10% while reducing total costs by 5%. Consequently, ZRH achieved a significantly lower opex per passenger in 2011 than in 2008."
 - "AMS has been shown to be the most efficient large European hub airport. Unlike LHR it outsources its security operations to a number of security providers. It also has a much more expansive area of land to operate from, and as a result is considered a world-class leader in the concept of "Airport City" development, deriving significant additional non-aeronautical revenue from its real-estate business."

Figure 4 Adjusted Opex per Passenger, 2008



Source: (Booz & Company, 2012)

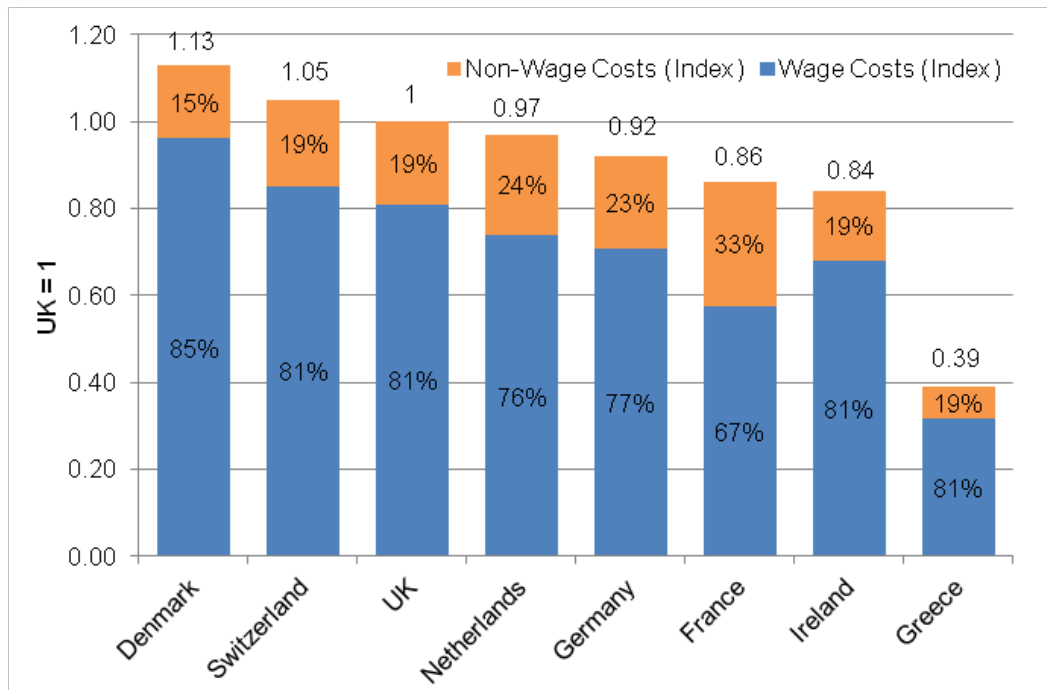
Figure 5 Adjusted Opex per Passenger, 2011



Source: (Booz & Company, 2012)

Adjusted Opex per Passenger

- 1.36 The study notes that the factor costs facing each airport are an important driver of cost, which should be accounted for in order to make an assessment of efficiency. The study makes factor cost adjustments in three areas:
- Staff costs based on national wage rates;
 - Energy costs, based on national price indices; and
 - Rent and rates, based on average rates paid in the UK.
- 1.37 The study states that:
- 1.38 “the UK faces some of the highest total staff costs amongst the comparators, only surpassed by Denmark and Switzerland. The main drivers are, first the gross salary level... Second, the weakening of the Euro plays a part and will naturally lower the index for the Euro countries. Both of these effects are, however, partly countered by a relatively low proportion of pension and social costs in comparison with other European countries – in particular France.”
- 1.39 The factors used in the analysis are shown below in Figure 6. The data suggests that France, Germany, the Netherlands and Belgium have lower labour costs than the UK.

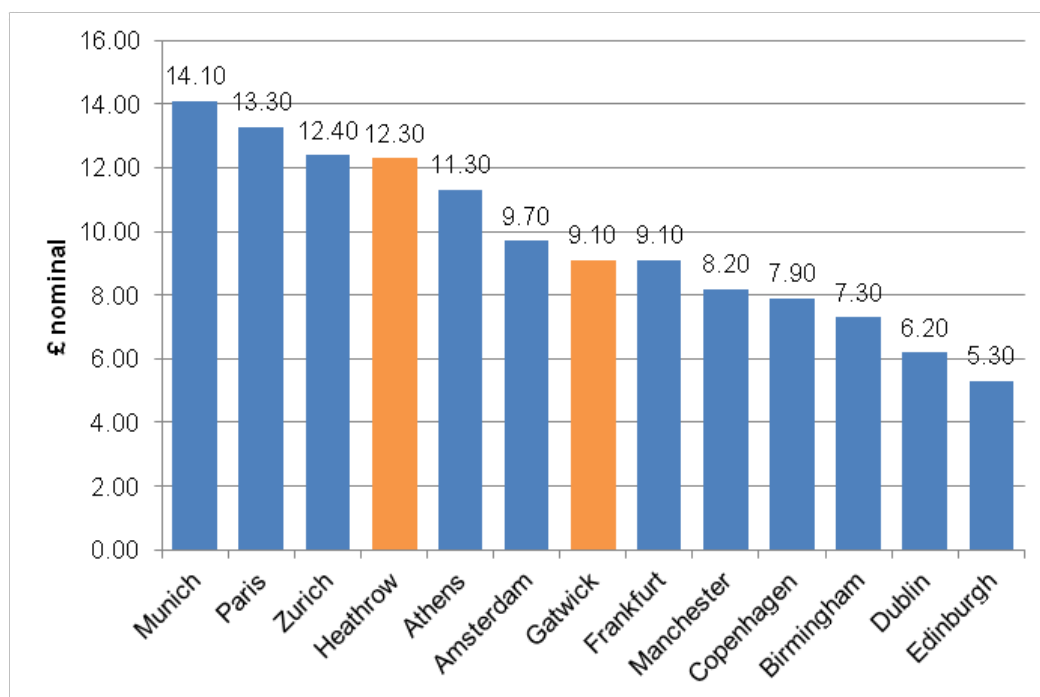
Figure 6 Average Staff Costs Compared to the UK (Gross Earnings)

Source: Eurostat and Booz & Company analysis

- 1.40 Adjusting staff costs to account for these differences, the study finds that: "LHR has the 2nd highest level of staff cost per FTE in the benchmark group even when staff costs have been adjusted for labour market differences." This is attributed to Heathrow's position in a high cost area of London where wage rates are relatively high compared to the UK average.
- 1.41 The study states that utility costs in the UK are around average – lower than Germany, Ireland and Greece, but higher than the Netherlands, Denmark and France. Overall, after adjusting for differences in national costs Heathrow's utility costs per passenger are the second highest in the sample (slightly below Gatwick, but almost twice as high as the third highest airport Athens).
- 1.42 To account for difference in rent and rates costs, the study uses the ACI airport survey to estimate the average proportion of expenditure on rent and rates across the UK (10% as a proportion of total opex) and non-UK airports (6%). The costs of non-UK airports have been inflated to 10% of total opex to normalise to UK levels of rent and rates, which tend to be higher than European comparators.
- 1.43 Using these three factor cost adjustments the study estimates a factor cost adjusted, adjusted opex per passenger for each airport. The results

are shown in Figure 7. This shows that as a result of the factor cost adjustment Heathrow has fallen from the 2nd to the 4th highest airport in terms of opex per passenger. Gatwick has fallen from the 5th to the 7th highest. Heathrow remains above the sample average of £9.71 and is above Amsterdam, which has an opex per passenger of £9.70. Gatwick is now below the average but remains above comparators such as Copenhagen.

Figure 7 Factor Cost Adjusted Opex per Passenger, 2011



Source: (Booz & Company, 2012)

Econometric Analysis

1.44 To account for uncontrollable factors described above, the study uses econometric analysis to adjust for the impact of long haul and premium passengers on opex per passenger, finding a relationship between these variables in a pooled cross-sectional regression. The relationship is shown below and has an R² value of 0.56, although the statistical significance of the variables is noted to be rejected at the 5% level.

$$\text{Opex/pax} = 6.0 + 2.8 * (\% \text{ Long Haul}) + 64.4 * (\% \text{ Premium Passengers})$$

1.45 Using this formula the study compares Heathrow with three benchmark airports in terms of opex per passenger; Amsterdam, Gatwick and Edinburgh. The analysis takes account of each airports passenger 'complexity' to derive a 'residual productivity factor' for Heathrow

finding that opex per passenger at Amsterdam is £1.10 lower than Heathrow, Gatwick is £0.80 lower, and Edinburgh is £1.30 lower.

Key Findings

- 1.46 The overall conclusions of the study are summarised in the following points:
- Overall total adjusted opex per passenger is £12.30 at Heathrow and £9.10 at Gatwick, this compares with an average of £8.90 for the sample as a whole.
 - Factor cost adjustments for wages, utility and rent and rates costs increase the average adjusted opex across the sample to £9.71.
 - After factor cost adjustments, opex per passenger at Heathrow remains above Amsterdam. Gatwick remains above comparators such as Manchester and Copenhagen.
 - Econometric analysis of opex per passenger, accounting for passenger complexity indicates that in comparison to Amsterdam, Gatwick and Edinburgh, Heathrow has an efficiency gap of between £0.80 and £1.30 (assuming these airports represent the efficient frontier).

Assessment

- 1.47 The estimates of adjusted opex per passenger are slightly lower than the estimates in the other study, and the sample average is slightly higher – probably because of different opex adjustments and also because the study is based on more recent 2011 data.
- 1.48 The sample used in the study is smaller in comparison with the other studies; focussing on only 13 airports in two time periods. On the other hand it could be argued that the sample is more directly comparable for the purposes of benchmarking Heathrow.
- 1.49 In principle the adjustments for national factor costs could improve the analysis; however the choice of data may influence the results and improve the apparent position of Heathrow and Gatwick.
- 1.50 For example the Eurostat data used to adjust staff costs across the sample is based on gross annual earnings, which shows that the UK has higher staff costs than France, Netherlands and Germany. However the same data shows that on an hourly basis, UK staff costs are lower than most countries in Europe. Minimum wages are also lower, as are 'hourly

labour costs in the business economy'. These three metrics all show the UK has lower labour costs than France the Netherlands and Germany in contrast to the Booz & Company analysis⁴.

- 1.51 It is likely that 'passenger complexity' may have some impact on costs; however the regression results used to estimate the parameters for the adjustment are based on a very small sample. It is possible that a larger sample could generate different estimates of these parameters and the overall efficiency assessment.
- 1.52 Overall the study provides a useful framework for assessing airport opex per passenger. However in order to implement this framework many adjustments and assumptions have been made, which may affect the results and could potentially favour the UK airports.

Steer Davies Gleave Stansted mid Q Review

- 1.53 As part of the Stansted mid Q review, Steer Davies Gleave undertook opex per passenger benchmarking to analyse the relative performance of Stansted against other major UK airports, including Heathrow and Gatwick (Steer Davies Gleave, 2011).

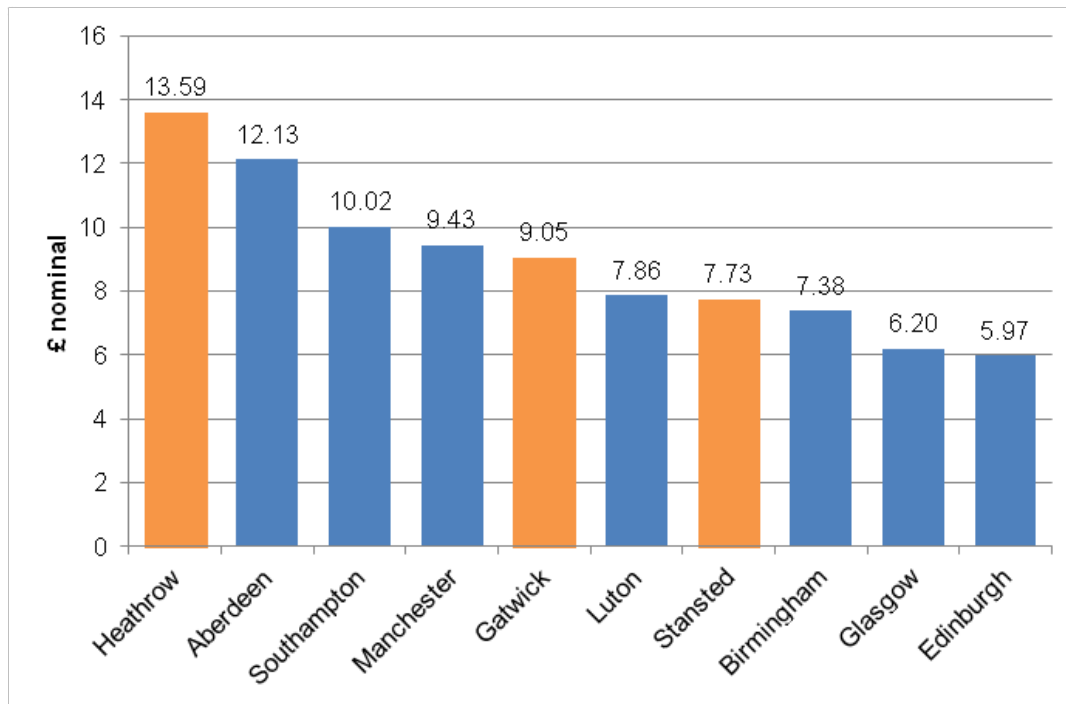
Method

- 1.54 The study used published financial accounts to gather information on airport opex between 2000 and 2010. This information was adjusted to ensure comparability between each airport by removing costs related to depreciation, NATS and PRM. The costs were also deflated into a common price base to enable historical comparisons of opex over time.

Results and Conclusions

- 1.55 The study used an adjusted opex measure, excluding depreciation, retail, rail, ANS and PRM costs where possible. The figures for 2010 are shown in Figure 8 below. No adjustments are made for factor costs or passenger complexity in the results, although as the airport sample only includes airports from the UK there is less need for such adjustment.

4 Based on figures from Eurostat, April 2013, including median gross hourly earnings of all employees, hourly labour costs in the business economy and minimum wages: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Wages_and_labour_costs

Figure 8 Adjusted Opex per Passenger, 2010

Source: (Steer Davies Gleave, 2011)

1.56 The study also examined changes in adjusted opex per passenger over time, estimating that between 2000 and 2011, opex per passenger increased by 33% at Gatwick and -1% at Stansted. This compares with a group median reduction of 13%. No figures for Heathrow are provided.

Key Findings

1.57 In 2010, adjusted opex per passenger at Heathrow was £13.59, significantly above the sample average of £8.94. Opex per passenger at Gatwick was £9.05, and £7.73 at Stansted.

Assessment

1.58 The SDG study has a relatively limited sample of UK airports. This reduces the complexity of the analysis relative to the other studies as the opex data does not need to be adjusted for exchange rates, prices or other factors; however there are no airports of an equivalent size to Heathrow within the sample.

1.59 The study also provides some analysis of changes in cost over time at Gatwick and Stansted. This provides a useful form of analysis to complement the static comparisons and shows how opex per

passenger has changed over time relative to the benchmark sample. The advantage of this approach is that differences between airports business models are a less significant factor in the analysis.

Summary of Evidence

1.60 The benchmarking studies indicate that opex per passenger at Heathrow is significantly above the average as measured in the various study samples. Opex per passenger is generally slightly above the sample averages at Gatwick, although not in every study. Opex per passenger at Stansted is below the average in both of the studies in which it is included. The results of the studies with regard to opex per passenger are summarised in Figure 9 below.

Figure 9 Opex per Passenger Estimates (£)

Study / Airport	ATRS 2009	Leigh Fisher 2009	Booz & Co 2011	SDG 2010
Heathrow	14.40	13.30	12.30	13.59
Gatwick	8.69	9.20	9.10	9.05
Stansted	6.92	Not Included	Not Included	7.73
Sample Average	7.17	6.00	9.71	8.94
Sample Size	141	50	13	10
Average Airport Size	20.4m	35.1m	30.6m	22.5m

- 1.61 The results of the benchmarking are sensitive to the method and sample used and the studies suggest a range of relative performance with:
- Opex per passenger at Heathrow between 27% and 201% higher than the average of the studies considered;
 - Opex per passenger at Gatwick between 6% lower and 53% higher than the average of the studies considered; and
 - Opex per passenger at Stansted between 3% and 13% lower than the average of the studies considered.
- 1.62 There are several factors which may explain the relatively high levels of opex per passenger at Heathrow and Gatwick relative to the average, including higher levels of long haul passengers, service quality and

higher factor costs. Similarly lower than average costs at Stansted may be partially explained by a higher proportion of low cost airlines and short haul passengers.

- 1.63 Direct comparisons with airports of a similar size do however suggest that there is likely to be scope for catch-up at each airport. For example Heathrow's opex per passenger has been shown to be higher than Amsterdam, Paris and Hong Kong, Gatwick's higher than Copenhagen, Manchester and Zurich and Stansted higher than Edinburgh and Birmingham.
- 1.64 Furthermore, the econometric efficiency analysis in the ATRS study, which provides a more comprehensive assessment of efficiency than the partial metrics, supports this conclusion showing Heathrow, Gatwick and Stansted to be less efficient than the European average in terms of VFP taking account of a variety of input and output factors. Overall, the evidence tends to suggest that Heathrow, Gatwick and Stansted are not at the efficient frontier.

CHAPTER 2 CAA Opex Benchmarking

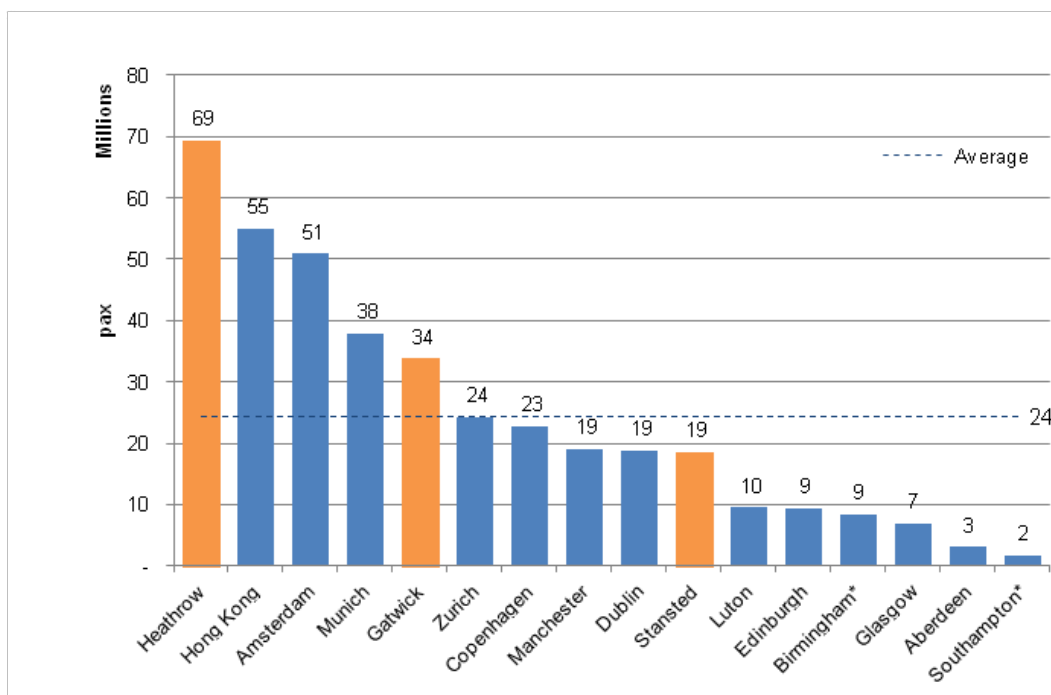
Overview

2.1 Building on the evidence and methodologies described in the previous section, the CAA has undertaken additional analysis of the relative performance of Heathrow, Gatwick and Stansted against comparators based on the latest financial data. This section describes the method and results of this work.

Method

2.2 As with the studies described above, information on airport opex has been collected from published financial accounts. This data has been collected for a sample of 16 airports from 2000 to 2011 (where available). These airports and their size in terms of passengers are shown below in Figure 10.

Figure 10 Total Airport Passengers, 2011



Source: Airport financial accounts *Denotes that data is based on financial year accounts

- 2.3 The benchmark sample has been chosen primarily on the basis of data availability. The CAA has not undertaken a detailed consideration of the comparability of the airports except to ensure that the sample includes some airports of a comparable size to Heathrow, Gatwick and Stansted. Amsterdam, Copenhagen and Edinburgh have also been included as these airports have been highlighted as relatively efficient within the literature review and could be considered representative of the efficient frontier.
- 2.4 Heathrow is the largest airport in the sample followed by Hong Kong and Amsterdam. Gatwick is the fifth largest and comparable in size to Munich, Zurich and Copenhagen. Stansted is the 10th largest airport in the sample and is comparable to Manchester, Dublin and Luton.
- 2.5 Two 'sub-samples' have been used for the purposes of benchmarking Heathrow, Gatwick and Stansted. The first sample includes the full range of airports and has been used to benchmark Heathrow.
- 2.6 The second sub-sample has been used to benchmark Gatwick and Stansted and excludes Amsterdam on the basis that it is a relatively large airport, which is less directly comparable with Gatwick and Stansted. The data for the airport is also based on a range of assumptions (as described in a following section), which could reduce its reliability as a comparator.
- 2.7 Two partial productivity metrics have been used to examine the relative performance of these airports against the sub-samples:
- **Ordinary opex per passenger** – Including staff costs, depreciation and all other costs such as utilities, rent and rates, maintenance and police costs, but excluding exceptional items. This metric represents the total actual opex per passenger incurred by the airport in a typical year and has not been adjusted to take account of differences in airport activities.
 - **Adjusted opex per passenger** – including staff costs and other costs such as utilities, rent and rates, maintenance and police costs but excluding depreciation, exceptional items and other non-core activities such as retail, sales of assets, rail and regulatory levies. This metric is intended to adjust for airport activities to provide a more consistent estimate of each airport's core operating costs for comparative purposes.
- 2.8 Airport financial accounts are presented in different formats meaning that the calculation of adjusted costs is not perfectly consistent across

airports. For example Manchester, Birmingham and the non-UK airports do not include information on retail expenditure in their financial accounts; it has therefore been necessary to make an estimate of the average proportion of retail costs based on sample averages. Across a sample of six UK airports average retail spending grew from 0.31% of total opex in 2000 to 3% in 2011. These figures have been used to adjust the costs in the other airports where detailed info is not available.

- 2.9 Similarly information on Amsterdam is published in its group accounts, which include the costs of other airports. To adjust for this we have estimated Amsterdam's costs as a proportion to its share of group traffic, which has fluctuated between 95% and 99% of the total since 2000.
- 2.10 The total and adjusted opex per passenger metrics have also been calculated twice; firstly based only on exchange rate conversion factors to make a straightforward comparison between airports in different countries, and secondly using factor cost adjustments to adjust for differences in labour cost and factor input prices in different countries. The factor cost adjustment process is described in more detail in a following section.
- 2.11 In addition to the static cross sectional benchmarking used in the studies described above, we have analysed changes in opex over time from the year 2000. To do this we have deflated costs to provide a consistent time series in 2011/12 prices based on the UK CHAW RPI index.
- 2.12 Different airports use different accounting periods. It has therefore been necessary to compare data reported in both financial and calendar years. Unless otherwise stated, any references to a given year therefore applies to both the calendar year; January to December; and the financial year from April to March of the following year (depending on the airport).

Exchange Rates

- 2.13 Exchange rate conversion is based on annual average exchange rates in 2012. The exchange rates used in the study are shown in Figure 11 below. The data has been converted across the sample based only on the rates for 2012 to minimise volatility.

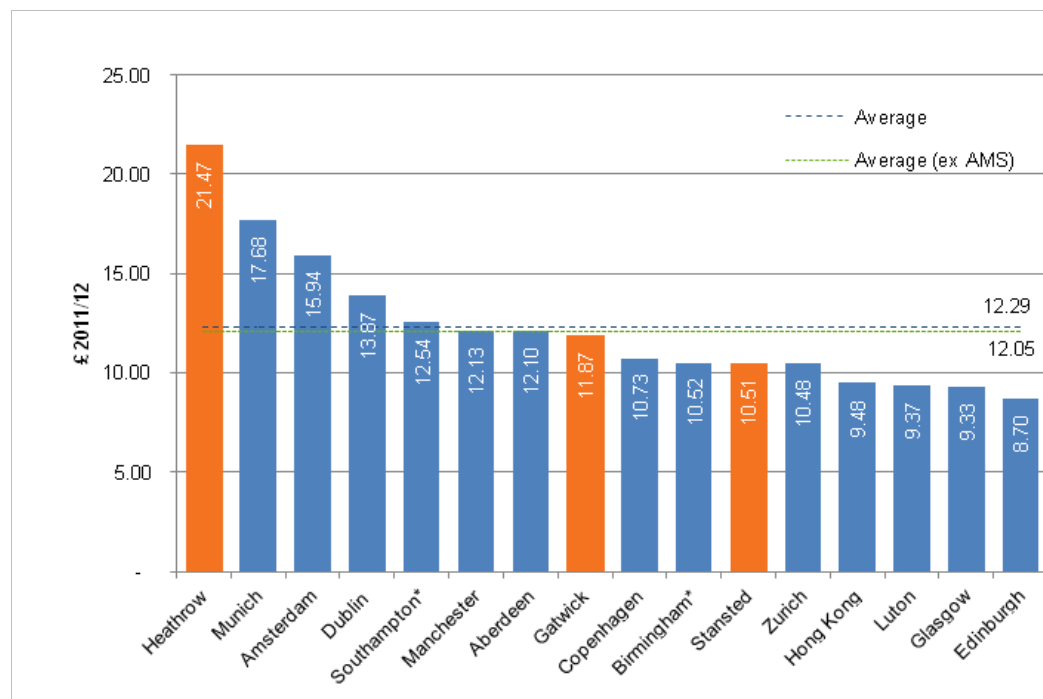
Figure 11 Average Annual Exchange Rates

Year	EUR/GBP	HKD/GBP	DKK/GBP	USD/GBP	CHF/GBP
2012	0.81	0.08	0.12	0.63	0.67

Source: annual averages based on data from <http://www.oanda.com/>

Results

- 2.14 Figure 12 shows ordinary opex per passenger across the sample. The average opex per passenger in the Heathrow and Gatwick/ Stansted benchmark sub-samples was £12.29 and £12.05 respectively; in comparison opex per passenger was £21.47 at Heathrow, £11.87 at Gatwick and £10.51 at Stansted.
- 2.15 Heathrow's ordinary opex per passenger is the highest in the sample and above Munich, Amsterdam and Hong Kong. Gatwick's ordinary opex per passenger is above Copenhagen and Zurich. Stansted's operating costs are below Dublin and Manchester, but above Luton.

Figure 12 Ordinary Opex per Passenger, 2011

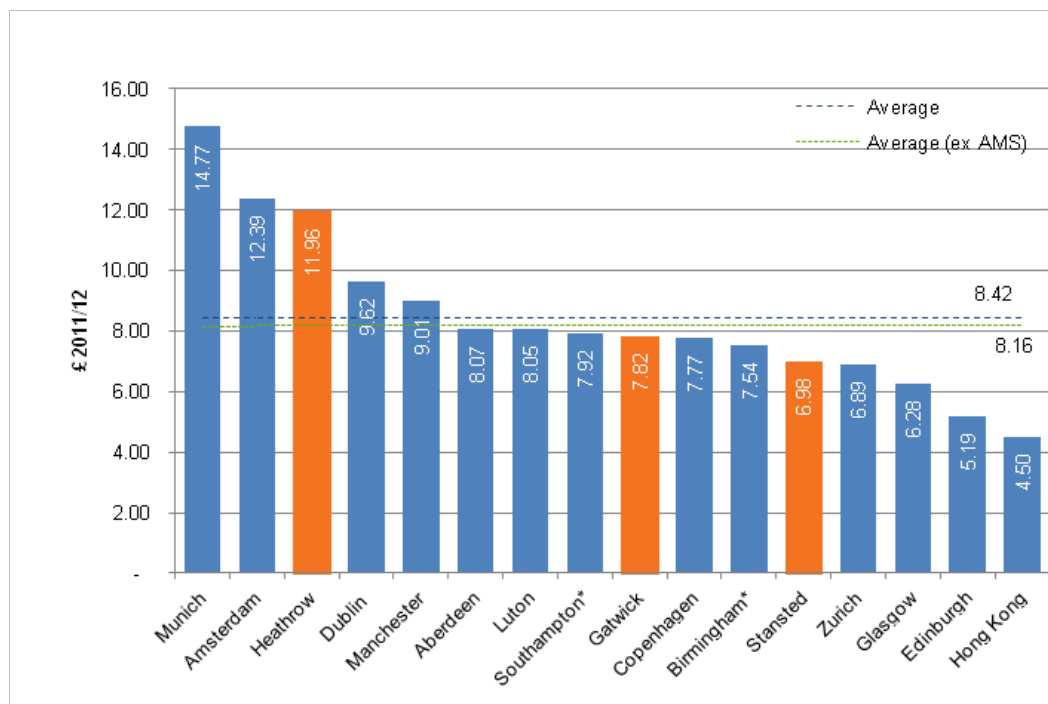
Source: CAA analysis based on airport financial accounts *Denotes that data is based on 2010 accounts

- 2.16 Figure 13 shows adjusted opex per passenger across the airport sample. The average opex per passenger across the sub sample is significantly lower than ordinary opex at £8.42 and £8.16 reflecting the

various cost activities excluded from this metric. In comparison cost per passenger was £11.96 at Heathrow, £7.82 at Gatwick and £6.98 at Stansted.

- 2.17 Adjusted opex per passenger was highest at Munich at £14.77 and lowest at Hong Kong at £4.50. The adjustments to opex means that Heathrow's operating costs per passenger are now lower than Munich and Amsterdam. Gatwick's operating cost per passenger remains higher than Copenhagen and Zurich. Stansted's operating costs are now lower than Luton.

Figure 13 Adjusted Opex per Passenger, 2011



Source: CAA analysis based on airport financial accounts *Denotes that data is based on 2010 accounts

- 2.18 The results of the analysis are summarised in Figure 14 below showing the relative performance of Heathrow, Gatwick and Stansted against the airport sub samples in terms of ordinary and adjusted opex per passenger.

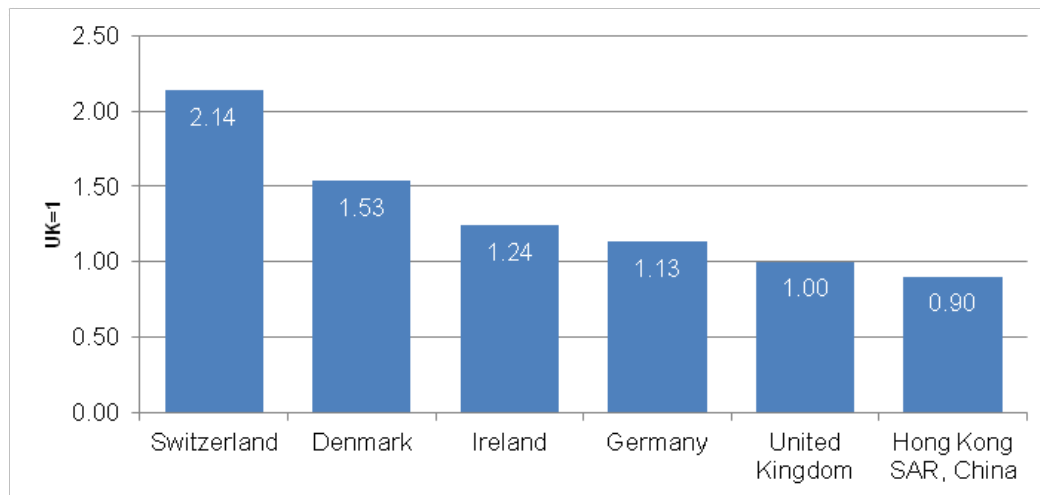
Figure 14 Relative Performance of Heathrow, Gatwick and Stansted

£ nominal	Ordinary Opex / Pax	Adjusted Opex / Pax
Max	21.47	14.77
Average	12.29	8.42
Average (ex AMS)	12.05	8.16
Min	8.70	4.50
Heathrow	21.47	11.96
Gatwick	11.87	7.82
Stansted	10.51	6.98

- 2.19 The figures show that Heathrow has the highest levels of ordinary opex per passenger in the sample. It also has very high levels of adjusted opex per passenger in comparison with its sub sample average, although lower than Amsterdam and Munich.
- 2.20 Gatwick's levels of ordinary and adjusted opex per passenger are slightly lower than the sub sample average, although above Copenhagen in both cases. Stansted's levels of ordinary and adjusted opex per passenger are significantly lower than the sub sample and Dublin and Luton.

Adjusted Factor Costs Comparisons

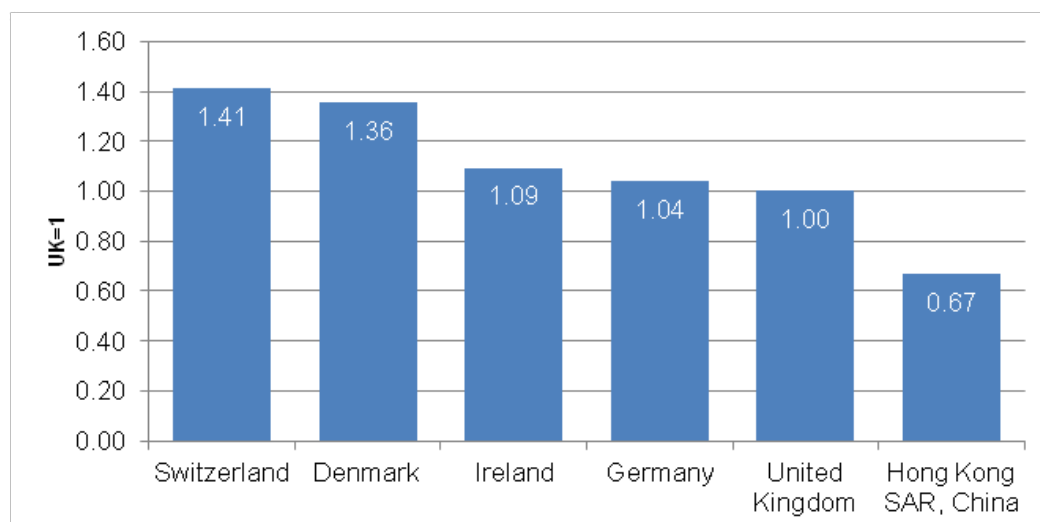
- 2.21 Different countries have different factor costs, which can distort comparisons. To adjust for this, the opex per passenger metrics have been re-estimated using factor cost adjustments. This includes adjusting costs based on GDP per capita, to reflect different wage costs, and purchasing power parity (PPP) indicators to reflect general price levels.
- 2.22 In the Booz & Company study described above, labour cost data was used to adjust the total staff costs for each airport. We have used GDP per capita as a proxy for labour cost – primarily because the Eurostat data used in the Booz & Company study and other similar labour cost data sets do not include Hong Kong.
- 2.23 Figure 15 below shows that the UK has the second lowest per capita GDP of the international sample, behind Hong Kong. These factors have been used to adjust the relative staff costs of the non-UK airports, for example inflating the staff costs of Hong Kong and deflating the staff costs of airports in other non-UK airports.

Figure 15 GDP per Capita Relative to UK, 2011

Source: World Bank GDP per capita

Link: <http://data.worldbank.org/indicator/SL.GDPPCAREM.KD/countries/1W?display=default>

2.24 Non-labour costs have been adjusted using estimates of Purchasing Power Parity indices, which are often used to account for different price levels in different countries⁵. Figure 11 shows the metric for each country in the sample indicating the price level in each country relative to the UK.

Figure 16 Price Level Relative to UK, 2011

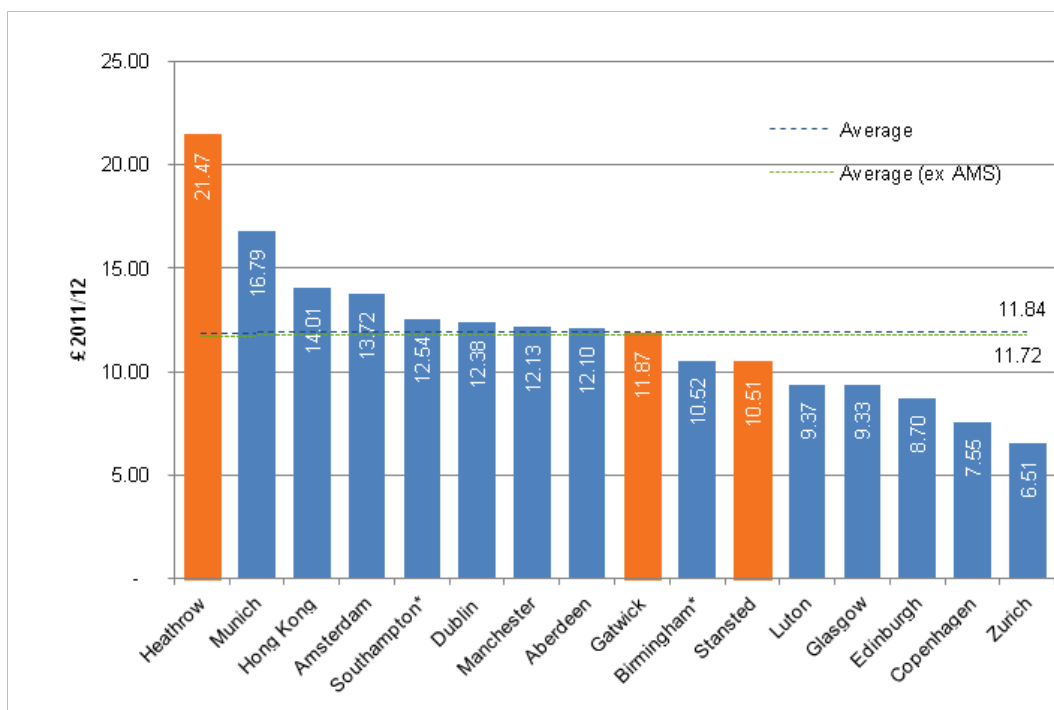
Source: World Bank Purchasing Power Parity Conversion Factors

Link: <http://data.worldbank.org/indicator/PA.NUS.PPPC.RF>

⁵ Purchasing power parity conversion factor is the number of units of a country's currency required to buy the same amounts of goods and services in the domestic market as U.S. dollar would buy in the United States.

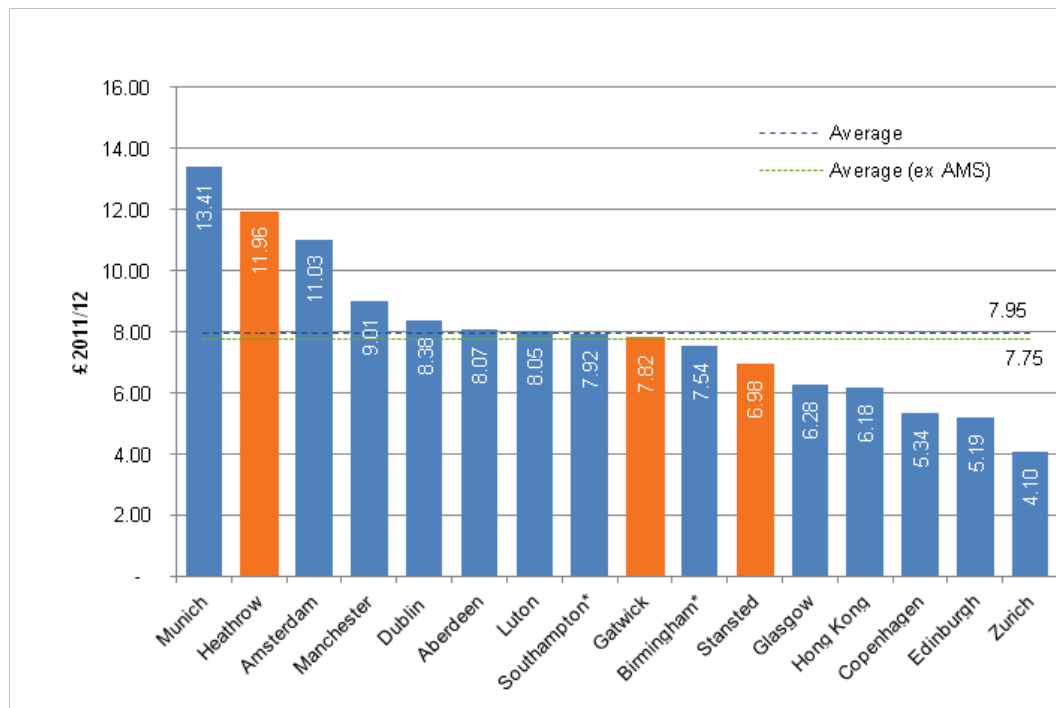
- 2.25 Using these factor adjustments, the opex per passenger analysis is reproduced below in Figure 17 and Figure 18. The main difference with the previous figures is that operating costs at Hong Kong appear significantly higher adjusting for its lower prices and GDP per capita. In contrast costs at Amsterdam, Munich, Dublin Copenhagen and Zurich have fallen reflecting higher levels of GDP per capita and general price levels.

Figure 17 Ordinary Opex per Passenger with Factor Cost Adjustment, 2011



Source: CAA analysis based on airport financial accounts *Denotes that data is based on 2010 accounts

- 2.26 Following the factor cost adjustments, Heathrow, Gatwick and Stansted's ordinary opex per passenger remains the same as before at £21.47 £11.87 and £10.51 respectively. The sub sample averages fall by around 5% to £11.84 and £11.72 reflecting the changes in relative factor costs.

Figure 18 Adjusted Opex per Passenger with Factor Cost Adjustment, 2011

Source: CAA analysis based on airport financial accounts *Denotes that data is based on 2010 accounts

- 2.27 Following the factor cost adjustments Heathrow has moved from the third to the second highest airport in terms of adjusted opex per passenger rising above Amsterdam. Gatwick remains in the same relative position above Copenhagen, Stansted has fallen from 12 to 11th place and is below Luton, but has moved above Zurich.
- 2.28 As with total opex, the sub sample averages fall by around 5% to £7.95 and £7.75 reflecting the changes in relative factor costs.
- 2.29 A summary of the analysis is provided in Figure 18. The figure shows that after factor cost adjustments, Heathrow is the highest cost airport in terms of ordinary opex per passenger and is the second highest in terms of adjusted opex per passenger; Gatwick is close to the sub sample average for both metrics. Stansted remains below the sub sample average for both metrics.

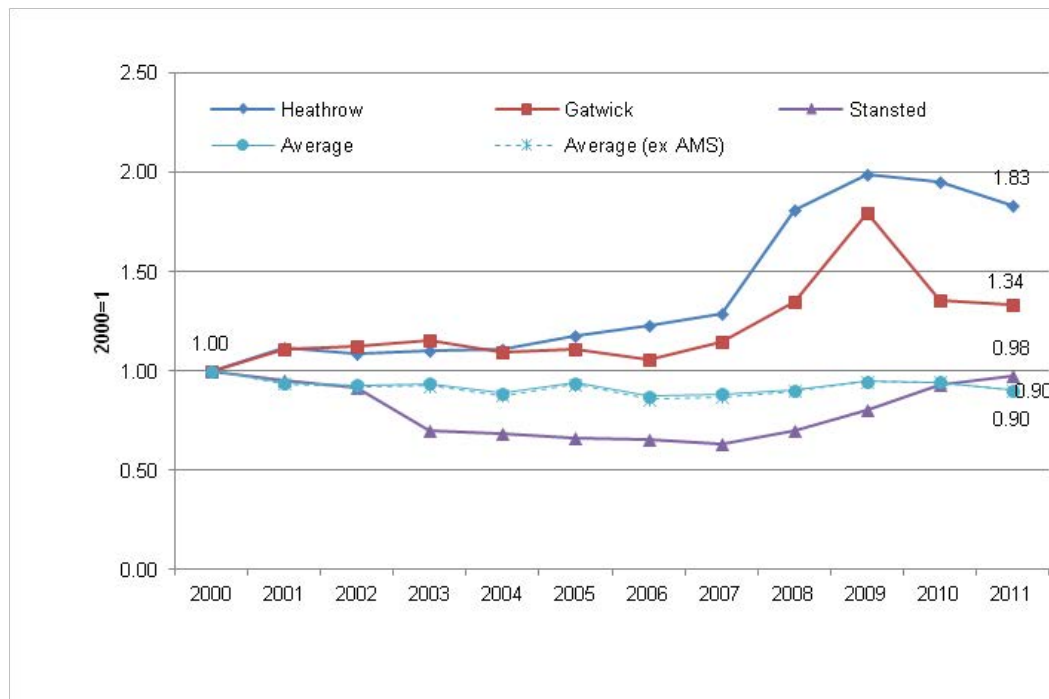
Figure 19 Relative Performance of Heathrow, Gatwick and Stansted with Factor Cost Adjustments

£ nominal	Ordinary Opex / Pax	Adjusted Opex / Pax
Max	21.47	13.41
Average	12.29	8.42
(with factor costs)	11.84	7.95
Average (ex AMS)	12.05	8.16
(with factor costs)	11.72	7.75
Min	6.51	4.10
Heathrow	21.47	11.96
Gatwick	11.87	7.82
Stansted	10.51	6.98

Time Series Analysis

- 2.30 The figures on the next page provide a time series analysis of ordinary and adjusted opex per passenger (with factor cost adjustments) from 2000 to 2011 showing the proportional change over time. The figures are presented in real terms (2011/12 prices).
- 2.31 Figure 20 shows that between 2000 and 2011 ordinary opex per passenger fell by 10% on average across both sub samples. In comparison, at Heathrow opex per passenger increased by 83% (from £11.72 to £21.47). At Gatwick opex per passenger increased by 34% (£8.88 to £11.87). At Stansted opex per passenger fell by 2% (£10.73 to £10.51).

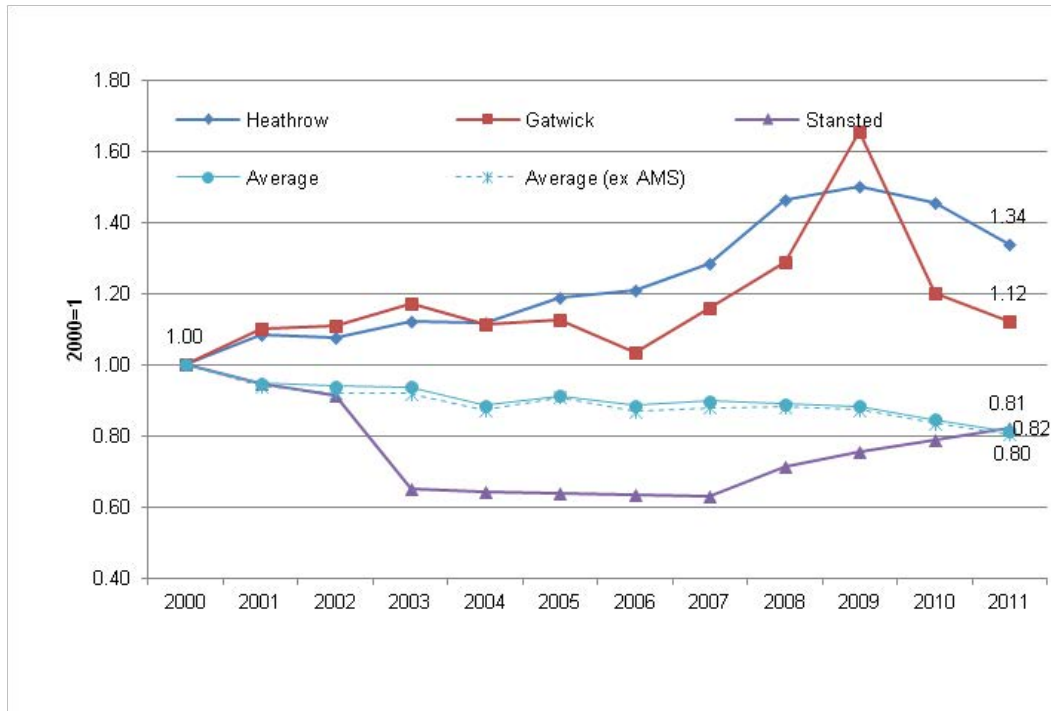
Figure 20 Ordinary Opex per Passenger with Factor Cost Adjustment, 2000-2011



Source: CAA analysis based on airport financial accounts

- 2.32 All three airports show significant increases in opex per passenger in recent years relative to the average. At Heathrow, this is likely to be partially explained by the opening of T5 in 2008, although opex per passenger has not fallen significantly in subsequent years.
- 2.33 At Gatwick, the substantial increase in 2009 is primarily caused by the costs incurred to prepare the airport for sale in 2009 and could be considered as exceptional, there is a significant fall in 2010 reversing this increase. At Stansted, opex per passenger growth has been below the average. Since 2008 there has been a relative increase which is likely to be related to falling passenger numbers at the airport.
- 2.34 Figure 21 shows that between 2000 and 2011 adjusted opex per passenger fell by 19% in the first sub sample and by 20% in the second. In comparison at Heathrow opex per passenger rose by 34% from £8.93 to £11.96. At Gatwick opex per passenger rose by 12% from £6.97 to £7.82. At Stansted opex per passenger fell by 18% from £8.49 to £6.98.

Figure 21 Adjusted Opex per Passenger with Factor Cost Adjustment, 2000-2011



Source: CAA analysis based on airport financial accounts

- 2.35 The analysis indicates that since 2000 opex per passenger at Heathrow and Gatwick have grown significantly faster than the sub sample average. Opex per passenger growth at Stansted has been below the sample average for most of the period, but has increased in the last few years so that overall growth has been similar to the sub sample average.

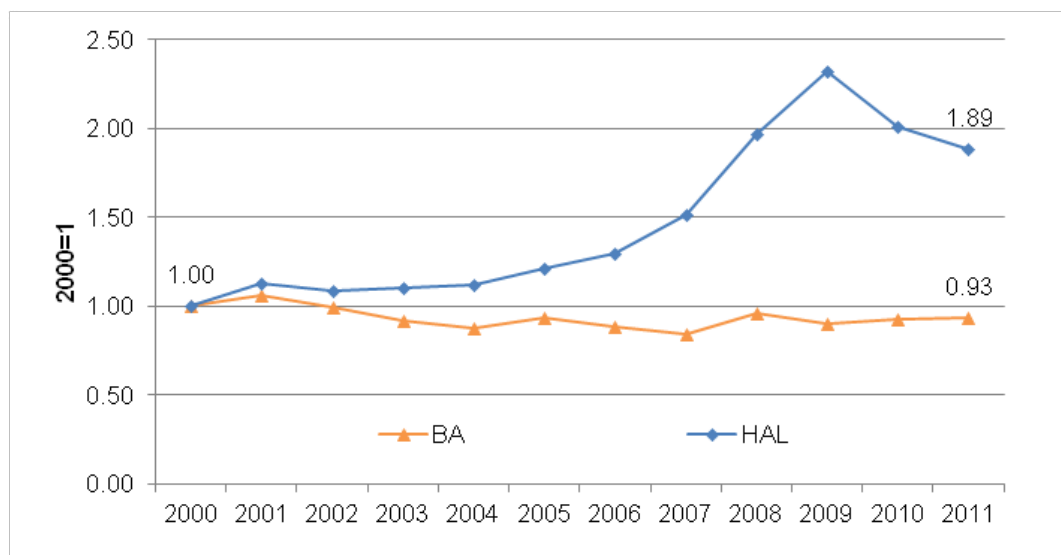
Airline Benchmarking

- 2.36 To provide further supporting analysis of the relative performance of the airports over time, the CAA has also undertaken a comparison of airport opex performance relative to the three largest airlines operating from Heathrow, Gatwick and Stansted. These are: BA, easyJet and Ryanair respectively.
- 2.37 It could be argued that as competitive businesses operating in a similar industry to the airports the airlines could provide a benchmark of the level of performance the airports might be expected to achieve.
- 2.38 This analysis is based on a comparison of trends in total opex per passenger (for the airports) and total opex per Available Seat Kilometre

(ASK) (for the airlines)⁶. As with the airports the financial accounts of the airlines have been used to determine the total opex and passenger numbers. No adjustments have been made for core costs or factor costs differentials as the purpose of the analysis is to compare the change in the relative expense of the different business outputs over time rather than directly against one another. The results of the analysis are shown in the following charts.

- 2.39 Since 2000 BA have reduced total opex per ASK by 7% in real terms. In comparison total opex per passenger at Heathrow has risen by 89%.

Figure 22 Comparison of Heathrow and BA total opex per output unit

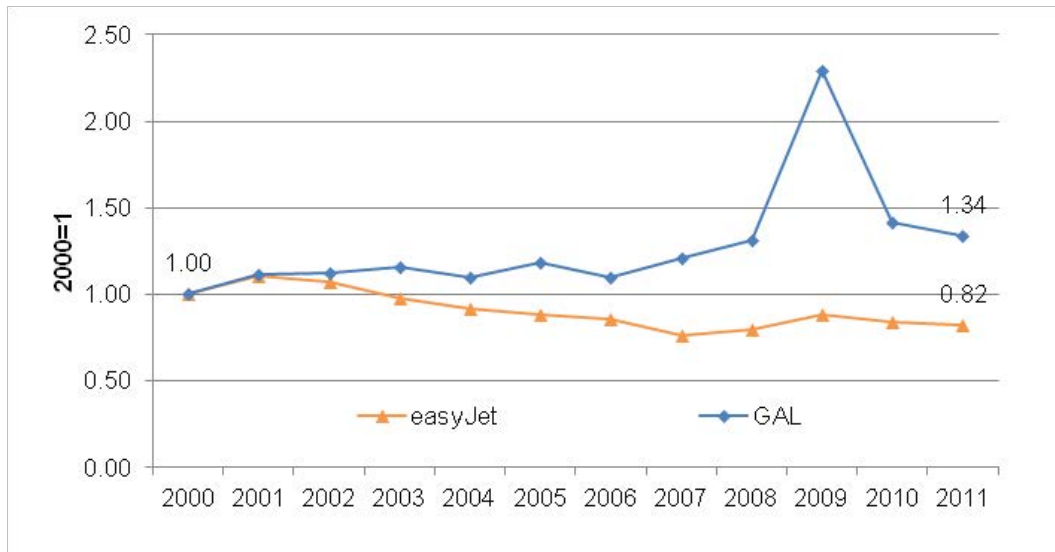


Source: CAA analysis based on airport and airline financial accounts

- 2.40 Since 2000 easyJet have reduced total opex per ASK by 18% in real terms. In comparison total opex per passenger at Gatwick has risen by 34%.

⁶ ASK are widely used to benchmark airline performance as the metric provides a reasonable measure of the output of an airline in terms of the number of aircraft operated and the total distances flown.

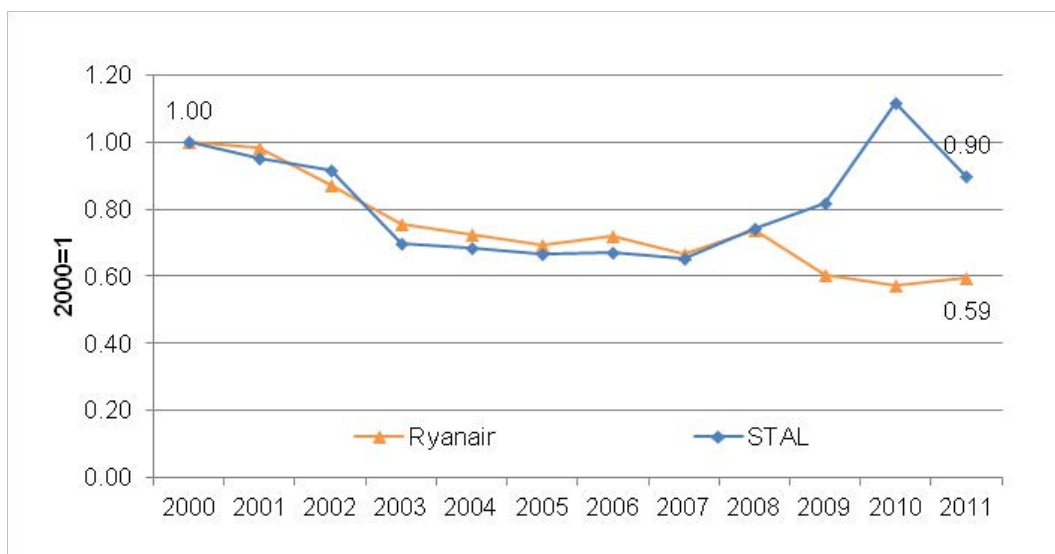
Figure 23 Comparison of Gatwick and easyJet total opex per output unit



Source: CAA analysis based on airport and airline financial accounts

2.41 Since 2000 Ryanair have reduced total opex per ASK by 41% in real terms. In comparison total opex per passenger at Stansted has fallen by 10%. The chart below also shows a very strong relationship between the two variables until 2009 when there is a divergence between the series.

Figure 24 Comparison of Stansted and Ryanair total opex per output unit



Source: CAA analysis based on airport and airline financial accounts

- 2.42 In each case it is clear that the airline has outperformed the airport in terms of operating cost per unit of output since 2000 by a significant margin.
- 2.43 Comparisons of opex performance between airlines and airports are difficult as they have very different business models. Whilst they operate in a similar industry and are subject to a similar range of technical security requirements, price pressures and economic shocks, the operations of the airlines are generally more flexible, enabling a more effective reaction to changes in market conditions through the cancellation of routes or transfer of aircraft etc. This could mean that they are able to control costs more effectively, particularly in periods of falling demand.
- 2.44 It could also be argued that the airports have been under greater cost pressure from increasing security requirements. However airlines also face these pressures, although perhaps not to the same extent.
- 2.45 It is also clear that the airlines have been successful in reducing costs per ASK despite significant fuel cost pressures. Statistics from the Department for Energy and Climate Change indicate that the cost of heavy fuel oil has increased by over 270% in real terms between 2000 and 2012. In the case of BA, fuel and oil costs have risen from 12% to 35% of total opex over the period as a consequence.
- 2.46 Furthermore, the Stansted - Ryanair comparison indicates that in some cases airports can match the opex performance of the airlines over long periods and that the comparison with airline cost performance is therefore not unreasonable.
- 2.47 Overall the analysis supports the inter airport comparisons described in the previous section, which tends to suggest that opex at Heathrow, Gatwick and Stansted has risen faster than benchmarks over recent years and that there is likely to be scope for reduction.

CHAPTER 3

Summary and Conclusions

3.1 This section provides a summary and interpretation of the analysis described above. The main estimates of cost per passenger described in the report (and highlighted in the Initial Proposals) are also summarised in the figure below.

Figure 25 Benchmarking Summary – Opex per passenger (£)

Study / Airport / Year	ATRS 2009	Leigh Fisher 2009	Booz & Co 2011	SDG 2010	CAA* 2011
Heathrow	14.40	13.30	12.30	13.59	11.96
Gatwick	8.69	9.20	9.10	9.05	7.82
Stansted	6.92	Not Included	Not Included	7.73	6.98
Average	7.17	6.00	9.71	8.94	7.95 and 7.75
Sample Size	141	50	13	10*9 years	16*12 years
Average Airport Size	20.4m	35.1m	30.6m	22.5m	24.3m

Heathrow

3.2 The existing benchmarking literature strongly indicates that Heathrow has amongst the highest levels of operating cost per passenger of the samples considered. This is partially accounted for by non-core activities such as rail and high levels of retail costs. Even accounting for these factors, the airport has very high levels of adjusted opex per passenger in comparison with the average and airports of a comparable size such as Hong Kong and Amsterdam Schiphol.

3.3 Econometric benchmarking analysis in the ARTS study also suggests that Heathrow was 60% less efficient than the frontier in terms of VFP

in 2009, indicating that the airport is not at the efficient frontier in terms of opex per passenger.

- 3.4 These findings are supported by the benchmarking analysis undertaken by the CAA, which shows that in 2011 the airport had an adjusted opex per passenger of £11.96, significantly higher than the sub sample average of £7.95 (adjusting for factor costs).
- 3.5 The CAA benchmarking also shows that historically adjusted opex per passenger at Heathrow was close to the sample average. In 2000 adjusted opex per passenger was 9% below the sub sample average. Since then, costs per passenger have increased to 50% above the sub sample average. This is the greatest relative increase of any airport in the sample, and suggests that there has been a significant decline in relative efficiency at Heathrow since 2000. Comparisons with BA's cost performance also show a significant gap and tend to support the conclusion of declining relative efficiency.
- 3.6 There are some factors which mean that the airport's costs are likely to be uncontrollably higher than comparators. These include relatively high levels of long haul and premium passengers and the airports location in London, with relatively high land and labour costs. However it is not clear that these factors have changed significantly over time to explain the apparent decline in relative efficiency.
- 3.7 The Booz and Company benchmarking study commissioned by Heathrow does provide some evidence that long haul and premium cost passengers require higher levels of opex. Taking account of factor costs and 'passenger complexity' this study finds a residual productivity differential between Heathrow and Amsterdam, Gatwick and Edinburgh of £1.10, £0.80 and £1.30 per passenger respectively.
- 3.8 Overall the evidence suggests that there is significant scope for cost reductions in opex per passenger at Heathrow relative to its current position.

Gatwick

- 3.9 All but one of the existing benchmarking studies found that opex per passenger at Gatwick was slightly higher than the average of the sample. The CAA's benchmarking also indicates that Gatwick's adjusted opex per passenger is £7.82, slightly higher than the sub sample average of £7.75 (adjusting for factor costs).

- 3.10 The CAA sample includes a wide range of airports of comparable size to Gatwick, in particular Zurich and Copenhagen, which provide a more direct benchmark of the efficient frontier. At £7.82, adjusted opex per passenger at Gatwick is significantly higher than both Copenhagen and Zurich, which have factor adjusted opex per passenger of £5.34 and £4.10 respectively. Econometric benchmarking analysis in the ARTS study also suggests that Gatwick was 50% less efficient than the most efficient airport in terms of VFP in 2009.
- 3.11 Historically, costs per passenger have been below the sub sample average. In 2000, adjusted costs per passenger (including factor adjustments) were 28% below the sub sample average; by 2011 this had increased to 1% above, suggesting a relative decline in efficiency despite current performance being close to the average. Comparisons with easyJet's cost performance also show a significant gap and tend to support the conclusion of declining relative efficiency.
- 3.12 In summary, whilst opex per passenger at Gatwick is similar to the average of the CAA sample, it is higher than a number of more direct comparators and since 2000 there has been a significant increase in opex per passenger relative to the sub sample average. On balance this suggests that Gatwick is not at the efficient frontier and there is likely to be scope for reductions in opex per passenger relative to its current position.

Stansted

- 3.13 The existing benchmarking evidence indicates that Stansted has relatively low opex per passenger in comparison with the average. The CAA benchmarking supports this finding, with an estimated adjusted opex per passenger of £6.98 against a sub sample average of £7.75 (adjusting for factor costs).
- 3.14 This may be explained by the high level of low cost carriers and short haul flights from the airport, which will tend to reduce costs per passenger relative to other airports with greater levels of long haul flights (for example due to lower levels of baggage processing demands).
- 3.15 Direct comparisons with the most efficient airports indicate that Stansted is unlikely to be at the efficient cost frontier. For example Glasgow, Edinburgh, Copenhagen and Zurich, all have lower adjusted opex per passenger than Stansted. Econometric benchmarking analysis

in the ATRS study also suggests that Stansted was 36% less efficient than the frontier in terms of VFP in 2009.

- 3.16 Historically opex per passenger has been below the sample average. In 2000 the airports operating costs were 12% below the sub sample average, by 2005 - coinciding with the expansion of Ryanair - operating costs were 38% below the sample average. Since then, performance has declined significantly to the extent that costs have increased back to 10% below the sub sample average. This is largely attributed to significant falls in passenger numbers following the recession, but suggests that there is scope for reducing opex on a per passenger basis, particularly if there is a return to traffic growth. This is supported by comparisons with Ryanair's cost performance, which shows a very close relationship until 2008, when Stansted shows a significant decline in efficiency relative to the airline.
- 3.17 Overall the benchmarking evidence described in this report indicates that there is likely to be scope for further efficiency at Heathrow, Gatwick and Stansted airport relative to current levels of opex per passenger. All of the airports have higher opex per passenger than comparative airports and all have performed worse than the average in controlling costs since 2000 both in comparison to the CAA's benchmark sample and their own major airline customers.
- 3.18 However, drawing precise conclusions over the extent of the efficiency gap based on this evidence is difficult given the difficulty of ensuring comparability across the airports and data used in the various studies.