

Report for Lydd Airport Action Group

Author: Department of Air Transport, Cranfield University (for more information see appendix 4)

1. Summary and Conclusions

- 1.1. It is highly unlikely that Lydd Airport could make a positive operating profit at levels of annual passenger throughput of 500,000
- 1.2. The only way an airport of such a traffic volume could be profitable would be to attract lucrative off-shore oil business, a flourishing business park or other activities on the airport that were not related to commercial air transport activities.
- 1.3. Lydd Airport has none of the specific advantages that a very limited number of other UK airports have for successful commercial exploitation of the above activities, and could be seriously disadvantaged by the special status of the land surrounding the airport.
- 1.4. Low passenger numbers are unlikely to attract the more successful concessionaires, severely limiting the potential to generate ancillary revenues

2. Introduction

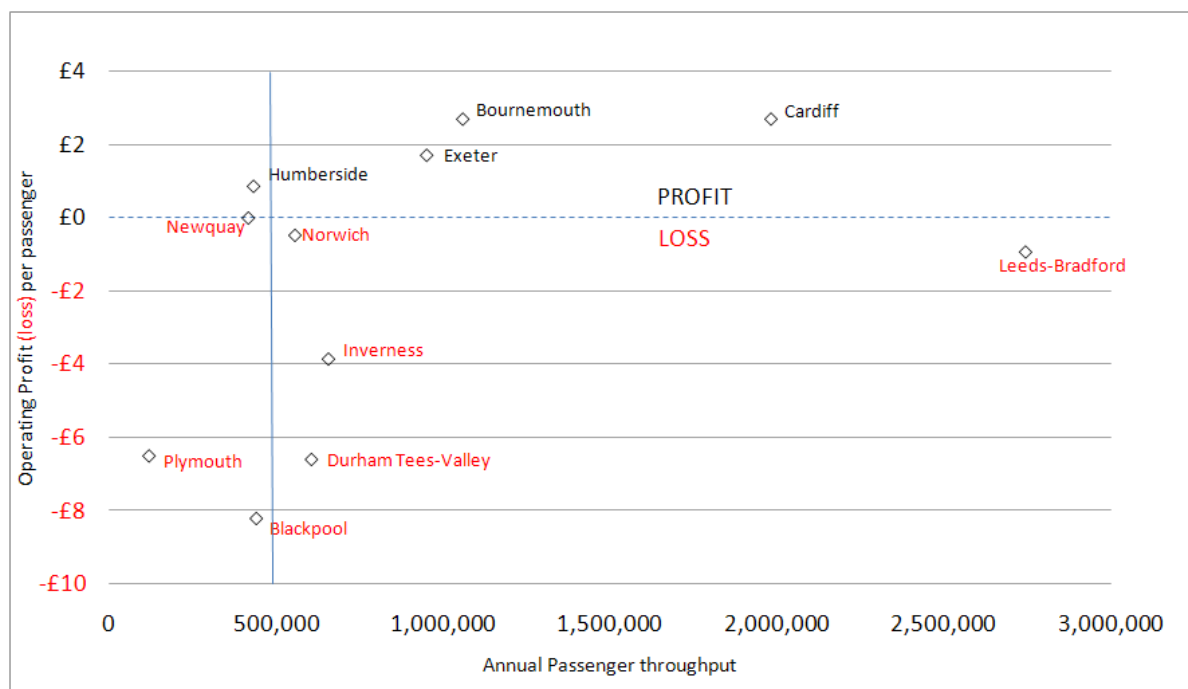
- 2.1. This report is aimed at examining the question:
Lydd Airport would remain loss making at a throughput of 500,000 passengers per annum (ppa)
- 2.2. The approach adopted to address the above was to analyse the financial results of a range of UK airports including those with a scale of operations similar to that proposed by Lydd Airport.
- 2.3. The alternative would be to estimate the likely costs and revenues that would be incurred and generated by Lydd Airport at the proposed level of throughput. Fixed and running costs would increase significantly for example from improvements required to the terminal facility (in general), provision of security inspection equipment and personnel as well as modification to ensure arrival/departure separation, and an upgrade to fire cover.
 - 2.3.1. Although the costs could be estimated, such an approach would also require revenue estimates and depend on second guessing the negotiations between Lydd Airport and the airlines that it wished to attract, not an easy task given the confidential nature of such arrangements. These would probably be low cost airlines that would seek very low per passenger charges at least initially. These low charges are agreed in return for delivering higher volumes of passengers to the airport, which would provide the airport with the opportunities to make money from non-aeronautical activities such as shops and car parking. Estimating such revenues and related costs would be possible but require assumptions that would be difficult to substantiate and open to challenge.
- 2.4. A second piece of analysis focused on the types of operator that would generate the 500,000 annual passengers using the larger aircraft (B737 and A320) as well as the smaller turbo-props in Lydd Airport's proposal. This considers one element of the alternative approach that was rejected above, relating the type of operator to airport profitability.

3. Analysis: UK airport profitability

- 3.1. The study used a sample of eleven UK regional airports. Six of these handled volumes of passenger traffic within a range of 400,000 to 800,000 passengers in the year to end March 2009. Plymouth, the smallest of the sample, handled 117,000. Four larger airports, Exeter, Bournemouth, Cardiff and Leeds-Bradford, all handled in excess of 1 million passengers in the same period. They were included to provide some sense of how larger airports perform in relation to the smaller ones.
- 3.2. Figure 1 plots average operating profit /loss per passenger against passenger throughput (data in Appendix 1). It shows that there is a relationship between passenger throughput and airport profitability and that the breakeven threshold appears to lie beyond 500,000 and much closer to the 1 million passenger threshold.

- 3.2.1. The heaviest loss-maker is Blackpool airport despite passenger growth in recent years fuelled by Ryanair network expansion. Ryanair services have failed to deliver sufficient revenue for the airport to break-even. This suggests that the low cost airline was persuaded to establish services at the airport on the basis of a heavily discounted airport charges contract on the expectation that the airport would achieve break-even in the long-run.
- 3.2.2. The much smaller airport of Plymouth, which relies almost exclusively on Air Southwest scheduled services, actually performed better than Blackpool but still incurred a loss.
- 3.2.3. Durham Tees-Valley, which handed just over 600,000 passengers in 2008-9, incurred a large operating loss per passenger of £6.60. The airport handles mainly low cost and charter traffic with a modest level of full service scheduled services offered by KLM and Eastern.
- 3.2.4. Inverness, similar in size to Durham Tees-Valley, incurred a lower deficit. This airport mainly handles domestic flights operated by Easyjet and Flybe but has struggled historically with high operating costs.

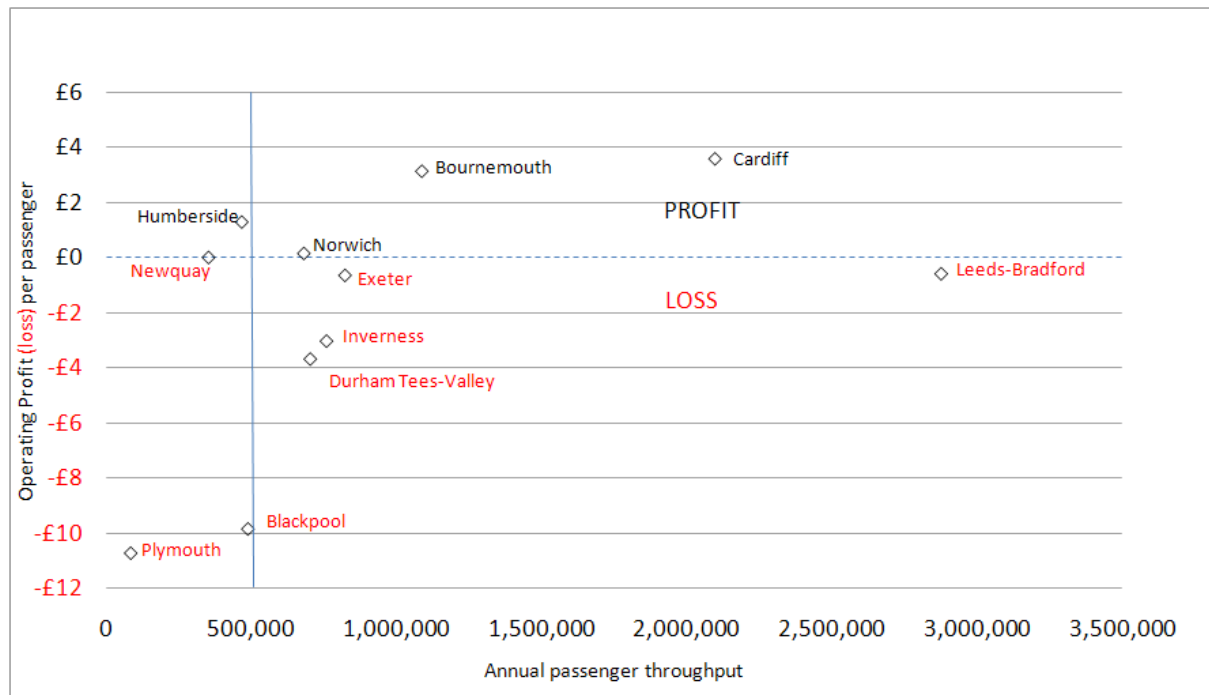
Figure 1 Operating profit (loss) per passenger vs total terminal passenger throughput 2008-9



Source: CRI Annual Airport Statistics 2008/9 (year to end March 2009)

- 3.2.5. Newquay airport is unusual in that it receives an annual subsidy which covers its operating loss. It is therefore, difficult to establish from the accounts what its underlying financial performance would be without the subsidy.
- 3.2.6. Interestingly, Humberside and Norwich airports appear to handle traffic within the region of 500,000 and yet have vastly superior levels of financial performance than the other airports already mentioned. Norwich incurs a very small operating loss while Humberside, on 431,000 passengers, actually made a small profit. This suggests that it is not simply a question of traffic volumes which determines airport profitability but nature of the markets that they serve and the degrees to which they have diversified into other non-aeronautical income streams.
- 3.2.7. Humberside is used by oil companies to ferry workers on helicopter flights to and from North Sea gas field installations. It is the second largest UK North Sea helicopter base. The airport is also the headquarters and maintenance base for UK regional airline, Eastern Airways. Furthermore, Humberside also has one of the largest perishables storage facilities of any UK regional airport and handles seafood freight flights from Iceland. Non-aeronautical activities such as the presence of MRO maintenance bases and income from high yield oil-related operations and freight can have a substantial effect on the profitability of a regional airport. Norwich too has a diversified business model and one that is quite similar to Humberside. Norwich also handles oil-related helicopter traffic as well as hosting a KLM maintenance base and various safety-related training activities. Scheduled and programmed charter services are also offered there by various airlines such as KLM, Eastern and Flybe. This suggests while it is possible to run a profitable airport on comparatively low volumes of passenger traffic, this can only be really achieved with the support of income from non-aeronautical activities.
- 3.3. Figure 1 also shows that larger airports, handling passenger traffic in the region of 1million ppa are able to generate profits.
- 3.3.1. Both Exeter and Bournemouth's regular passenger activities are supplemented by non-aeronautical income derived from various aircraft maintenance activities located at both airports.
- 3.3.2. At higher thresholds the profits are greater with the exception of Leeds-Bradford where the airport had suffered from airline capacity cuts due to the economic downturn. The airport's operating costs have also risen quite substantially in recent years due to the effects of fairly significant levels of capital expenditure.
- 3.4. While 2008/9 coincides with the economic downturn, Figure 2 below provides comparable data for the year to end September 2008 (see Appendix 2 for data). The picture is not too dissimilar to that illustrated in Figure 1 with the exception that Exeter incurred a small loss compared to a modest profit in 2008/9.

Figure 2 Operating profit (loss) per passenger vs total terminal passenger throughput average 2007-8



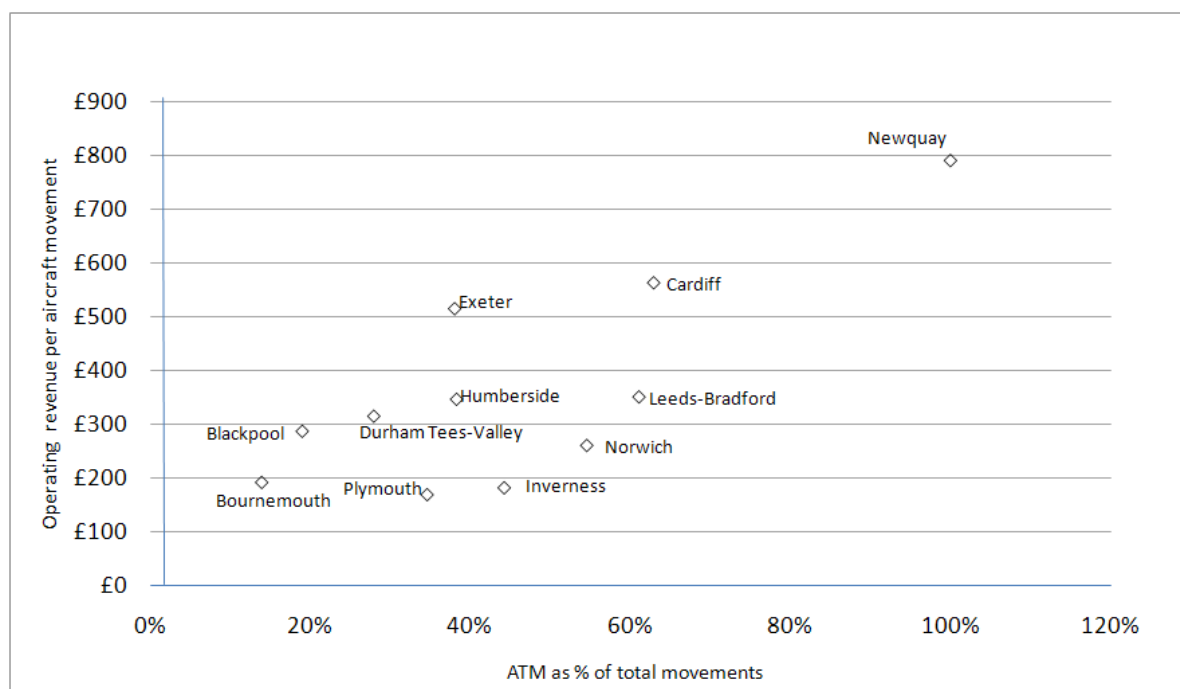
Source: CRI Annual Airport Statistics 2007/8 (year to end March 2008)

3.5. Figure 3 contrasts the total operating revenues generated per aircraft movement with the commercial movement ratio (commercial air transport movements (ATMs) as a percentage of total aircraft movements) at each airport.

3.5.1. Commercial ATMs cover passenger and freight flights whilst total aircraft movement includes these operations in addition to general aviation, flying club activity, positioning flights and MRO-related (aircraft maintenance, repair and overhaul related) movements.

3.5.2. Figure 3 illustrates the importance of commercial ATMs to generating sufficient yield. However, it is also necessary to generate sufficient volumes of commercial ATMs for the airport to generate profits. Without this yield airports must rely on non-aeronautical revenues from other activities which explains why Newquay is unable to generate a profit from its high commercial ATM ratio and high yield and Bournemouth is able to meet its costs from a comparatively low commercial ATM ratio and lower yield. It is the availability of non-aeronautical revenues that is the key to profitability.

Figure 3 Operating revenue per aircraft movement vs ATM as % of total movements 2007-8



Source: CRI Annual Airport Statistics 2008/9 (year to end March 2009)

3.6. The importance of non-aeronautical income is further re-enforced by what is shown in Figure 4. Here operating profit per passenger at each airport is compared with the proportion of operating revenue generated from non-aeronautical sources. This covers all income streams other than aeronautical charges and includes for example: terminal retail, car parking, advertising and real estate rental. Non-aeronautical revenue streams are generally more profitable than those generated by aeronautical charges. This contrast in the performance of aeronautical and non-aeronautical activities is illustrated in Table 1.

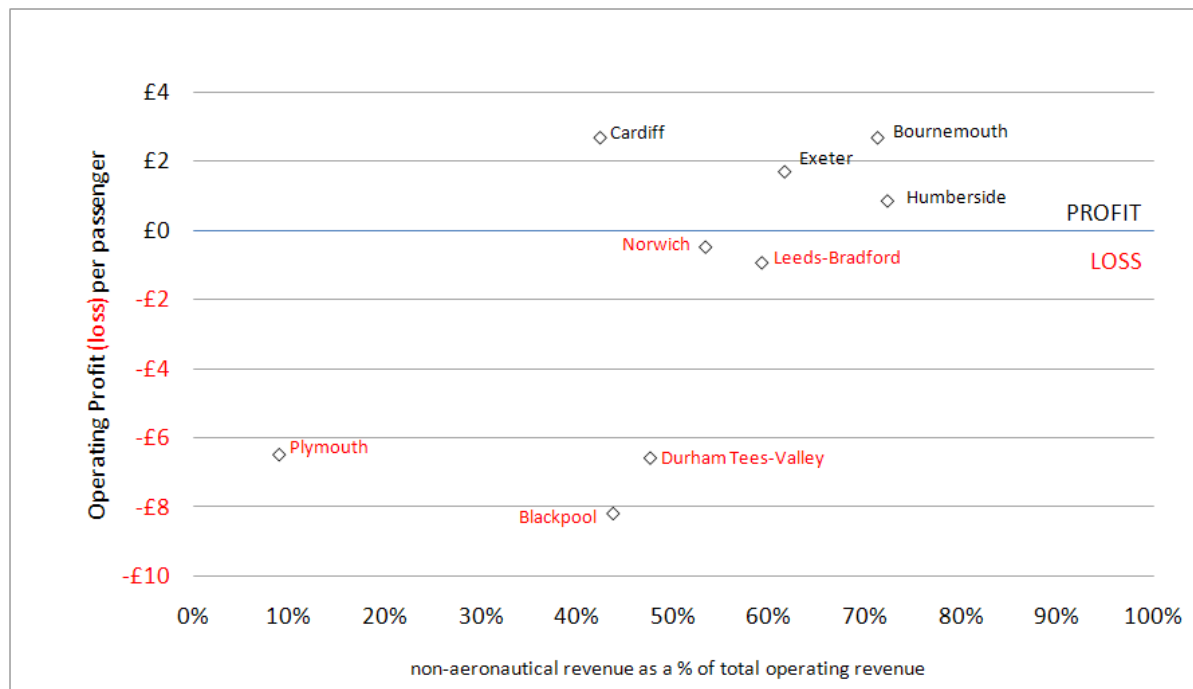
Table 1 Profit and loss on aeronautical and non-aeronautical activities sample of airports 2008-9

	Aeronautical profit / loss (£000)	Non-aeronautical profit / loss (£000)
Norwich	-3,779	3,118
Humberside	-2,127	2,498
Bournemouth	-2,631	5,484
Leeds-Bradford	-10,477	8,635
Cardiff	-486	5,833

Source: CRI Annual Airport Statistics 2007/8 (year to end March 2008)

3.7. Thus one would expect that those airports that derive a higher proportion of their operating revenue from commercial sources should have higher operating profit per passenger. This is broadly confirmed by Figure 4.

Figure 4 Operating profit (loss) per passenger vs non-aeronautical (commercial) revenue as a % of total operating revenue 2008-9



Source: CRI Annual Airport Statistics 2008/9 (year to end March 2009 – data in Appendix 3)

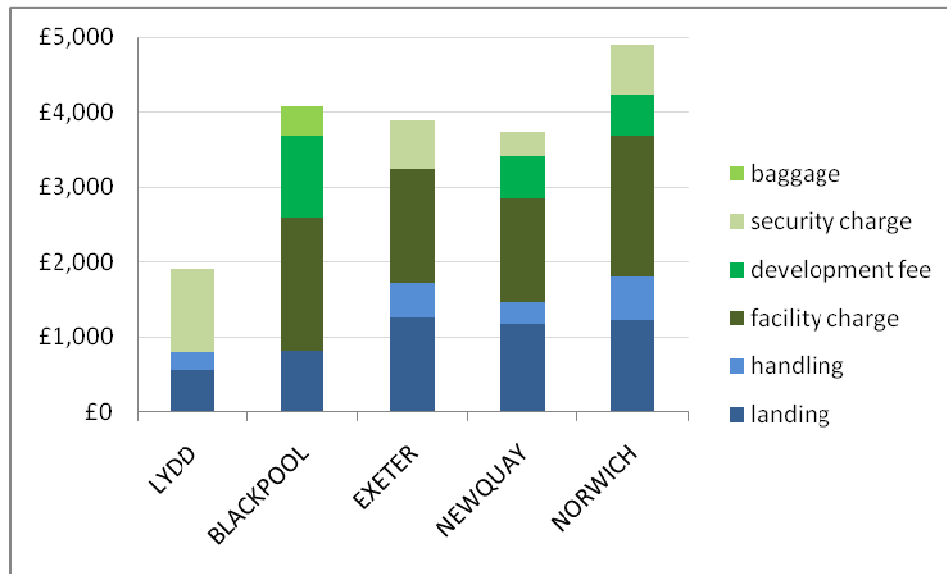
3.8. The cluster of airports with significant commercial activities: Exeter, Humberside and Bournemouth are also generating high profits in contrast to Blackpool and Plymouth.

3.8.1. While Cardiff and Blackpool share the same proportion of revenue from non-aeronautical activities, they are markedly different in terms of profitability. This suggests that it is also the nature and scale of non-aeronautical activities that is also important, in particular the potential to exploit real estate rental income from MRO fixed base operators and associated clusters of tenants as is the case at Cardiff. Cardiff is the home to one of British Airways’ aircraft maintenance facilities as well as an engine overhaul centre.

3.8.2. This level of exploitation is not possible at Blackpool and Durham Tees Valley, and would be impossible to replicate elsewhere. At Blackpool in particular, their decision to offer free car parking to support passenger growth further curbs their ability to fully exploit non-aeronautical revenue potential.

3.9. As explained above, airports with limited traffic volumes, such as those projected for Lydd Airport, depend heavily on aeronautical charges and fees to generate the revenue required to cover operating costs. Next we look at the levels of aeronautical charges currently levied at some of the UK's smaller airports. They give a rough measure of the revenue per aircraft turnround (landing and take-off) Lydd Airport should aim for.

Figure 5 Aeronautical revenue from A320 aircraft at selected UK airports (2010)



Source: Airport publications

3.10. Figure 5 shows the airport revenue from the landing of an A320 aircraft (65 tonnes maximum take-off weight) and its subsequent departure with 110 passengers to a destination outside the UK. The fees and charges are based on the published rates at the airports concerned, and take no account of discounts negotiated with airlines. Handling charges are included where these are published, but the composition of the handling service will vary, and extra services such as push-back, aircraft cleaning and lavatory services are unlikely to be included.

3.11. It is worth noting that four airports, Blackpool, Exeter, Newquay and Norwich, require passengers to pay directly to the airport on departure an additional "airport development fee". The need to collect additional revenue from passengers, over and above the passenger facility charge already paid through the ticket price, suggests the airports are not able to generate the required levels of revenue elsewhere, and could reflect the level of discount they have given to airlines.

3.12. The revenue generated for this benchmark operation under Lydd's current published charges is very low. The current charges will no doubt be reviewed before any significant air transport operations are initiated, but they will have to be kept low to attract carriers.

- 3.13. The impact of low aeronautical revenue at Lydd Airport will be exacerbated by the absence of income from other aeronautical activities such as maintenance operations and corporate aviation, and (expected) low levels of contribution from retail activities such as cafes and bars, and car parking.
- 3.14. It should be noted that despite the relatively high aeronautical charges evident from the chart, and additional revenues generated from other sources, none of the airports featured in Figure 5 manages to return an operating profit without subsidy (the case of Newquay, where the local council “tops up” airport revenue).

4. Analysis: Airlines serving UK airports

- 4.1. It is not clear what types of operator, or what mix of airline, Lydd Airport expects to attract to generate the forecast traffic levels. In this section we attempt to link profitability at the smaller UK airports with the nature of the air transport operators using them.
- 4.2. Table 2 below shows the current mix of operations by airline at these smaller airports in the UK. It includes all scheduled flights, and some charters, published in the OAG Flight Guide. Other charters, general and corporate aviation (private flying and air taxi services) are not included. The table highlights low-cost carriers, (in green) and those airlines which generate over two-thirds of the traffic at any airport (in red).
- 4.3. Low cost airlines
The business model of LCC includes negotiation of low user charges at airports. This suggests that where airports do not have passenger volumes to generate sufficient levels of commercial revenue, or do not host other commercial activities (such as Bournemouth’s maintenance organization), a high share of LCC activity is unlikely to be associated with profitability.
- 4.3.1. Low cost airlines are important in terms of traffic at Blackpool (Aer Lingus 12% of movements, Jet2 47%), Bournemouth (Ryanair 60%) and Inverness (easyJet 22%). Of these three airports with relatively high LCC activity, only Bournemouth has produced consistently positive operating profits in recent years.
- 4.4. Dominant carriers
Although all the airports have “principal” airline customers in terms of activity, the levels of dominance appear significant only at Exeter and Inverness (Flybe at both) and at Plymouth (Air Southwest).
- 4.4.1. Of these three airports, only Exeter achieved break-even levels of profitability in 2008-9. It is not clear how dependence on single airlines impacts on the financial health of airports, but there will always be the concern that very dominant clients are in a strong position when it comes to negotiating fees for airport use. Other airports, with more airlines within their basket of customers, may be in a better position to maintain viable levels of user charges.

4.4.2. Activity at Lydd Airport appears to be completely dominated at present by the small number of scheduled operations by Lydd Air.

4.5. Charter airlines

Airlines offering holiday charter services can be UK-based (e.g. Thomas Cook at Humberside) or “resort”-based (Balkan Holiday at Blackpool).

4.5.1. It is unlikely that a UK charter airline would establish a base at Lydd, so to avoid an expensive series of empty legs between its home-base (e.g. Luton) and Lydd, the airline/tour operator would probably prefer to implement a “W” operation. This would involve the airline flying (say) Luton to Malaga, then Malaga to Lydd and return, before flying back to Luton from Malaga. This type of schedule involves a potentially empty leg (Malaga-Lydd) only at the start of the series of charter flights.

4.5.2. A resort-based carrier would be able to set up a series of charters between Lydd and the tour operator’s destination area involving empty sectors only at the start, and the end, of the series of flights.

4.5.3. Clearly, the problem with charter services is that they are seasonal. Unless a tour operator is willing to operate and promote winter-sun holidays, or ski packages, through the winter season, an airport with traffic focussed on charter operations is highly vulnerable to significant swings in traffic levels throughout the year.

Table 2: Airlines serving selected UK regional airports

CARRIER % OF FLIGHTS September 2010	Blackpool	B'mouth	Exeter	Humberside	Inverness	Lydd	Durham	Newquay	Norwich	Plymouth
Astraeus	0.0%	11.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
BMI British Midland	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	13.0%	0.0%
Flybe	0.0%	8.4%	85.3%	2.2%	78.0%	0.0%	1.3%	20.2%	33.8%	0.0%
Balkan Holiday	1.7%	1.3%	0.0%	1.7%	0.0%	0.0%	1.7%	0.0%	0.3%	0.0%
Condor	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Aer Lingus	11.5%	0.0%	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%
Ryanair	0.0%	59.2%	0.0%	0.0%	0.0%	0.0%	5.7%	1.6%	0.0%	0.0%
Isles of Scilly Skybus	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	18.2%	0.0%	0.0%
KLM	0.0%	0.0%	0.0%	51.1%	0.0%	0.0%	39.1%	0.0%	28.8%	0.0%
Air Malta	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
Lufthansa	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.4%	0.0%	0.0%
Jet2.com	47.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%
Lydd Air	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
Manx2	39.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Air Southwest	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	53.7%	0.0%	100.0%
Eastern Airways	0.0%	0.0%	0.0%	39.8%	0.0%	0.0%	41.7%	0.0%	16.5%	0.0%
Thomas Cook	0.0%	0.0%	1.8%	5.2%	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%
Thomson Airways	0.0%	19.1%	12.2%	0.0%	0.0%	0.0%	2.2%	0.0%	4.3%	0.0%
easyJet	0.0%	0.0%	0.0%	0.0%	21.6%	0.0%	0.0%	0.0%	0.0%	0.0%
Eurocypria	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
bmi baby	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.5%	0.0%	0.0%

Source: OAG

5. Conclusion

- 5.1. The above analysis shows that it is highly unlikely that Lydd Airport could make a positive operating profit at levels of annual passenger throughput of 500,000.
- 5.2. The only way an airport of such a traffic volume could be profitable would be to attract lucrative off-shore oil business, a flourishing business park or other activities on the airport that were not related to commercial air transport activities.
- 5.3. Lydd Airport has none of the specific advantages that a very limited number of other UK airports have for successful commercial exploitation of these activities, and could be seriously disadvantaged by the special status of the land surrounding the airport.
- 5.4. Commercial activity focussed on passengers, particularly retail and parking initiatives, are usually offered by third parties under concession agreements rather than the airport itself. Low passenger numbers are unlikely to attract the more successful operators in this field and any firm would incur substantial fixed costs (in addition to those of the airport in providing space and services) with the prospect of low and possibly seasonal revenues.
- 5.5. Having significant volumes of air cargo operations might also help Lydd to become profitable, although these types operations do not generate the amounts of ancillary revenues that passengers provide through the retail and parking purchases referred to in the preceding paragraph.

Appendix 1: Airport traffic and financial data 2008/9 (April 2008 to March 2009)

	Terminal Passengers 2008/9	Total aircraft Movements 2008/9	Total air transport Movements 2008/9	Operating Revenue 2008/9	Aeronautical Revenue 2008/9	Commercial Revenue 2008/9	Operating Cost 2008/9	Operating Profit 2008/9
Blackpool *	439,420	37,258	7,094	£10,686,000	£6,014,000	£4,672,000	£14,289,000	-£3,603,000
Bournemouth	1,058,845	84,412	11,802	£16,166,000	£4,644,000	£11,522,000	£13,313,000	£2,853,000
Cardiff	1,983,236	37,125	23,352	£20,905,000	£12,048,000	£8,857,000	£15,558,000	£5,347,000
Durham Tees Valley	604,778	28,721	8,033	£9,042,000	£4,739,000	£4,303,000	£13,027,000	-£3,985,000
Exeter	950,347	44,258	16,846	£22,787,000	£8,753,000	£14,034,000	£21,164,000	£1,623,000
Humberside	431,000	36,817	14,100	£12,751,000	£3,532,000	£9,219,000	£12,380,000	£371,000
Inverness	655,884	40,538	17,936	£7,558,000	n/a	n/a	£9,884,000	-£2,526,000
Leeds-Bradford	2,746,735	60,119	36,713	£21,087,000	£8,601,000	£12,486,000	£23,644,000	-£2,557,000
Newquay	415,488	12,238	12,232	£9,675,374	£9,421,839	£253,535	£9,676,374	-£1,000
Norwich	555,300	47,792	26,072	£12,443,000	£5,805,370	£6,637,630	£12,707,000	-£264,000
Plymouth	117,823	19,651	6,804	£3,315,000	£3,019,000	£296,000	£4,080,000	-£765,000

*Blackpool traffic and financial data originally 9-month financial year. Normalised to 12-month financial year

Source: CRI, Fame database, Highlands & islands Airports Annual Report 2008-9

Appendix 2: Airport ratios 2007/8 (April 2007 to March 2008)

	Terminal Passengers	Operating profit per passenger
	2007/8	2007/8
Blackpool *	488,000	-9.836
Bournemouth	1,088,000	3.125
Cardiff	2,099,000	3.573
Durham Tees Valley	759,000	-3.030
Exeter	823,000	-0.648
Humberside	467,000	1.285
Inverness	703,371	-3.681
Leeds-Bradford	2,879,000	-0.590
Newquay	352,548	0.000
Norwich	681,000	0.147
Plymouth	84,000	-10.714

* Blackpool traffic and financial data originally 9-month financial year. Normalised to 12-month financial year

Source: CRI, Fame database, Highlands & Islands Airports Annual Report 2007-8

Appendix 3: Airport ratios (April 2008 to March 2009)

	Operating revenue per passenger 2008/9	Operating cost per passenger 2008/9	Operating profit per passenger 2008/9	Commercial revenue per passenger 2008/9	Operating revenue per aircraft 2008/9	ATM as % total movements 2008/9	commercial revenue %
Blackpool *	24.3	32.5	-8.199	10.63	287	19%	44%
Bournemouth	15.3	12.6	2.694	10.88	192	14%	71%
Cardiff	10.5	7.8	2.696	4.47	563	63%	42%
Durham Tees Valley	15.0	21.5	-6.589	7.12	315	28%	48%
Exeter	24.0	22.3	1.708	14.77	515	38%	62%
Humberside	29.6	28.7	0.861	21.39	346	38%	72%
Inverness	11.2	15.1	-3.851	n/a	182	44%	n/a
Leeds-Bradford	7.7	8.6	-0.931	4.55	351	61%	59%
Newquay	23.3	23.3	-0.002	0.61	791	100%	n/a
Norwich	22.4	22.9	-0.475	11.95	260	55%	53%
Plymouth	28.1	34.6	-6.493	2.51	169	35%	9%

*Blackpool traffic and financial data originally 9-month financial year. Normalised to 12-month financial year

Source: CRI, Fame database, Highlands & islands Airports Annual Report 2008-9

Appendix 4: Overview of the Department of Air Transport, Cranfield University

In today's rapidly changing air transport environment, governments, airlines and airport authorities are facing increasingly complex and often conflicting pressures. Effective management, planning and training can help to solve these problems but the industry requires access to advanced and comprehensive knowledge, coupled with an in-depth understanding of its needs.

The Department of Air Transport at Cranfield University combines a wealth of practical expertise together with extensive research and teaching experience in one centre of excellence. Cranfield has been serving the air transport industry for over a quarter of a century. The Department is the main European centre for strategic and applied research and consultancy in all aspects of the operation and management of airlines, airports and air traffic control services. It also provides career development training and postgraduate teaching.

As well as its own staff comprising some 16 lecturers and researchers, the Department can draw on expertise and resources from elsewhere within Cranfield, notably other departments in the School of Engineering, and externally from other air transport specialists. Supported by extensive library facilities and on-line access to databases, the Department is heavily engaged in four major activities:

Postgraduate Courses

The Department runs one-year full time postgraduate Masters (MSc) courses in Air Transport Management or Airport Planning and Management, whose aim is to prepare graduates, either directly from university or with work experience, for careers at a senior level in the management of the civil air transport industry. Alumni from these courses are highly sought after and some are now in senior positions, including CEO/COO level, within airlines and other air transport companies throughout the world.

There are also part-time MSc programmes Air Transport Management and Airport Planning and Management as well as Safety and Accident Investigation and Airworthiness. The part-time MSc programmes make use of a number of highly successful one week residential professional courses offered by the Department (see below).

The full-time courses are focused around a structured lecture programme, but also include case study work, seminars led by industry experts, videos, visits and group projects. The courses include a thesis, which provides an opportunity to study a problem in considerable detail, and sponsoring organisations may co-operate in the choice of a suitable subject.

There are also around 25 preparing Doctorates (PhD) in Air Transport. These cover many of the areas of research listed below.

Research

A large number of externally or internally funded research projects are normally being undertaken at any one time. Research focuses on four key areas:

- **Airline business developments**, including
 - Low cost and charter airline business models and operations
 - Airline operations in remote regions (public service routes)
 - Airline productivity and efficiency
 - Airline distribution and travel planning
 - Airline revenue management
 - Airline alliances
 - Environmental costs and policy
 - Aircraft operations and evaluation

- **Airport economics and operations**, including
 - Benchmarking of airport and ground handling charges
 - The economic regulation of airports

Air traffic forecasting
The provision of air transport infrastructure in remote regions

- **Aircraft operations and planning**, including
 - Fleet planning and aircraft acquisition
 - Aircraft financing
 - The environmental impact of aircraft operations
 - Corporate and business aviation
- **Safety and accident investigations**, including
 - Safety management in the airline industry
 - Aviation safety assessment
 - Aviation operation management & accident investigation
 - Ramp safety

Much of this research is published in the form of either the Department's own Research Reports or articles/papers by staff from the Department in academic and other publications. The Department has recently produced a series of studies for the European Commission's Transport and Energy Directorate that are available on their website. More details are available on the Department's web site at <http://www.cranfield.ac.uk/soe/>.

Consultancy

The Department has extensive worldwide research and consultancy experience. It has been engaged in a variety of consultancy projects for a very wide range of clients, ensuring a thorough understanding of industry requirements. Services are offered in the following major areas:

Airport forecasting, marketing, operations and planning
Air transport market analysis
Air transport regulation
Air transport systems planning
Airline marketing, economics and strategy
Aircraft operations and evaluation
Corporate and business aviation
Air safety & accident investigation
Airspace & air traffic control

The client list includes major international bodies such as ICAO, UNDP, the World Bank and other regional development banks, and the European Commission. In the UK, work has been undertaken for the Civil Aviation Authority and Ministries of Transport, Trade & Industry and Defence, while the Spanish, Dutch, Argentinean, Malaysian and Norwegian governments are examples of overseas clients.

A large number of airlines (both scheduled and charter), airports and civil aviation departments worldwide have also benefited from consultancy assignments performed by the Department's staff. The Department is also ideally placed to offer training in conjunction with specific consulting assignments; this could take the form of on-site seminars or more specific counterpart training.

Work has included advice on air traffic forecasting and financial modelling in connection with airport privatisations in Malaysia, Jamaica, Mexico, Argentina, Hanover, London Luton and Berlin. A study was completed for a major European airline on new transatlantic routes, and on travel agency relationships for another European airline.

Studies are undertaken on airport and ground handling charges, and advice was given to a large European hub airport on service standards. The Department completed a major Single Market review for the aviation sector for the European Commission in 1997, followed by a study on the future of EU aviation over the next 10-15 years in 2005. It also was engaged to provide quarterly and annual reports on air transport within the EU between 2005 and 2008 and these reports are available on the EC

Short Courses

A large number of *residential short courses* are offered each year lasting from one to six weeks. They enable employee training and professional updating without long absences from the workplace in management and technical disciplines:

Safety, reliability and accident investigation

Accident Investigation for Aviation Management
Aircraft Accident Investigation
Airworthiness Fundamentals
Applied Safety Assessment
Flight Data Monitoring Operational Quality Assurance
Fundamentals of Accident Investigation
Hazards & Evidence Awareness for Air Accident Responders
Practical Reliability
Safety Assessment of Aircraft Systems
Safety Management Systems in Aviation

Air transport

Aircraft Performance for Air Transport Managers
Airline Fleet Planning
Airport Business Management
Airport Economic Regulation and Competition Policy
Airport Commercial Revenue Development

Airport Design
Airport Operations

Air Transport Management Seminar
Air Transport Engineering
Mergers and acquisitions in aviation markets

In addition, tailor-made courses for single clients are designed to meet the specific needs of firms in the aviation industry, and can be run in-house or on campus. For instance, courses have been run for the following clients:

Airlines: British Airways, Aer Lingus, China Southern, Cyprus Airways, Emirates Airlines, Finnair, LOT Polish Airlines, Malaysia Airlines, South African Airways, Vietnam Airlines, Virgin Atlantic Airways.

Airports: Aena (Spanish Airports Authority), Amsterdam Schiphol Airport, Birmingham Airport, Tallinn Airport, Hyderabad Airport, Vienna airport and partners.

Others: Airbus, Amadeus, Amex, British Telecom, GECAS, Embraer, Sema Schlumberger, SITA, UBS Warburg.

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