APPENDIX F

Evidence and analysis on competitive constraints by passenger switching

Introduction

F1 This appendix evaluates the strength of the competitive constraint that Stansted Airport Limited (STAL) might face from marginal passengers switching away from the airport in light of a price increase. This form of constraint could supplement the potential competitive constraints faced by STAL that could be imposed by airlines switching marginal services away from Stansted.

F2 Apart from this introductory section, this appendix consists of three sections:

- Section 1 sets out a summary of the CAA's Stansted market power assessment: Developing the 'minded to' position (the minded to Consultation) and a summary of stakeholders' responses on passenger switching.
- Section 2 is an evidence section where the CAA:
  - Considers the characteristics of Stansted's passengers, to identify which passengers have a choice of airport and general trends in their preferences.
  - Estimates the required critical loss of passengers that STAL would have to lose to make a small but significant non-transitory increase in price (SSNIP) unprofitable, and derives the corresponding critical price elasticities of demand.
  - Estimates a range for Stansted airport's charge elasticity of demand.
- Section 3 sets out the CAA's conclusion on competitive constraints posed on STAL by passenger switching.

Passenger switching in derived demand

F3 The ability and willingness of passengers to switch airport depends, in part, on the extent to which they regard services at different airports as reasonably close substitutes and the costs they face in switching to the next best alternative airport.[1] The availability of suitable alternative flights to the same destination as well as the willingness of passengers to follow an airline to an alternative airport is likely to be important to passengers' willingness to switch.

F4 As discussed in appendix D, passengers' demand for airport services is derived from their demand for air travel. The derived nature of passenger demand means that the exposure of passengers to increases in airport charges are likely to be muted, as these are levied directly on airlines but are only faced indirectly by passengers in airfares. Two factors are likely to reduce passenger exposure to increases in airport charges:

- As illustrated in appendix E, airport charges only constitute around 10 to 20 per cent of an airline's variable cost base. This implies that a 10 per cent price increase in airport charges, even if passed through completely into fares, would only represent a 1 to 2 per cent increase in prices faced by the passenger on a low cost carrier (LCC) flight.
- Airline airfares may not always reflect airport charges or be priced according to an airline's costs. Airlines may, for example, absorb some or all of any increase in airport charges rather than pass them on in higher fares.

F5 Overall, the evidence suggests that:

- Airport charge increases are unlikely to have a significant impact on airfares, particularly in the short run but may have a larger effect in the longer run.
- Marginal passengers at Stansted are unlikely to switch away in significant numbers in light of a 5 to 10 per cent increase in airport charges (see section 2.3).

F6 However, it is also important to consider the number of marginal passengers, and what factors would drive this 'marginality'. By considering this, estimates of the likely actual scale of passenger switching can then be compared to estimates of the required scale of passenger switching to

[1] See the CAA's Guidance on the assessment of airport market power (the Guidelines) which can be accessed at: http://www.caa.co.uk/docs/5/Final%20Competition%20Assessment%20Guidelines%20-%20FINAL.pdf, paragraph 3.34.

undermine the profitability of an airport price rise (the critical loss), to establish whether a price increase might be profitable.

Section 1: Minded to Consultation

F7 In the minded to Consultation, the CAA considered the extent to which marginal passengers currently using Stansted were able to switch to alternative airports in response to a hypothetical price increase.

F8 The CAA also considered that passenger switching would only arise to the extent that increases in airport charge were passed on by airlines. It found that passengers using Stansted had a preference for it compared with alternatives, implying that only a proportion of passengers in catchment overlaps would be prepared to switch. Furthermore, the CAA outlined that if increases in airport charges were passed on, the level of marginal passenger switching would be less than that required to constrain STAL's behaviour.

Stakeholders' views

F9 Manchester Airports Group (MAG), the new owner of STAL, disagreed with the CAA's analysis of the competitive constraints that STAL faces from passenger switching. In summary, MAG considered:

- The CAA's analysis did not consider the marginal switching by airlines in addition to passenger switching in response to a 5 to 10 per cent increase in airport charges.
- The CAA's analysis ignored Stansted passengers inbound to London (i.e. non-UK residents), where distance to central London is key.
- The modelling results did not include substitution effects to Southend and London City.
- The CAA's analysis did not discuss different types of passenger e.g. business and leisure, inbound or outbound.
- The CAA's analysis placed too much weight on analysis of average passengers' preferences and often disregarded the effects on most marginal passenger segments.
- Most of analysis was based upon historic information from when the airport was under BAA's common ownership and not under its ownership (a situation that MAG considered will result in an expanded catchment and the attraction of airlines from other airports to Stansted).

F10 On the critical loss analysis and estimates of airport charge elasticity that the CAA had outlined in the minded to Consultation, MAG considered that:

- Frontier Economics' 2011 paper is unreliable and flawed and cannot form a basis for estimating switching.
- Frontier Economics' model ignores allocation of future growth.
- National Air Passenger Allocation Model (NAPALM) based models ignore potential of switching to Southend.
- Some of the assumptions used to derive airport charge elasticities would lead to an underestimation of the elasticity, particularly the assumptions relating to the airport charge to fare ratio and on the use of average fares and not fares paid by marginal passengers.
- In places, the analysis ignores the higher opportunity that inbound passengers have to substitute from Stansted.

Section 2: Evidence and analysis

F11 To consider the scale of passengers required to switch to impose a constraint on STAL, the CAA has:

- Examined the characteristics of Stansted's passengers, to identify which passengers have a choice of airport and general trends in their preferences.
- Estimated the critical loss of passengers required to make an increase in airport charges unprofitable for STAL.
- Considered a range of modelled elasticities to estimate the likely scale of switching required to constrain STAL.
- Compared the estimates of critical loss and actual loss of marginal passengers to reach a judgement on the extent marginal passengers' switching could constrain STAL's pricing behaviour.

Section 2.1: Characteristics of passengers using Stansted

F12 Different groups of passengers have different reasons for choosing a particular airport from which to fly. The variation in passengers' preferences can influence how likely they would be to switch away from Stansted, to the extent that a 5 to 10 per cent increase in airport charges is passed through in airfares.

F13 Passengers' preferences at Stansted, as well as at airports more generally, can vary according to a number of factors, including:

- Whether they begin or finish their journey in the airport's catchment area (surface outbound and inbound passengers) or connect at the airport.
- Where they originate in the airport's catchment area, the costs of access and egress and convenience of transport links.
- Passenger journey purpose.
- Why passengers choose to travel to/from Stansted.
- The timing and convenience of flights on offer.
- The duration of the flight.

F14 Each of these factors is considered, in turn, below for passengers at Stansted. At the centre of the analysis of switching by marginal passengers is the sensitivity of these to an increase in airport charges that airlines pass through in the form of higher airfares. This appendix therefore focuses on establishing the potential characteristics of cost-sensitive, marginal, passengers.

Surface travel time and catchment area analysis

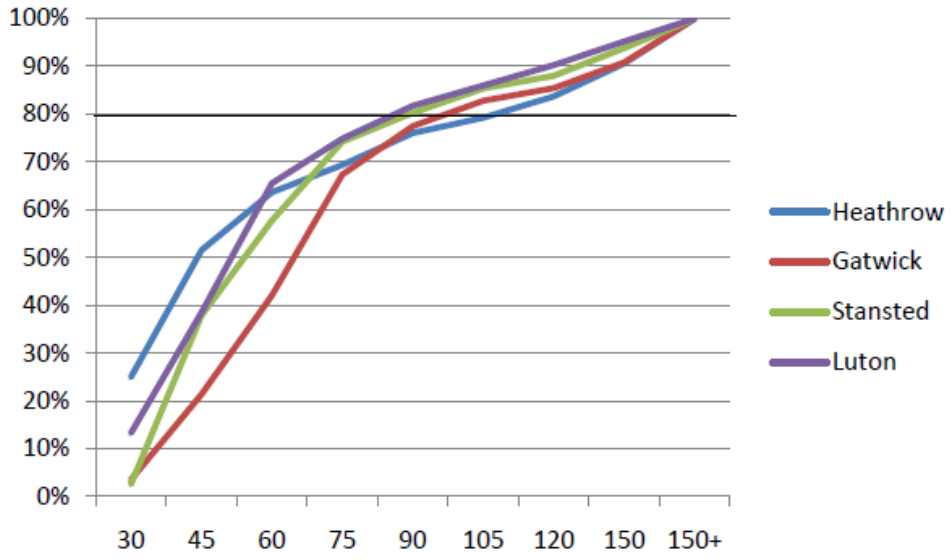
F15 The point of origin for a surface passenger can influence the amount of time they spend travelling to an airport, and whether they are likely to originate from a location covered by more than one airport's catchment area. This section considers what effect these considerations could have on the degree of airport choice faced by passengers.

F16 According to the CAA Passenger Survey (2012), at least 96 per cent of Stansted's 17.4 million passengers travelled to the airport by surface access transport.

Surface travel times

F17 Figure F.1 shows the travel time distribution for all passengers accessing the four biggest London airports by surface access transport. Overall, approximately 80 per cent of passengers at each of Gatwick, Luton and Stansted have an estimated travel time of travel of at most approximately 90 minutes. Eighty per cent of Heathrow passengers are within 105 minutes of the airport.

Figure F.1: Surface travel time (minutes) by airport



Source: CAA Passenger Survey and the Department of Transport's (DfT) Surface Access times

F18 However, different passenger types have a different preferences for travel-time to the airport.[2]

- Passengers travelling for business typically prefer shorter surface travel times, compared to passengers visiting friends and relatives (VFR) and holiday passengers who are willing to travel for longer periods of time to reach their departure airport.[3]
- Long-haul passengers are typically willing to travel to the airport for longer than those on short-haul and domestic services, reflecting the fact that the surface journey represents a smaller proportion of long-haul passengers' total journey time.
- Passengers residing in the UK tend to have longer surface travel times than passengers residing abroad (foreign visitors who are likely to stay in central London and/or plan their visit so they are close to the airport when they arrive or depart).

2 Full supporting details can be found in the CAA's working paper on Catchment Area Analysis, October 2011, available at: http://www.caa.co.uk/docs/5/Catchment%20area%20analysis%20working%20paper%20-%20FINAL.pdf.

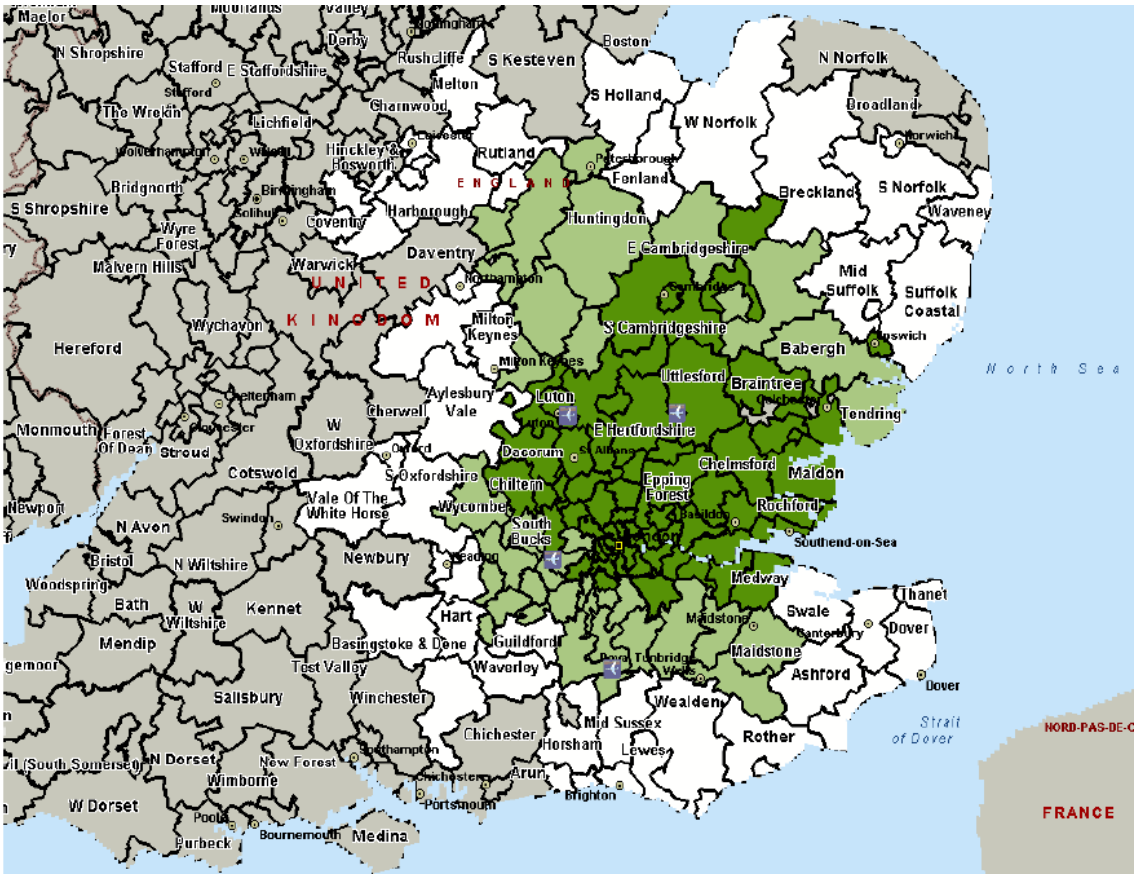
3 This reflects DfT's estimates that business passengers are likely to have a higher value of time than other passengers. For example, DfT assumes a value of time of around £50/hour for business passengers and of around £11/hour for leisure passengers in their modelling.

Catchment area analysis

F19 An airport's catchment area is an estimate of the geographic area from which a large proportion of an airport's outbound passengers originate and inbound passengers travel to. It can also represent the geographic distribution of passengers within this area. The extent to which catchments of different airports overlap is useful in assessing the extent to which passengers might consider airports to be substitutes, based on their location alone.[4]

F20 Figure F.2 shows the districts from which Stansted would draw passengers, based on surface travel time to Stansted, with the dark and light green areas together accounting for 80 per cent of Stansted's total passengers and, as seen in Figure F.1 above, being within 90 minutes of Stansted.

Figure F.2: Stansted overall surface travel time catchment area



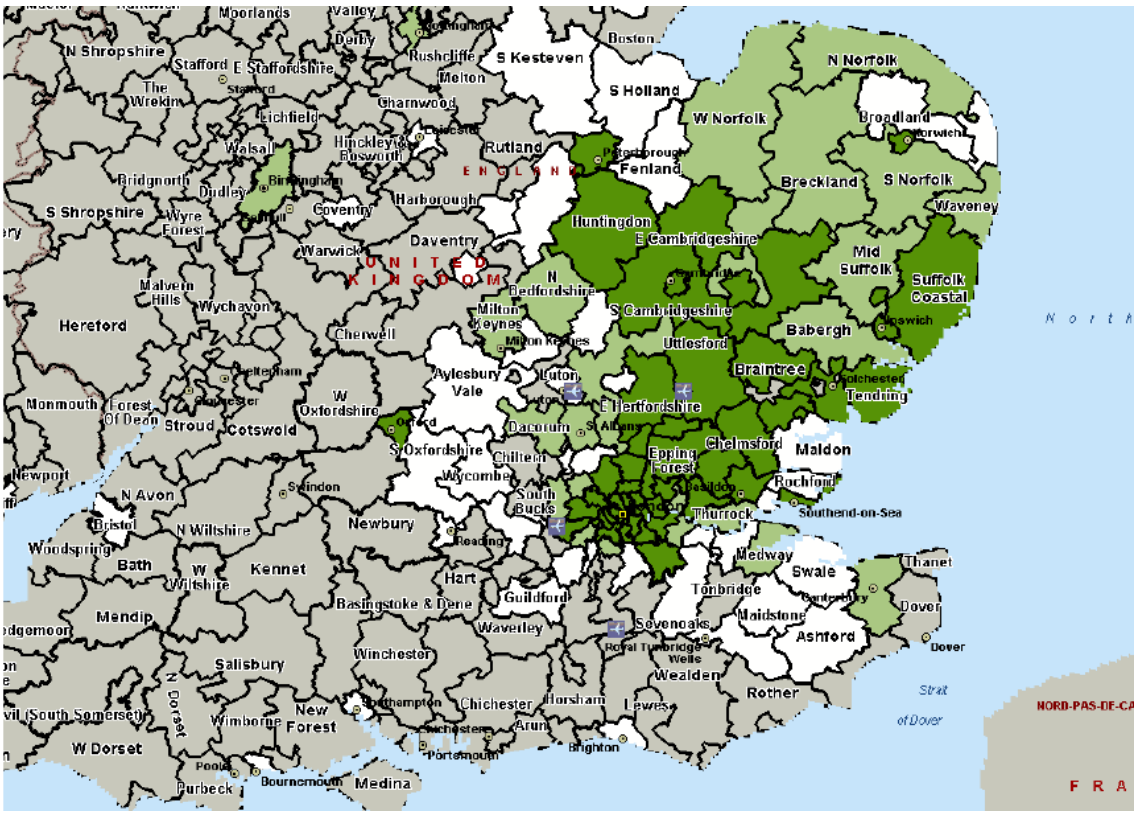
Source: CAA analysis of the CAA Passenger Survey 2010 and DfT surface access data.

Note: shading shows cumulative proportion of passengers attending Stansted when districts are ranked by travel time to the airport; Dark green – the first 70 per cent of passengers, Light green – the 70th to 80th percentile, White – the 80th to 90th percentile.

[4] For full details of this analysis, please see the CAA working paper on Catchment Area Analysis, October 2011.

F21 However, using CAA Passenger Survey data on the historical use of Stansted (i.e. when districts are ranked by the number of passengers using Stansted, rather than surface travel time to the airport), the airport's catchment area has a different distribution.[5] Notably, some of the dark and light green districts are more distant from London (i.e. they have a high proportion of Stansted's passengers even though they may not be close to Stansted – for example Suffolk and Norwich).

Figure F.3: Stansted historical usage catchment area



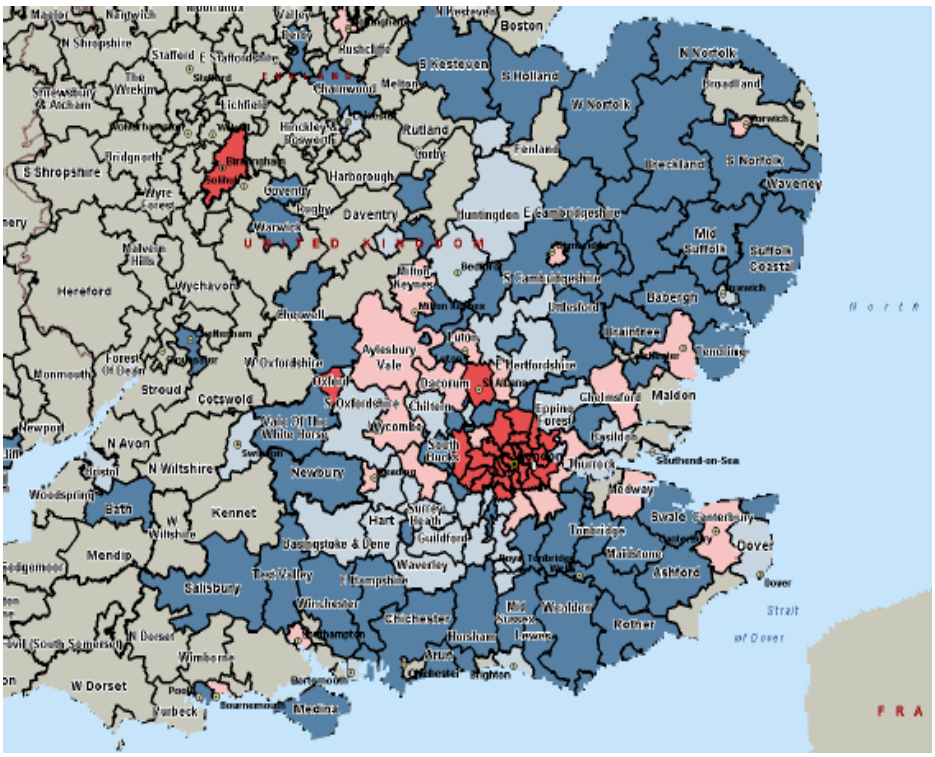
Source: CAA analysis of the CAA Passenger Survey (2010)

Note: shading shows cumulative proportion of passengers attending Gatwick when districts are ranked by passengers numbers; Dark green – the first 70 per cent of passengers, Light green – the 70th to 80th percentile, White – the 80th to 90th percentile

F22 The degree of passengers' choice regarding which airport from which to fly to/from can be influenced by whether their point of origin lies within an area of catchment overlap of two or more airports. Figure F.4 illustrates the catchment area overlaps based on historical usage between the four largest London airports (Heathrow, Gatwick, Stansted and Luton) for 80 per cent of passengers within each airport's catchment area, while Figure F.5 sets out the underlying proportions.

[5] This approach used CAA Passenger Survey data to rank districts according to number of Stansted's passengers, from which a cumulative distribution is obtained.

Figure F.4: Overlaps of historical usage catchment areas (using the 80 per cent threshold)



Source: CAA analysis of the CAA Passenger Survey (2010)
Note: Dark Blue: 1 airport (no overlap), light blue: 2 airport overlap, pink: 3 airports, red: 4 airports.

Figure F.5: Stansted's historical catchment area overlaps quantification

Catchment overlap zones	No. of Districts	4 Airport Passengers (m)	Stansted Passengers (m)	Proportion (4 airports) (%)	Proportion (Stansted) (%)	Stansted Share (%)
STN	18	3.59	1.92	4	11	53
LHR/STN	1	0.24	0.07	0	0	30
LGW/STN	4	1.30	0.47	1	3	36
STN/LTN	6	2.23	0.90	2	5	40
LHR/LGW/STN	7	3.53	0.95	4	6	27
LHR/STN/LTN	7	4.05	1.19	4	7	30
LHR/LGW/STN/LTN	28	40.58	8.00	43	47	20
Total Stansted Catchment	**71**	**55.51**	**13.51**	**58**	**79**	**24**
Out of Catchment		39.52	3.68	42	21	9
Total		**95.03**	**17.19**	**100**	**100**	**18**

Source: CAA analysis of the CAA Passenger Survey (2010)

F23 Figure F.5 shows that, cumulatively, 68 per cent of Stansted's passengers travel to and from a district where the airport's catchment area overlaps with that of at least one other airport.[6] In particular, 47 per cent of Stansted's passengers and 43 per cent of passengers using one of the four airports begin or end their journey in a district lying in a four-way overlap of the catchment areas of Stansted, Heathrow, Gatwick and Luton. Figure F.5 also shows that this overlap is mainly made up of the districts in and around central London. By contrast, only 11 per cent of Stansted's passengers originate from a district which is only covered by the airport's catchment area.[7]

F24 Based on catchment area analysis alone, it appears that a significant proportion of Stansted's passengers might be able to consider flying from another of the other three largest London airports and that many passengers start their surface journey to an airport in areas there is a high usage of at least one other airport. However, this analysis does not consider the following factors that can affect passengers' choice of airport:

- The importance of journey purpose and passenger residence.
- The importance of passenger preferences.
- The airline offering available at each airport (business models, destinations and frequencies and passengers preference for them).

F25 These additional considerations can significantly alter a passenger's scope for choosing to fly to/from another airport, in response to an increase in the price of using Stansted. Each of these is considered in turn below.

Connecting passengers

F26 Connecting passengers are a by-product of the size of the airport's route network, where full service carriers (FSCs), whose airline business models cater for the needs of those passengers, are present. The LCCs do not actively market for these types of passengers. This type of passenger is predominantly self-interlining and will have to check-in and go through security again to board their next plane. These passengers

6 The sum of passenger proportions in LHR/STN, LGW/STN, STN/LTN, LHR/LGW/STN, LHR/STN/LTN and LHR/LGW/STN/LTN overlaps.

7 By design, approximately 20 per cent of Stansted's surface passengers are outside its catchment area. Many of those passengers are likely to originate within the catchment area of other London airports, as the 90 per cent zone of Figure F.3 indicates. Furthermore, the analysis is dependent on the catchment definition and cut-off used. However, the result that there are significant catchment overlaps over central London is a robust one.

would also have no guarantee of being able to get on the next flight if their inbound flight was late.

F27 Overall, the CAA does not consider that competitive constraints resulting from marginal connecting passengers switching to connect at an alternative airport are likely to be material, due to the small proportion (4 per cent[8]) of these passengers to Stansted's total passengers.

Journey purpose

F28 A passenger's journey purpose can influence their choice of airport, as it is likely to imply particular preferences. For example, preferences regarding the quality and speed of an airport's surface access links and the particularities of the services provided by airlines including price, destinations and frequencies might all be expected to vary according to the purpose of a passenger's journey.

F29 Based on the CAA Passenger Survey, as well as previous discussions with stakeholders[9], the CAA considers that passengers can be categorised into three different types of journey purpose:

- Holiday passengers – these passengers tend to be the most cost-sensitive, but less time-sensitive and have a potentially broader choice of destinations.
- VFR passengers – these passengers tend to have more destination-specific preferences.
- Business passengers – these passengers are likely to be most time-sensitive and have destination-specific preferences.

F30 The CAA considers that cost-sensitive passengers would be more likely to consider switching away from Stansted in light of an increase in the cost of using the airport than those for whom cost is less important. From this, the CAA considers that Stansted's holiday passengers, inbound VFR passengers and outbound VFR passengers with routes available at alternative airports would be more likely to switch than business passengers.

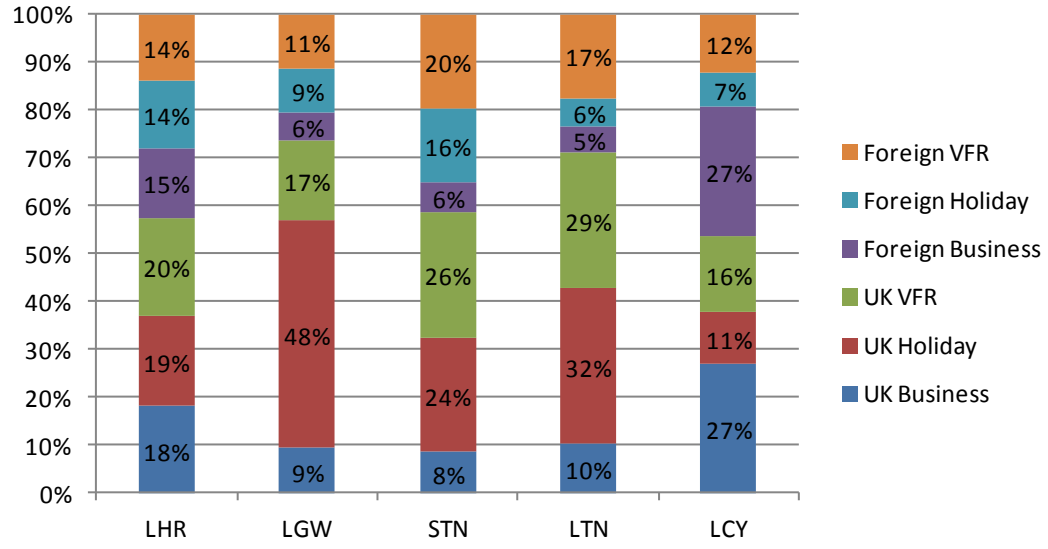
8 CAA Passenger Survey 2012.

9 These categories reflect stakeholders' views in the context of the CAA's work on preparing for a more competitive airport sector. See for example, the August 2010 Competition Guidelines Issues paper: http://www.caa.co.uk/docs/5/ergdocs/CompetitionGuidelinesIssuesPaper.pdf, paragraph 3.149.

F31 Figure F.6 sets out CAA Passenger Survey data on the journey purpose for Stansted's surface passengers, taking into account whether or not they reside in the UK. Passengers travelling to VFR are the largest group (46 per cent) followed by passengers travelling on holidays (40 per cent). Business travel accounts for just 14 per cent of Stansted's passengers.

F32 Compared to the four other largest London airports, Stansted has a similar passenger profile to Luton's passengers. VFR constitutes a considerably larger proportion of Stansted's passengers as a share of its total passengers than Heathrow (34 per cent), Gatwick (28 per cent) and London City (28 per cent). By contrast, business passengers constitute the lowest proportion of Stansted's passengers (14 per cent), which is comparable to that of Luton and Gatwick but considerably smaller than that of Heathrow and London City. Stansted also has a lower proportion of holiday passengers compared with Gatwick (54 per cent) but a higher proportion of holiday passengers than Heathrow and London City.

Figure F.6: Proportion of surface passengers by residence by purpose

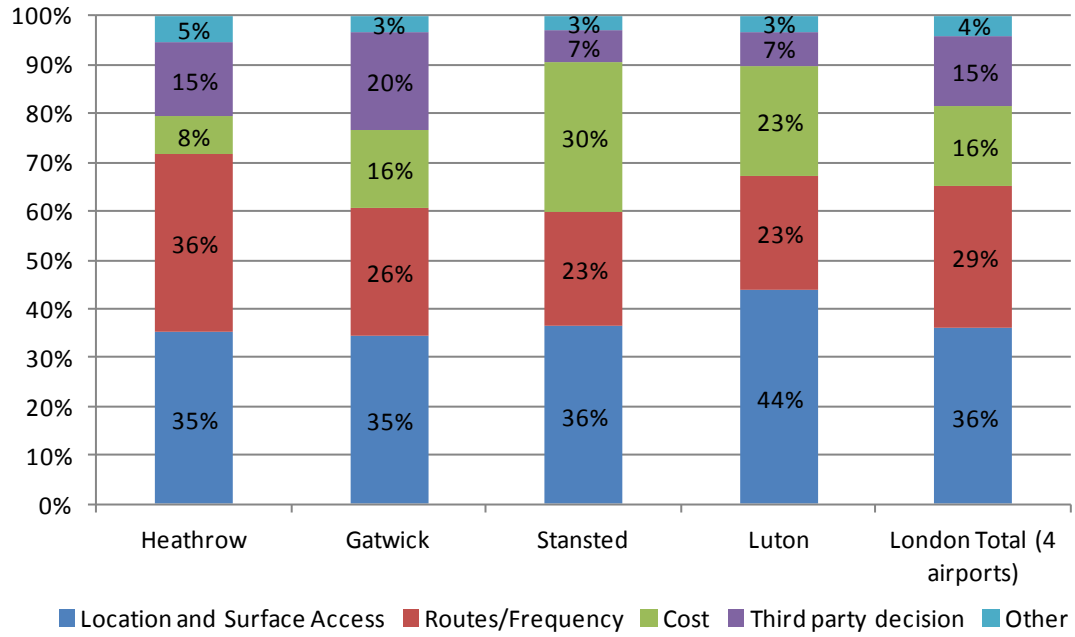


Source: CAA Passenger Survey 2012

Reasons for airport choice

F33 As well as their journey purpose, passengers might have a specific reason why they choose to travel to and from a particular airport. Figure F.7 sets out the responses to the CAA Passenger Survey for the four largest London airports.

Figure F.7 Reason for airport choice for surface access passengers



Source: CAA Passenger Survey 2012

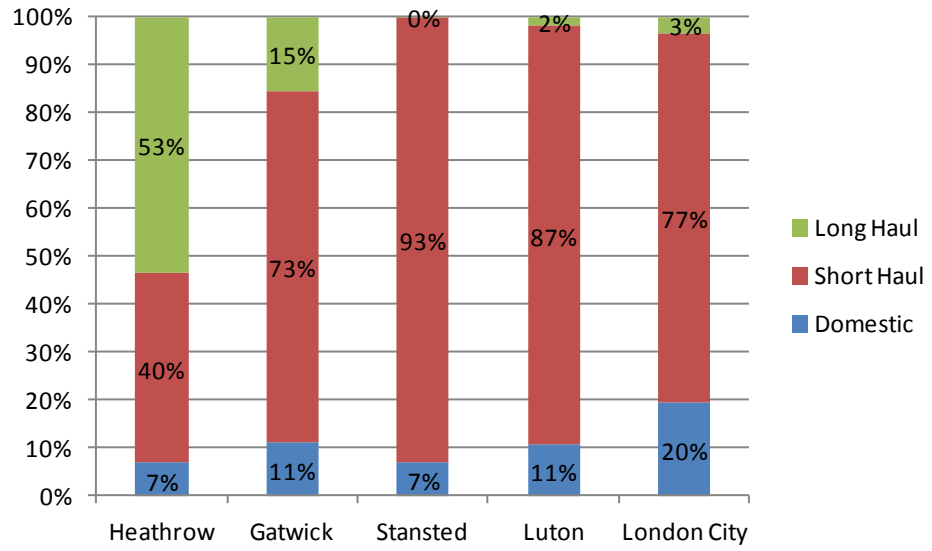
F34 For each airport, its location and surface access (36 per cent) are the most common reasons why passengers chose to fly from a particular airport. This reflects the airline evidence that each airport has a core catchment area, as discussed in appendix D. Figure F.7 suggests that location and surface access is the most important single reason behind a passenger's choice. The second most important reason for passengers choosing Stansted is the cost of travel. This contrasts to the situation with Heathrow, where the most important reason is the availability/frequency of route and with Gatwick, where third party decisions (probably because of tour operators' decisions) and route/frequency reasons were quoted more frequently than cost.

F35 Nevertheless, Figure F.7 suggests that several factors contribute to the reason why a passenger chooses a particular airport. The CAA therefore considers that it is useful in illustrating the importance of analysing factors other than location and cost when looking to understand the likely propensity of passengers to switch airports.

Trip length and route overlaps

F36 Passengers at Stansted, as shown in Figure F.8, fly predominantly to short-haul (93 per cent) and domestic (7 per cent) destinations with hardly any flying to long-haul destinations.[10] The degree of route overlaps across airports is greater in the short-haul segment than in the long-haul segment as long-haul services are concentrated at Heathrow and to a lesser extent at Gatwick.

Figure F.8: Proportion of London airports' passengers by destination type



Source: CAA Passenger Survey, 2012

F37 Route overlaps illustrate the extent to which passengers might be able to fly to the same destination from another London airport. Figure F.9 shows that that there is considerable route overlap for domestic routes (83 per cent), with five out of the six routes at Stansted overlapping with Gatwick, three with Luton and two with London City.

Figure F.9: Number of domestic route overlaps between London airports, 2012

DOM	Routes	Overlaps	% Overlap	1.LHR	2.LGW	3.STN	4.LTN	5.LCY	6.SEN
1.LHR	7	7	100%		7	4	4	3	1
2.LGW	12	11	92%			5	7	5	2
3.STN	6	5	83%				3	2	1
4.LTN	7	7	100%					5	2
5.LCY	6	5	83%						1
6.SEN	2	2	100%						

Source: CAA Airport Statistics
Notes: UK Cities served with more than 10,000 passengers.

[10] Long-haul passengers are passengers whose journeys ultimate airport destination is located beyond geographical Europe and North Africa. Domestic passengers are passengers whose journeys' ultimate airport destination is located in the UK.

F38 Figure F.10 shows that there is 66 per cent overlap of short-haul routes at Stansted with other London airports, with Gatwick and Luton having the most overlap.

Figure F.10: Number of short-haul route overlaps between London airports, 2012

SH	Routes	Overlaps	% Overlap	1.LHR	2.LGW	3.STN	4.LTN	5.LCY	6.SEN
1.LHR	77	65	84%		54	29	28	15	3
2.LGW	138	111	80%			77	53	19	8
3.STN	147	97	66%				56	14	8
4.LTN	86	73	85%					11	9
5.LCY	28	23	82%						7
6.SEN	9	9	100%						

Source: CAA Airport Statistics

Notes: Geographical European cities with more than 10,000 passengers.[11]

F39 Similar to catchment area analysis, route overlap analysis has a number of limitations.

- As route overlap analysis is only a measure of whether a route is available at another airport, it omits related passenger considerations such as the daily and weekly schedule differentiation for a given route across the airports at which it is available.
- The analysis assumes that a suitable flight to the same destination is available, when in practice, for example, a charter route may not be a good substitute for a scheduled one. Differences in scheduling can also affect substitutability.
- As route overlap analysis takes no account of service differences, it is likely to over-state the extent of passenger switching that could occur in reality. On the other hand, it also ignores the possibility that passengers could decide to use a different airport to fly to a different destination that could be seen by the passenger as a good substitute (for example, a similar sunshine destination).

F40 For an airport to act as a viable substitute for a marginal passenger seeking to travel on a particular route, it would be at least necessary for a passenger:

- To be located in an area of catchment area overlap of at least two airports, as they are more likely to be able to access conveniently different airports.

[11] A city can be served by multiple airports (e.g. Paris - Charles de Gaulle and Paris - Orly).

- Have a choice of route availability from each of these airports.[12]

Short-haul airline competition across London airports

F41 Another useful way to assess the potential for passenger switching across airports is to consider the extent airlines compete across airports. A 2008 working paper by the Competition Commission (CC) analysed airline yield data and found some evidence that BAA airports (Heathrow, Gatwick and Stansted) are substitutes for passengers. In that analysis, the CC considered that:

It is not possible to estimate cross-price elasticities [faced by airports] directly: historical joint-ownership has prevented competition between the airports and so we observe only a few instances of switching behaviour by airlines. This means we must look to passenger willingness to substitute between airports in response to relative airfare changes instead to guide our view on incentives for airlines to switch in response to changes in relative airport charges. [13]

F42 The CAA considers that difficulties in estimating the cross-price elasticities faced by airports continue to apply, notwithstanding the recent acquisition of STAL by MAG (February 2013). In particular, the intervening period between the purchase and the time of writing this Determination is too short to analyse likely reactions to the new ownership.

F43 The CAA has, however, analysed easyJet route revenue and profitability data by constructing a panel dataset of easyJet's London routes' annual revenue and annual profitability. The CAA has supplemented this data with information from the CAA Airport Statistics on alternative seat capacity at the same airport and at other London airports for each route year.

F44 This data was used to try to understand the extent to which there is competition between airlines across the London airports and to aid in the CAA's understanding of the extent to which passengers substitute between London airports.

F45 The CAA fitted a panel fixed effects model[14] where easyJet revenue was regressed against easyJet seat capacity and seat capacity provided at

[12] Some passengers may also have a choice of alternative destinations.

[13] CC, Working paper on analysis of airline yield data, available at: http://www.competitioncommission.org.uk/assets/competitioncommission/docs/pdf/inquiry/ref2007/airports/pdf/working_paper_airline_yield_data.pdf.

[14] An econometric model that controlled for route and time specific effects, allowing the relationship between revenue and seat capacity to be measured.

alternative airports. This attempted to assess the extent to which airport seat capacity at alternative London airports constrain easyJet route revenue and profitability at Stansted.

F46 The results for easyJet's Stansted routes suggest that:

- One extra seat provided at another London airport to the same destination reduces easyJet revenue on a route between Stansted and the destination by approximately [✂]. One extra seat provided at Stansted by another airline but to the same destination reduces easyJet revenue on that route by about [✂].
- Heathrow, Gatwick [✂] Luton seem to be constraining route revenue at Stansted, [✂].

F47 While elasticities of demand were not derived from this analysis, the CAA found that:

- There are signs of airline competition for passenger demand at and across London airports.
- Competition between airlines at the same airports appears to be stronger than competition between airlines at different airports in London.
- [✂].

F48 The CAA therefore concludes that there are signs of airline competition for passenger demand (the downstream market) at and across London airports. It also appears that competition between airlines at the same airport appear to be stronger than competition between airlines across different London airports. However, air services from different London airports may place different constraints on easyJet routes, although it is unclear from which airport the constraint is largest.

Stakeholders' views

F49 In its response to the minded to Consultation, MAG noted that:[15,16]

- The catchment analysis contained in the minded to Consultation was superficial.

[15] MAG, Interim response of MAG to the CAA's minded to document, 24 May 2013, paragraphs 5.74 to 5.84.

[16] Case associates, Assessment of CAA's approach to Stansted's Market Definition, 23/05/2013, p. 47.

- The CAA did not discuss important differences between types of passengers such as business and leisure passengers, and inbound and outbound passengers that can reveal the nature of competition.
- Most of the CAA's evidence around travel isochrones and passenger survey evidence relates exclusively to UK-based passengers and that foreign residents represent 42 per cent of Stansted's passengers.
- The catchment area analysis ignores those passengers for whom Stansted is the destination rather than the point of origin of their journeys. MAG considered that for inbound passengers (42 per cent of Stansted's passengers), it is the distance to central London that matters and not the distance to their homes.
- 20 per cent of passengers travel more than 90 minutes by surface. For that reason, these are likely to be the marginal passengers and therefore the most likely to switch when faced with a price increase.
- The catchment area analysis focused on a time when the three largest London airports were in common ownership and, therefore, based on historic traffic patterns that may no longer be relevant.

CAA views

F50 The CAA has extended its analysis on passenger types and catchments that was outlined in the minded to Consultation, addressing, in part, many of MAG's concerns. The CAA's analysis takes into account both inbound and outbound passengers. The catchment overlap analysis takes into account that most inbound passengers have a strong preference to access central London. The NAPALM model also takes into account the passenger demand residence characteristics.

F51 The CAA also considers that downstream choice for passengers originating in catchment overlaps is not significantly constrained by surface access conditions. However, surface access is just one of several dimensions taken into account by passengers when choosing airports and airline services. Other factors, such as availability of route, frequency of service are also important considerations on passengers' choices.[17]

F52 Given this multidimensional nature of passenger choice, the CAA considers that choice-modelling (see section 2.3) is a better way of capturing the variety of elements that influence passengers' preferences. The CAA therefore considers that those type of results (presented in

[17] See, for example, DFT, UK Aviation Forecasts, January 2013, box 2, available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223839/aviation-forecasts.pdf.

section 2.3) would be better suited to quantify the number of passengers that would stop using Stansted when faced with an airport charge increase.

F53 The CAA agrees that there are strong signs of competition between airlines in the downstream market for air transport services. However, the analysis in this section is not sufficient to conclude on the extent to which competition in the downstream (airline-passenger) market constrains airport pricing in the upstream airport-airline market. This is particularly the case as airport charges represent a small part of passenger ticket prices and because there are different ways (and extents) by which airport charges increases are passed onto passengers.

F54 The CAA acknowledges that its analysis is focused on a time when the three London airports were in common ownership and that BAA's divestment of a number of these airports may change the picture. However, the CAA considers that there is merit in looking at the available historical evidence, particularly for structural demand characterisation.

Conclusion on characteristics of passengers at Stansted

F55 This section has considered broad trends in passenger characteristics at Stansted compared to other London airports. While catchment area analysis suggests that a significant proportion of Stansted's passengers are likely to be able to travel from at least two London airports, this does not take into account the other factors that influence passenger preferences in choosing an airport.

F56 The vast majority of passengers at Stansted travel on short-haul flights, followed by domestic and hardly any on long-haul services, which reflects the airline services available at the airport. The extent of route overlaps for these different flight durations could affect passengers' choice of airport.

F57 Analysing catchment area overlaps, reasons for airport choice and route overlaps also suggests that a significant number of domestic and short-haul passengers face a degree of choice regarding flying to the same destination from a different London airport. Econometric analysis of fares also suggests some potential for competition across London airports.

F58 The majority of Stansted's passengers are also leisure (holiday and VFR) passengers, who are typically more likely to be cost-sensitive than business passengers. In addition, VFR passengers (around 46 per cent of Stansted's total passengers), together with business passengers (around 14 per cent of Stansted's total passengers), are more likely to prefer a specific destination. Inbound holiday passengers that are also likely to be the most price-sensitive demand category accounted for around 16 per cent of passengers.

F59 In addition, approximately 32 per cent of domestic and short-haul passengers appear to be cost-sensitive with respect to travelling through Stansted. However, this does not necessarily mean that these passengers would constitute STAL's marginal passengers in light of a 5 to 10 per cent increase in airport charges. As discussed in section 2.3:

- Airport charges account for a relatively small proportion of an airline's operating costs (around 10 or up to 20 per cent). A hypothetical 10 per cent increase in these costs would be then likely to lead to an increase of one to two per cent in airfares. This is a relatively small increase in the price faced by passengers.
- Airlines might not always in the short run pass through to passengers the increase in airport charges, as airfares are not always priced to fully reflect costs.

F60 The CAA considers that these two factors are likely to reduce the scale of switching by marginal passengers. The likely loss of passengers following an airport charge increase (if it was fully passed onto passengers by airlines) is estimated in section 2.3.

Section 2.2: Critical loss analysis

F61 This appendix has so far considered the likely characteristics that might describe STAL's marginal passengers. This section:

- Estimates the required critical loss of passengers that STAL would have to lose to make a SSNIP unprofitable.[18]
- Produces the corresponding price elasticities of demand.

[18] A loss of passengers equal to the critical loss means that the price rise would not give incremental profits. When the loss exceeds the critical loss level, the airport operator would lose existing profits in addition to the price increase not being profitable.

Approach and assumptions

F62 The critical loss analysis examines the level of passenger demand reduction – and equivalent flight/aircraft withdrawal – that would be required for an airport charge increase to be unprofitable for the airport operator. The analysis considers an increase in airport charges of 5 to 10 per cent.

F63 The analysis examines the impact of an increase in revenue from airport charges on top of STAL's current total revenue per passenger, which includes commercial revenue. Due to the vertical nature of the relationships between airport operator, airline and passengers, the following critical loss analysis focuses on increases in airport charges to airlines. However, the analysis takes into account the potential loss to STAL of both the aeronautical and non-aeronautical revenue for each passenger switching away.

F64 The analysis uses regulatory accounts information for 2012/13 and takes into account the impact of a change in charges on operating costs and commercial revenues. The analysis makes the following assumptions:

- Operating cost elasticity of demand of 0.5 based on analysis undertaken by Steer Davies Gleave (SDG) as part of the Stansted mid Q review.[19] An alternative elasticity of 0.3 has been used based on work undertaken by the CC as part of the STAL Q5 review.[20]
- Assumptions regarding non-aeronautical revenue variability are shown in Figure F.11 below. For the purposes of this analysis aeronautical revenue from non-passenger aircraft is included with non-aeronautical revenue as non-passenger traffic is assumed not to vary with passenger traffic.

[19] SDG, Stansted airport: Review of operating expenditure and investment consultation (Annex D): Mid term Q5, May 2012, p. 57. This document is available at: http://www.caa.co.uk/docs/5/SDGStanstedReport.pdf. The elasticity is quoted as 0.44 but increases to 0.5 in periods with declining traffic. As an increase in charges is likely to lead to a decline in traffic the elasticity of 0.5 has been used.

[20] CC, Annex 5 of Appendix H, Stansted Airport Ltd: Q5 price control review. This document is available at: http://www.competition-commission.org.uk/assets/competitioncommission/docs/pdf/non-inquiry/rep_pub/reports/2008/fulltext/539ah.pdf.

Figure F.11: Non-aeronautical revenue variability assumptions

Non-aeronautical revenue category	2011/12 revenue (£m)	Proportion variable (%)	Variable revenues (£m)
Other traffic related	0.5	0	0
Retail	75.0	100	74.8
Property	14.8	100	14.8
Other	11.9	30	3.57
Non-passenger traffic	8.2	0	0
Total	110.4	85	93.37

Source: STAL draft regulatory accounts 2012/13 and CAA analysis

F65 Additionally, MAG has invested in facilities that will *'transform the passenger experience in two key areas: the terminal and car parking'*. MAG expects that this project (the Terminal Transformation project), will '*grow the level of retail income per passenger'*.[21] MAG has also stated that the redevelopment of the departure lounge is likely to increase retail revenue [✂].[22] MAG also has plans for initiatives to grow car park income.

F66 As a sensitivity analysis, the effect that a structural increase of £1 per passenger in variable aeronautical revenue would have on the critical elasticity was assessed. In undertaking this analysis, the CAA has assumed that an increase in commercial revenue does not to have any impact on passenger numbers using Stansted.

Impact on passengers

F67 Figure F.12 shows the critical loss analysis. The analysis shows that a 5 to 10 per cent increase in aeronautical charges will increase aeronautical revenue from an average of £7.22 per passenger to £7.58/£7.94 per passenger. This gives an overall aeronautical revenue increase of £6.3 million/£12.6 million (assuming no change in passenger numbers). Based on this and taking into account the potential reduction in operating costs and the loss of non-aeronautical revenue from lower passenger numbers, the CAA estimates a critical loss of passengers of 0.6 million to 0.7 million, for a 5 per cent change in charges, and a critical loss of 1.2 million to 1.4 million for a 10 per cent change in charges.[23]

21 MAG, Terminal Transformation Project – Airline Consultation document, March 2013.

22 MAG [✂].

23 These ranges reflects different assumptions on opex elasticities and it is calculated as follows: [increase in total revenue]/([variable revenue per passenger]-[operating cost per passenger]*[opex

These are the reductions in passengers required for the aeronautical charge increases to be unprofitable for STAL.

Figure F.12: Critical loss in terms of passengers

	Increase in aeronautical revenue	
SSNIP increment (%)	5	10
Background data		
Passengers (million passengers per annum (mppa))	17.517	17.517
Aeronautical revenue (£m)	126.4	126.4
Non-aeronautical revenue (£m)	110.4	110.4
Total revenue (£m)	236.8	236.8
Operating costs (£m)	140.3	140.3
Aeronautical revenue per passenger (£ per pax)	7.22	7.22
Non-aeronautical revenue per passenger (£ per pax)	6.30	6.30
Variability of non-aeronautical revenue (%)	85	85
Total revenue per passenger (£ per pax)	13.52	13.52
Operating costs per passenger (£ per pax)	8.01	8.01
After price increase		
Aeronautical revenue per passenger (£ per pax)	7.58	7.94
Non-aeronautical revenue per passenger (£ per pax)	6.30	6.30
Total revenue per passenger (£ per pax)	13.88	14.24
Variable revenue per passenger (£ per pax)	12.91	13.27
Increase in revenue (£m)	6.3	12.6
Critical loss (mppa) (SDG opex elasticity)	0.710	1.365
Critical loss (mppa) (CC opex elasticity)	0.602	1.163
Critical loss (mppa) (CC opex elasticity & £1 structural increase in variable non-aeronautical revenue per passenger)	0.549	1.065

Source: STAL draft regulatory accounts 2012/13 and CAA analysis

elasticity]).

F68 Figure F.13 shows the implied elasticity from the change in passenger numbers. The reduction in passengers implies that if the airport charge elasticity is above the range of between 0.68 and 0.79[24], then STAL cannot profitably increase charges. As shown in section 2.3, the likely range for the airport charge elasticity of demand is 0.2 to 0.6. This implies that, all other things being equal, STAL can profitably increase airport charges to passengers.

F69 However, as mentioned in paragraph F66 above, as a sensitivity analysis, the CAA considered the effect of structural change in STAL's business where STAL is able to increase variable[25] non-aeronautical revenue per passenger by £1. The CAA estimates that such a structural transformation, if successful, would be able to reduce the critical elasticity interval by about 0.06 to 0.62 to 0.73.

Figure F.13: Implied passenger demand elasticity

	Increase in aeronautical revenue	
SSNIP increment (%)	5	10
Change in passengers - SDG opex elasticity (%)	4.1	7.8
Change in passengers - CC opex elasticity (%)	3.4	6.6
Change in passengers - CC opex elasticity & £1 structural increase in variable non-aeronautical revenue per passenger (%)	3.1	6.1
Implied elasticity - SDG opex elasticity	0.81	0.78
Implied elasticity - CC opex elasticity	0.69	0.66
Implied elasticity - CC opex elasticity & £1 structural increase in variable non-aeronautical revenue per passenger)	0.63	0.61

Source: STAL draft regulatory accounts 2012/13 and CAA analysis

Implied aircraft withdrawal requirements

F70 A further way of considering the critical loss is to examine the number of aircraft that would need to be withdrawn for a SSNIP to be unprofitable. This has been considered separately with Ryanair and easyJet aircraft assumptions.

[24] Mid-points reported in Figure F.13.

[25] Variable means variable with respect passenger numbers.

Based on Ryanair aircraft assumptions

F71 Ryanair accounts for around 68 per cent of passengers at Stansted.[26] Ryanair's fleet consists entirely of Boeing 737-800, with 189 seats.[27] The average load factor is 82 per cent[28], which gives an average of 155 passengers per air transport movement (ATM). CAA analysis (Figure F.14) implies that the withdrawal of 2 to 4 based aircraft (year round) would be sufficient to prevent the airport operator from increasing airport charges. Cross checking this against an average of 300,000 passengers per based aircraft year[29], gives a slightly higher level of aircraft withdrawal, as shown in Figure F.15.

26 CAA, Passenger survey data (2011).

27 Ryanair, http://www.ryanair.com/en/about/fleet (accessed 10 December 2012).

28 Ryanair, http://www.ryanair.com/en/investor/traffic-figures (accessed 10 December 2012).

29 Correspondence with Ryanair, based on 3 rotations per based aircraft. The RBB report (page 13) gives a higher figure of 400,000 passengers per year although the CAA understands that this is based on a higher assumed number of rotations per day. Ryanair: Assessment of Airline Bargaining Power at Stansted Airport, RBB economics, November 2011. This document can be accessed at: http://www.caa.co.uk/docs/5/rbb%20stansted%20final%20non-confidential%20version%2029%20Nov%2011.pdf

Figure F.14: Critical loss of aircraft – Ryanair aircraft assumptions

	Increase in aeronautical revenue	
SSNIP increment (%)	5	10
Passenger loss		
Critical loss (mppa) (SDG opex elasticity)	0.710	1.365
Critical loss (mppa) (CC opex elasticity)	0.602	1.163
Air Traffic Movement (ATM) loss (per year)		
Critical loss of ATMs (SDG) per year	4,581	8,806
Critical loss of ATMs (CC) per year	3,884	7,503
ATM loss (per day)		
Critical loss of ATMs per day (SDG)	13	24
Critical loss of ATMs per day (CC)	11	21
Loss of based aircraft		
Critical loss of based aircraft per day (SDG)	2	4
Critical loss of based aircraft per day (CC)	2	3

Source: CAA analysis, assumed 3 rotations or 6 ATMs per based aircraft per day.

Figure F.15: Critical loss of aircraft – Ryanair aircraft assumptions

	Increase in aeronautical revenue	
SSNIP increment (%)	5	10
Passenger loss		
Critical loss (mppa) (SDG opex elasticity)	0.710	1.365
Critical loss (mppa) (CC opex elasticity)	0.602	1.163
Loss of based aircraft		
Critical loss of based a/c per day (SDG)	2	5
Critical loss of based a/c per day (CC))	2	4

Source: CAA analysis. This analysis assumes 300,000 passengers per based aircraft.

Based on easyJet aircraft assumptions

F72 easyJet makes up around 22 per cent of passengers at Stansted. Figure F.16 shows easyJet's fleet mix. Based on a typical load factor of 89 per cent, this gives an average of 144 passengers per aircraft. The CAA's analysis (Figure F.17) implies that the withdrawal of between 2 and 4 based aircraft (all year) would be sufficient to prevent the airport operator from increasing airport charges. Cross checking against an average load of 350,000 passengers per based aircraft per year[30], implies a withdrawal of between 2 to 4 aircraft per year (see Figure F.18).

Figure F.16: easyJet aircraft fleet mix

	Number of aircraft	Seats per aircraft
A319-100	160	156
A320-200	54	180
Total	214	162
Average load factor (%)		89
Passengers per ATM		144

Source: easyJet Annual report 2012, page 15 and page 21, available at: http://corporate.easyjet.com/~/media/Files/E/Easyjet-Plc-V2/pdf/investors/result-center-investor/annual-report-2012.pdf

[30] Frontier Economics, Market power assessment: Gatwick and Stansted Airport: Report for easyJet, November 2011, p. 18. This document can be accessed at: http://www.caa.co.uk/docs/5/rpt-easyJet%20Competition%20Assessment%20Final%20Report_Abridged.pdf.

Figure F.17: Critical loss of aircraft – easyJet aircraft assumptions

	Increase in aeronautical revenue	
SSNIP increment (%)	5	10
Passenger loss		
Critical loss (million passengers per annum (mppa)) (SDG opex elasticity)	0.710	1.365
Critical loss (mppa) (CC opex elasticity)	0.602	1.163
ATM loss (per year)		
Critical loss of ATMs (SDG) per year	4,931	9,479
Critical loss of ATMs (CC) per year	4,181	8,076
ATM loss (per day)		
Critical loss of ATMs per day (SDG)	14	26
Critical loss of ATMs per day (CC)	11	22
Loss of based aircraft		
Critical loss of based aircraft per day (SDG)	2	4
Critical loss of based aircraft per day (CC)	2	4

Source: CAA analysis, assumed 3 rotations or 6 ATMs per based aircraft per day

Figure F.18: Critical loss of aircraft – easyJet aircraft assumptions

	Increase in aeronautical revenue	
SSNIP increment (%)	5	10
Passenger loss		
Critical loss (mppa) (SDG opex elasticity)	0.710	1.365
Critical loss (mppa) (CC opex elasticity)	0.602	1.163
Loss of based aircraft		
Critical loss of based a/c per day (SDG)	2	4
Critical loss of based a/c per day (CC))	2	3

Source: Assumes 350,000 passengers per based aircraft and CAA analysis

easyJet and Ryanair airlines

F73 Overall, this analysis implies that based operators at Stansted would need to withdraw between 2 and 4 based aircraft, year round, to make a SSNIP unprofitable for STAL. The likelihood of this is assessed in appendix E.

Stakeholders' views

F74 Case Associates (an economic consultancy working for MAG) expressed a number of concerns about the approach and assumptions that were used by the CAA and which were outlined earlier. The majority of these were concerned with the assumptions used to compute the actual airport charge elasticity – see section 2.3 (below).

F75 Case associates noted that the CAA did not include revenue from cargo in its calculations and that this would lead to an overestimate of the critical loss.[31]

F76 The CAA was also criticised for not considering the effect of non-aeronautical revenues on STAL's business decisions. However, Case associates acknowledged that the CAA's critical loss analysis (CLA) calculations take into account non-aeronautical revenues by assuming that 74 per cent of non-aeronautical revenues to be proportional to the number of passengers using Stansted.

F77 Case associates also present a sensitivity analysis for a lower operating cost elasticity than the 0.3 to 0.5 range used by the CAA. In addition, Case associates pointed out that in 2006, the CAA had used an operating cost elasticity of around 0.2 to support its de-designation advice.

F78 Airlines did not make any representations to the CAA on this issue.

CAA views and conclusion

F79 The CAA acknowledges that it has removed cargo revenue from the critical loss analysis presented above to make the critical loss comparable with estimates of passenger switching. The non-passenger flights airport charge revenues represented around 6 per cent of total STAL's revenues in 2012/13. The CAA does not have any evidence that this would lead to an overestimate or an underestimate of the critical or the actual losses.

F80 The CAA considers that the effect of lower passenger volumes on non-aeronautical revenues is fully reflected in the critical loss analysis. Accordingly, Case associates' criticisms in this respect are unfounded.

[31] GAL made similar comments in their response to the CAA's minded to Consultation regarding GAL's market power assessment.

F81 The CAA acknowledges that it has used a cross elasticity of 0.2 in the past but it now considers the range for operating cost elasticity of 0.3 to 0.5 to be more appropriate given the CC precedent and the more recent research by SDG. If an assumption of operating cost elasticity was used in this analysis, the critical elasticity would be slightly lower (approximately 0.64).

F82 From the analysis outlined above, the CAA concludes that the critical airport charge elasticity of demand is likely to be between 0.68 and 0.79. That means that if estimates of actual airport charge elasticity of demand are below this interval then those estimates are indicative of STAL being able to profitably increase airport charges. The CAA acknowledges that this interval can be lower by around 0.06 if MAG manages to increase substantially the structural level of non-aeronautical revenue it is able to obtain from passengers without impacting their demand to use air services at Stansted.

Section 2.3: Estimating Stansted's airport charge elasticity of demand

F83 This section calculates estimates of Stansted's own airport charge elasticity of demand (CED) for passengers.[32] This is the degree to which airport demand varies with changes in airport charges (in terms of aeronautical revenue per passenger).[33]

F84 In undertaking this work, the CAA considers a number of methodologies that have been used to calculate Stansted's CED, including:

- Methodologies based on DfT's aviation forecasting model, including:
  - Analysis carried out by Frontier Economics on behalf of easyJet.
  - Analysis carried out by the CAA.

[32] The ability of airlines to switch airports is considered in appendix D with regard to market definition and appendix E with regard to the assessment of competitive constraints facing Stansted.

[33] The relevant price elasticity varies depending on what the relevant initial price is considered to be (ideally the competitive price level). However, for the purpose of this section the CAA focuses on the extent to which passengers respond to a price increase rather than on what is the competitive price level at Stansted (which is discussed elsewhere in this report). Sometimes the modelling will use explicit or implicit assumptions on price, which the CAA is not able to change. However, this appendix outlines any assumption that the CAA has made with regards initial airport charges for the calculation of CEDs.

- A methodology developed by [✂] for STAL in the context of forecasting future demand at the airport. This relies on a passenger allocation model[34] and time series regression to derive both short-run and long-run elasticities.
- A methodology developed by Frontier Economics using easyJet booking data.
- The results of the CAA's stated intentions passenger survey.

F85 For each of the approaches outlined above, the methodology used, its merits and limitations, and its relevance to the estimation of Stansted's CED is described. The CAA then derives estimates of Stansted's CED. A summary of the range of elasticity estimates is provided in Figure F.23.

Analysis using DfT's aviation forecasting model

F86 A number of approaches to estimating the elasticity of demand are based on DfT's aviation forecasting model, NAPALM. In Stansted – Market Power Assessment, the CAA's Initial Views – February 2012 (the Initial Views), the CAA stated that, while the NAPALM model is primarily designed to estimate long-run passenger demand forecasts, using the model to estimate short-run elasticities was a useful contribution to assessing passenger impacts at Stansted.[35]

Frontier Economics' 2011 estimates

F87 In section 5.2 of its report[36], Frontier Economics estimates how much of the marginal passenger demand at Stansted and Gatwick would switch to other UK airports as a result of a 10 per cent airport charges increase being added to the cost of accessing those airports. It does this by using the underlying allocation model of DfT's forecasting methodology.

F88 According to Frontier Economics, a 10 per cent increase in airport charges (66 pence per passenger at Stansted), would lead to a reduction of 0.69 million passengers at Stansted in 2010.

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34 [✂].

35 See paragraph 3.58 of the Initial Views, available at: http://www.caa.co.uk/docs/5/StanstedMarketPowerAssessment.pdf (accessed January 2013).

36 Frontier Economics, Market power assessment: Gatwick and Stansted Airport, November 2011, available at: http://www.caa.co.uk/docs/5/rpt-easyJet%20Competition%20Assessment%20Final%20Report_Abridged.pdf (accessed January 2013).

F89 The CAA calculates that this implies an airport CED in the region of 0.3 to 0.4 for Stansted, given the initial price used by Frontier Economics of £6.60 and the initial passenger number[37] of 18.3 million.

F90 Figure F.19 shows where passengers priced off from Stansted switch to under the two scenarios considered by the report.

Figure F.19: Impact of a 10 per cent change in airport charges on passenger numbers (million passengers in 2010)

	Base Case	No capacity available at Heathrow and London City
Gatwick	0.30	0.36
Stansted	-0.69	-0.61
Luton	0.11	0.13
Heathrow	0.02	0.00
London City	0.15	0.00
Out of London	0.10	0.13

Source: Frontier Economics

F91 The Initial Views stated that the modelled responsiveness of passengers appeared high, considering that a 10 per cent rise in the airport operator's revenues would only constitute a fraction of a passenger's total travel costs. [38] Nevertheless, there were a number of concerns with the modelling, which might suggest that the estimated responsiveness is at the lower end of the spectrum.

- The analysis uses the passenger allocation methodology of the DfT's forecasting model and not the overall model, thus a price increase at an airport only generates passenger switching to other alternatives, rather than passengers choosing not to fly.
- It is a one-year static analysis taking the existing route network at UK airports as given. It therefore does not take into account capacity constraints except for the option of not allowing any switching to Heathrow and London City.

37 From Table 8 of Frontier Economics' report, available at: http://www.caa.co.uk/docs/5/rpt-easyJet%20Competition%20Assessment%20Final%20Report_Abridged.pdf.

38 See paragraph 3.60 of the Initial Views.

- It treats passenger demand using low cost, charter and full service airlines as separate categories, which limits the substitution possibilities.[39]

CAA analysis

F92 To take account of some of the drawbacks highlighted above, the CAA requested DfT to run its aviation forecasting model in a number of scenarios to simulate the effect of an airport charge increase at Stansted. DfT provided the CAA with the outputs of the Central Case of its latest forecasts (August 2011)[40], as well as the results of runs that tried to mimic an airport charge increase at Stansted that was passed onto the customer in its entirety. Given the setup of the model, DfT advised that the best way to model a Stansted price increase was to increase the surface access cost of using Stansted. This approach is consistent with the approach adopted by Frontier Economics in a 2011 report and by HM Revenue & Customs (HMRC) in a 2012 report.[41]

F93 Figure F.20 shows that, over the five years between 2014 and 2018, Stansted would lose 10 per cent of its passengers if it is £1 more expensive to use Stansted from 2014 onwards. The majority of those passengers would travel from Luton or Gatwick rather than Stansted. Over a period of just one year, the amount of switching would be smaller: if it was £1 more expensive to use Stansted from 2014, Stansted would lose 7.4 per cent (1.4 million) of its passengers in 2014.

39 A full list of the concerns is given in paragraph 3.59 of the Initial Views.

40 DfT's forecasts are available at: http://assets.dft.gov.uk/publications/uk-aviation-forecasts-2011/uk-aviation-forecasts.pdf (accessed January 2013).

41 The report aimed to understand the impacts of potential price changes resulting from the devolution of Air Passenger Duty (APD) to Scotland and Wales, as well as hypothetical APD increases at Heathrow and Gatwick. The report states that 'the model is designed to capture the key inter-relationships between demand at different airports' but also acknowledges that 'as with all models, it is a simplification of reality and can never capture the full complexity of the aviation sector'. This report is available at: http://www.hmrc.gov.uk/research/report188.pdf (accessed January 2013).

Figure F.20: Forecast passengers (million) using the DfT's forecasting model

Period	2014				2014-2018			
Scenario	**Base Case**	**STAL increases £1**	**Absolute Change**	**% Change**	**Base Case**	**STAL increases £1**	**Absolute Change**	**% Change**
Heathrow	73	73	0.1	0.1	375	376	0.8	0.2
Gatwick	33	34	0.8	2.5	170	173	3.6	2.1
Stansted	19	18	1.4	-7.4	100	90	-9.9	-10.0
Luton	9	10	0.3	2.8	49	54	4.4	8.9
London City	3	3	0.0	0.1	21	21	0.2	0.9
Southend	0	0	0.0	-0.0	1	1	0.0	-0.1
Other Airports	93	93	0.1	0.1	495	495	0.2	0.0
Total	**231**	**231**	**-0.1**	**-0.0**	**1212**	**1211**	**-0.7**	**-0.1**

Source: CAA analysis of outputs of DfT's Aviation Forecasting Model

F94 Using the results of Figure F.20 and depending on the initial price assumption (in 2008 prices since the £1 increase is on that basis), the implied price elasticities of demand can be determined. Figure F.21 (below) shows that the implied Stansted fare elasticity of demand is likely to be between 4.5 and 6 and the CED between 0.37 and 0.60 (assuming that the assumptions taken and DfT's model are accurate).

Figure F.21: Implied own price elasticities of demand

Initial price assumption	2014	2014-2018
Fare - £60	4.5	6.0
Airport Charge - £6	0.45	0.60
Airport Charge - £5	0.37	0.50

Source: CAA analysis of outputs of DfT's Aviation Forecasting Model

Note: For the purpose of this analysis, two separate assumptions are made for the initial airport charge: £5 and £6. The fare elasticity for a £60 fare is presented for illustration purposes and it does not affect the estimated CEDs.

F95 The results of other models run (£2 increase vs base and £2 increase vs £1 increase) gave similar results. However, when the price increase was assumed to take place in 2008 instead of 2014, the implied elasticities were substantially higher. DfT suggested that this was because the model allows each airport, over time, to specialise in some routes rather keeping the same route served by multiple airports, reducing the potential for airport substitution. This effect arises because the model assumes

passengers value frequency of service higher than route availability at neighbouring airports. This variation in results emphasises the uncertainty around any elasticity estimates derived from using this model.

F96 The CAA therefore considers that using DfT's model to estimate the extent of passenger substitutability across airports for the CAA's purpose is informative (as the model attempts to reflect actual passenger behaviour based on survey data) but that this model has a number of limitations. In particular:

- The model treats passengers travelling on full service scheduled, charter and low cost carriers separately, and so limits passenger substitution between routes and business models. As a result, given the very high proportion of low cost traffic at Stansted, the demand that is displaced from Stansted cannot go directly to Heathrow, as there are no low cost services there. Under the model, low cost passenger demand can only switch to low cost services at Luton and Gatwick. The CAA considers that this artificial separation may weaken the extent of substitution reported by the model, depending on whether there are enough alternative services at Luton and Gatwick.
- The model does not predict much growth at Southend in response to a price increase at Stansted. The CAA considers that this is because there is no significant traffic at Southend in the base year and the airport never reaches critical mass in terms of passengers to become established. The recent entry of easyJet at Southend suggests that the potential competitive constraint posed by Southend on Stansted may be downplayed by these forecasts, although there is considerable uncertainty about the future growth of Southend. The materiality of the potential constraints posed by Southend is discussed in appendix E.
- Although the model allows routes to be dropped and started at different airports, it does not explicitly model airline behaviour. The model works with the underlying assumption that (route) supply will follow (passenger) demand. The CAA therefore considers that the model captures better the dynamics of passenger-led switching (which is an important determinant of route economic viability) more accurately than capturing airline-led switching, which, if passengers follow route/frequency supply, is an important switching dynamic.

Analysis prepared for STAL [✂]

F97 The methodology prepared for STAL by [✂] used two modelling approaches to gauge the sensitivity of traffic growth at Stansted to real and relative changes in airport charges: econometric analysis and a passenger allocation model.

F98 The time-series regression analysis is based on an error correction model (ECM) that allows estimation of both short- and long-run elasticities at the same time. The model suggests a long-run airport charges elasticity of around 0.26 at Stansted and that traffic would have been around 4 million pounds per annum (mppa) higher in 2011 if charges had not been raised in 2007.

F99 [✂] used its in-house passenger allocation model to 'reverse engineer' Stansted's traffic by running the forecasting model backwards from its 2010 base year to 2006. The results suggest Stansted would have attracted around 4.5 mppa less in 2006 compared to the actual passenger throughput with the charges change in place (and assuming the full modelled effect[42]). The analysis also suggested that a reduction in long-run fares of £2.86 per passenger (shadow cost) would be required to mirror its actual performance in 2006.

F100 The report states that the effects of an increase or decrease in charges using both methods is not symmetrical: a 20 per cent charge reduction has a bigger impact on traffic (1.5 to 1.9 mppa higher by 2025) than an equivalent increase in charge (1.2 to 1.5 mppa lower by 2025). Overall, while both methods appear to yield similar results, the allocation model suggests a greater ultimate effect (i.e. a higher elasticity is implied) whereas the elasticity approach suggests that the demand impact of a change in charges increases over time before flattening out.

F101 It was not possible with the information provided and in the time available for the CAA to assess fully the validity of the methods employed. However, from what the CAA has seen, a high level of uncertainty needs to be caveated to the estimated elasticities suggested in the analysis.

F102 STAL stated that [✂] sensitivity analysis did not represent its views on the issue. In particular, STAL considered that the results were likely to be an under-estimate of the CED because: [43]

- *the time period over which the elasticity had been calculated was not likely to provide a reasonable estimate of current elasticity of demand*;

[42] The actual impact may take some years to be felt.

[43] Source: STAL [✂].

- *there is insufficient variability in charges and growth rates over the period to be able to establish a clear and robust estimate of the elasticity of demand*;
- *until the discounts were phased out in March 2007, charges were materially lower than they are currently, and substantially below the competitive price level*;
- *prices were below the competitive price level for much of the period that has been analysed, the analysis will not provide a true and reliable guide to the sensitivity of demand to changes in charges from the competitive price level in a forward-looking sense*;
- *more extreme reactions to changes in airport charges were likely given the market structure and the characteristics of airlines at Stansted*.

F103 The CAA considers that concerns about the competitive price level are an important issue and is likely to be contributing to an underestimate of the CED. The potential for more extreme airline reactions is something that the CAA acknowledges throughout this appendix and is considered in appendix D.

Frontier Economics (2007[44]): passengers airport switching using easyJet booking data

F104 In a report commissioned by easyJet, Frontier Economics used easyJet booking data for a sample of routes, where the routes were served by easyJet from more than one London airport, to construct an airport choice model for easyJet's passengers. Among other controls, the probability of passengers choosing an airport (from which easyJet operated) was modelled against the travel distance and the price of easyJet flights at each alternative airport.

F105 The report stresses that the high travel time elasticities found suggest that passengers are unlikely to switch airports if they have to travel much longer than the alternative. However, from the analysis in the report, the CAA found equally high fare elasticities of demand, which suggests that passengers are quite willing to substitute airports if the airfares at an airport increase.

[44] Frontier Economics, The De-designation of Stansted Airport, October 2007, available at: http://www.frontier-economics.com/_library/publications/Frontier%20paper%20-%20de-designation%20of%20Stansted%20airport%20Oct%202007.pdf (accessed January 2013).

F106 Although not explicitly mentioned in the main part of the report, the confidential annex contains airfare elasticities of demand for 12 routes served out of Stansted, Luton and Gatwick by easyJet. Figure F.22 below summarises the fare elasticities found for each airport.

Figure F.22: Implied route own price elasticities of demand reported

	Stansted	Luton	Gatwick
Low (4th smallest elasticity)	[✂]	[✂]	[✂]
Average excluding top 3 and bottom 3 elasticities	[✂]	[✂]	[✂]
Median	[✂]	[✂]	[✂]
Average (12 routes)	[✂]	[✂]	[✂]
High (4th highest elasticity)	[✂]	[✂]	[✂]

Source: CAA analysis of Annex 1 of Frontier Economics' 2007 report

F107 These elasticities [✂] and assumed neither route substitution (within an airport or across airports) nor substitution away from easyJet, full airport charge pass through and a 10 per cent airport charge share of ticket price.[45]

F108 The main limitation of these estimates is that it only uses easyJet booking data. This restricts the alternatives for substitution available to passengers. Given the results of the econometric analysis of easyJet route revenue described in paragraphs F41 to F48 it is possible [✂]. This would mean that these price elasticities of demand would be an overestimate of the Stansted specific airfare elasticity of demand (FED). The elasticities are also calculated on a route-by-route level, which does not allow for route substitution.

[45] This implied elasticity would increase if the CAA assumed that the airport charge represented a higher proportion of the ticket price.

CAA stated intentions passenger survey

F109 In November 2011, the CAA published a working paper on the results of a passenger survey conducted at the four largest London airports.[46] Short haul passengers were asked whether they would switch to another airport or not travel if the cost of using the airport went up by £5 (one-way). Of those, 17 per cent of passengers at Stansted, 20 per cent of passengers at Gatwick and 10 per cent of passengers at Heathrow responded that they would no longer use that airport. In the case of Stansted, assuming an airport charge in the region of £5 to £6, that translates into an implied CED of around 0.2.

F110 However, given the relatively small sample size and potential biases, only an approximate CED can be derived.

Stakeholders' views

F111 MAG considered that the limitations on the NAPALM model, as set out by the CAA in the minded to Consultation, to be fundamental obstacles to the use of this model for the purposes of estimating switching responses to a STAL price rise. MAG therefore considered that the CAA should have concluded that it could not rely on NAPALM for the market power assessment.

F112 MAG's submission refers the CAA to the paper STAL commissioned from Case associates where this subject is discussed and where they conclude that the elasticity faced by Stansted for passengers is above unity.

F113 Case associates make a number of points regarding the estimation of Stansted's CED.

- Case associates considered that the CAA had used a very low airport charge/fare ratio (10 per cent), whereas at other points in the minded to Consultation (paragraph 4.46) and the Initial Views (paragraph 2.7) where the CAA shows that airport related costs are about 30 per cent of easyJet's costs. It also pointed to Ryanair's and easyJet's financial statements where airport handling charges and ground operation costs represented a higher (16 per cent for Ryanair and 25 per cent for easyJet) proportion of fares.

[46] See Figure 12 of the Passengers' airport preferences, Results from the CAA Passenger Survey, available at: http://www.caa.co.uk/docs/5/Passenger%20survey%20results%20-%20FINAL.pdf , (accessed January 2012).

- Case associates expressed reservations over the accuracy of the use that both the CAA and Frontier Economics make of the DfT's NAPALM model. Case associates share the CAA's concerns already expressed in the minded to Consultation, particularly that Southend does not appear to be considered a substitute airport and the limitation whereby direct (first order) substitution effects are limited to occur within the low cost airline segment, probably understating substitution possibilities of Stansted's passengers towards Heathrow and London City.
- Case associates expressed concerns with obtaining an estimate of elasticity with the impulse-response passenger survey, as well as its sample size.
- Case associates did not consider it appropriate to infer elasticities using average prices or yields, as they would not reflect the prices facing marginal passengers.

CAA views

F114 Average yields: Price discrimination by airlines will affect the extent of pass through to individual passengers. It is not correct to say that if airport charges increase by a nominal amount, that amount will be passed though uniformly to all passengers. In fact, the extent of pass through is likely to be weighted towards less price elastic segments of demand. This effect is likely to reduce the volume effect (that is the amount by which quantity would fall following a price increase) rather than increase it and so lead to lower elasticity estimates.

F115 The CAA considers that using airline financial statements to estimate airport charge proportions of fare will overstate the ratio because airport handling charges and ground operation costs categories are likely to include other costs alongside airport charges (such as tower navigation charges and groundhandling).

F116 The CAA has also reviewed CAA Airline Financial Statistics reports and considers that for easyJet, overall airport charges as a proportion of its revenue is at most 20 per cent and not 30 per cent as the CAA has said previously.[47]

[47] The 30 per cent figure that was calculated in the minded to Consultation included an additional 11 per cent related to en-route navigation charges. The 20 per cent that remains may include other elements such as tower navigation charges.

F117 The CAA also analysed Ryanair's accounts for the year to March 2013[48] and found that for the totality of its network, airport & handling charges were €612 million and total revenue was €4,884 million. In the same period, Ryanair sold 79.3 million tickets. The ratio derived using this set of numbers is an average ticket price of €62 and airport & handling charges costs as a proportion of revenue at around 12.5 per cent. It is also possible that Stansted ticket prices are Ryanair's network average, particularly because UK flights pay APD of around £12 per departing passenger.

F118 However, the level of airport charge to fare ratio is only relevant for converting FEDs into CEDs and is not in any way used to compute the critical CED. This ratio was also not used in the Frontier and the CAA's analysis of NAPALM, where CEDs are computed directly without making any assumption about average airfares.[49] Therefore, the CAA considers that much of the criticism from Case associates around airport charges to fare ratio and about using average airline yields is founded in a misunderstanding of the CAA's analysis. The CAA also considers that the sensitivity analysis of CEDs outlined in Table 3.3 of Case associates' paper is flawed and incorrect.

F119 The only places where the CAA has converted FEDs into CEDs were in relation to its analysis of the impulse response Passenger Survey and to convert the Frontier Economics' 2007 FED results into CEDs. If the CAA used a 20 per cent airport charge to fare ratio on the impulse response survey analysis that would double that elasticity to around 0.4. If the CAA had used the same ratio on Frontier 2007, that would have meant an elasticity of around [✂]. However, given the results of easyJet route revenue data conducted by the CAA in paragraphs F41 to F48, where it was found that [✂], the CAA considers that these FEDs are likely to be an overestimate.

Assessment of Stansted's airport charge elasticity of demand

F120 Based on the evidence presented above, the CAA concludes that Stansted's airport charge elasticity of demand is likely to be subject to a degree of uncertainty, with some research suggesting that it can be above 0.5 while other research suggesting it is as low as 0.2. Figure F.23 summarises the results described above and provides a brief description of each piece of analysis

[48] Available at: http://www.ryanair.com/doc/investor/2013/q4_2013_doc.pdf.

[49] The CAA compared a £1 increase with the average airport charge directly and therefore levels of airfares or charge to airfare ratios are not relevant.

F121 The CAA considers that all of the models used provide an imperfect representation of reality and each makes different assumptions that affect the results. In fact, many factors will affect the relevant/true Stansted CED. However, based on the analysis undertaken, the CAA considers that a 0.2 to 0.6 range is wide but suitable for Stansted's CED.

Figure F.23: Summary

	Stansted elasticity	Description
Frontier Economics 2011 (using NAPALM)	~ 0.3 to 0.4	Passenger-led switching of passengers no route dynamic effects
Full DfT forecasting runs (£1 increase in 2014)	~ 0.4 to 0.6	Passenger-led switching of passengers and routes
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
Stated intentions passenger surveys	~ 0.2	17% of Stansted passengers say they would switch airport if it was £5 more expensive to fly from Stansted
Natural Experiment	~0.2	In 2007, STAL's charges increased by about 100 per cent. This was associated with traffic decline of about 22 per cent over three years.

F122 Airlines' ability to switch services in the face of airport charge increases is considered in appendix E, much of the evidence presented above assumes a full pass through of airport charges increases into airfares paid by passengers but no supply side response from the airlines. In reality, the CAA expects to see a degree of partial pass through and some supply side response from airlines. Relaxing the first assumption would mean a lower elasticity range whereas relaxing the second would mean a higher elasticity range.

F123 In spite of the different shortcomings of the various models, the range of elasticities produced is within a similar range. They fall below the critical elasticity range of 0.68 to 0.79. Therefore, in light of the relatively small estimated number of potentially marginal passengers at Stansted and the relatively low estimated range of long-run airport elasticities, the CAA concludes that passenger switching in light of an increase in airport charges is unlikely to, on its own, constrain significantly STAL's behaviour.

Section 3: Conclusion on passenger switching competitive constraints

F124 This appendix has considered the likely characteristics of STAL's marginal passengers and analysed how likely they would be to switch away.

F125 The majority of Stansted's passengers are leisure (holiday and VFR) passengers, who are typically more likely to be cost-sensitive than business passengers. VFR passengers represent around 46 per cent of total passengers and these passengers, that together with business passengers represent 60 per cent of total passengers, are more likely more likely to prefer a specific destination. Inbound holiday passengers that are likely to be the most price sensitive demand category accounted for around 6 per cent of passengers.

F126 Furthermore, catchment area analysis suggests that a significant proportion of the airport's passengers is likely to be able to travel to at least two London airports.

F127 The CAA acknowledges the existence of airline competition for passenger demand that to some extent operates across London airports and that passengers appear to have a certain degree of airport choice in making their air travel purchasing decisions.

F128 However, the scale of passenger switching is likely to be highly dependent on the demand response of passengers to an increase in airport charges. Two factors are likely to considerably limit the scope of passenger switching:

- First, airport charges are approximately 10 to 20 per cent of an airline's operating costs, so a 10 per cent increase in airport charges would be, at most, a two per cent increase in airfares.
- Second, evidence suggests that some airlines price to what the passenger market will bear and compete on price with other airlines, rather than fully reflect their cost base. As a result, airlines are unlikely to fully pass through cost increases in the short run. This is likely to reduce the likelihood and scale of marginal passenger switching.

F129 Sections 2.2 and 2.3 have considered, respectively, the critical loss of passengers required to make a SSNIP unprofitable for STAL, and estimated the likely scale of actual marginal passenger switching. These figures are compared below both in terms of the level of switching and their implied elasticities to determine whether switching by marginal passengers is likely to constrain STAL's pricing.

F130 Comparing the critical loss level of marginal passengers with the estimated levels of switching that would be likely to occur can indicate whether a 5 to 10 per cent price increase in charges at Stansted is likely to be profitable for STAL. Figure F.24 shows critical and actual losses in terms of passenger numbers. Based on this analysis STAL is likely to be able to profitably increase its airport charges.

Figure F.24 Comparison of critical loss and actual loss estimates

Ranges	5 per cent SSNIP	10 per cent SSNIP
Critical loss (mppa)	0.60 - 0.71	1.16 - 1.36
Estimated likely loss (mppa)	0.18 - 0.53	0.35 - 1.05

Source: CAA analysis

F131 Based on the above methods, STAL's CED is likely to be subject to a degree of uncertainty, with some research suggesting that it can be above 0.5 whilst other research points to as low as 0.2.

F132 All of the models used inevitably provide an imperfect representation of reality and each makes different assumptions that affect the results in one direction or the other. On the available evidence, the CAA considers that a 0.2 to 0.6 range for a short run response is reasonable for Stansted passenger-led CED. These estimates are below the critical elasticity

range of between 0.68 and 0.79. For the modelled passenger response over a period of five years, the estimated elasticity was 0.6. This suggests that even the level of passenger switching over a longer term period might not be enough to make a price increase unprofitable.

F133 The CAA considers that the business transformation programme aimed at increasing the non-aeronautical revenue per passenger that STAL is able to generate may lower slightly the critical loss as STAL would lose more revenue for each passenger priced-off by higher airport charges.

F134 However, the CAA concludes that switching by marginal passengers as a short-run response to an increase in airport charges to airlines, as well as in the longer term, is unlikely to be sufficient to constrain STAL to the point of making a 5 to 10 per cent increase in airport charges unprofitable.

F135 Nevertheless, the CAA considers that airlines' ability to switch services in the face of airport charge increases can be an important factor in exacerbating passenger switching from an airport, as passengers will only be able to use another airport if the demanded air services are available at that airport. Airlines' ability to constrain STAL's ability to increase prices is considered in appendix E.