The continuing development of airport competition in Europe

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The notion that airports can and do compete has featured in regulatory and policy debates for some decades. However, it took the report commissioned by ACI EUROPE in 2012 to clearly demonstrate its existence across Europe, and to show that the preceding decade had seen a step change in its practical application. To an increasing extent airports were having to compete for the business of airlines and passengers and had had to develop the commercial approaches to do so.

Five years on, this report from Oxera confirms that the trends in the aviation market which drive airport competition are continuing. Indeed, in certain key respects they are gathering pace. Most notably, low-cost carriers (LCCs) continue to increase their share of the short haul market (with the greater mobility of services between airports that implies) and the hubs in the Middle East and Turkey have grown significantly, creating greater competition for European hubs and amongst European airports for the 'spokes' into their hubs. There is also evidence of full service carriers adjusting their business models and behaviours in ways which increase competitive pressures on airports.

Most importantly, the scale and direction of these developments is significantly altering the structure of airport competition. While competition previously affected most airports to some extent, it was most obviously concentrated on smaller airports, those where LCCs were most strongly represented.

What the Oxera report now demonstrates is that those competitive pressures are strengthening among larger airports, particularly those in the size range 10-25mppa but also among even larger airports. If they wish to continue growing their businesses such airports have had no choice but to attract LCCs. In so doing, they have to compete with other airports to secure their business and, on a continuing basis, to keep it, given the relative ease with which LCCs can adjust their route structures to optimise yield and profit. Such airports need to be able to offer the sort of commercial deals that have long been part of the armoury of smaller airports. In doing so they will be competing with airports right across Europe as, over the last five years LCCs have both deepened and extended their pan-European networks, increasing the choices available to them as to where they fly their planes.

While the very largest airports will have still have less exposure than most others to LCCs, this is also changing fast. And these airports continue to face increasing competition from another source. If LCCs represent the most mobile of airlines then connecting passengers are their passenger equivalent. They can use a variety of hubs for their journeys, responding to the offers made jointly by the airport and its hub airline partner. Their choices have increased significantly over the past five years as multiple hubs in the Middle East and Turkey have purposefully built their market positions to compete for the intercontinental traffic of European hubs (already strongly competitive against each other). Within Europe, hubbing is subject to further constraint from the continuing development of hub bypass, as the extension of point to point networks particularly enables more direct connections.

Looking ahead, there is no reason to think that the forces driving airport competition will slacken. The 2012 and current reports show that the trends driving this development are well established, and are underpinned by the orders already placed with aircraft manufacturers by LCCs and growing hub airlines. Beyond this, there are also signs of innovation in the market that could further increase airport competition. There are the beginnings of low-cost long haul and of connection assisted by either airports or LCCs. If any or all of these innovations take off they could have a disruptive effect on existing airport/airline models and thereby significantly increase airport (as well as airline) competition. Given the history of the last few decades it would look unwise to bet against such innovation taking hold.

While the pace of market developments has been fast, that of policy and regulatory debate has been slower. There is now much less loose talk of airport 'natural monopoly' and more recognition than there was five years ago of the reality of airport competition and of the resulting need to ensure that regulatory intervention is focussed only where necessary. The EU's Aviation Strategy published in 2015 was something of a landmark in this respect. However, regulatory structures have been less quick to adapt (with the UK perhaps an outlier). In some respects, this is unsurprising. Regulators tend to be cautious and legal structures are necessarily slow to change. But if the current review of the EU Airport Charges Directive is to result in change, the Oxera report shows that there is a stronger case even than in 2012 for any change to reflect what the report calls the 'new normal' - a continuing trend towards greater airport competition across different sizes and types of airport, a resulting diminution in their market power and outcomes that reflect the developing competitive dynamic. That reality needs to be better reflected in regulation than it is today.

Glossary

ADP	Aéroports de Paris
AMS	Amsterdam Schiphol Airport
ATMs	air traffic movements
AUH	Abu Dhabi International Airport
BCN	Barcelona–El Prat Airport
CAA	UK Civil Aviation Authority
CDG	Paris Charles de Gaulle Airport
DOH	Hamad International Airport, Doha
DUB	Dublin Airport
DXB	Dubai International Airport
ECAA	European Common Aviation Area
FCO	Fiumicino Airport
FRA	Frankfurt Airport
FSC	full-service carrier
IST	Istanbul Atatürk Airport
LCC	low-cost carrier
LHR	London Heathrow Airport
MAD	Adolfo Suárez Madrid–Barajas Airport
mppa	million passengers per annum
mspa	million seats per annum
MUC	Munich Airport
OTA	online travel agent
SSNIP	small but significant and non-transitory increase in price
VFR	visiting friends and relatives
VIE	Vienna International (Schwechat) Airport
WACC	weighted average cost of capital

1. Market developments

The aviation market grew by

25%

between 2010 and 2016.
Most of this growth came
from LCCs and services to
non-European countries
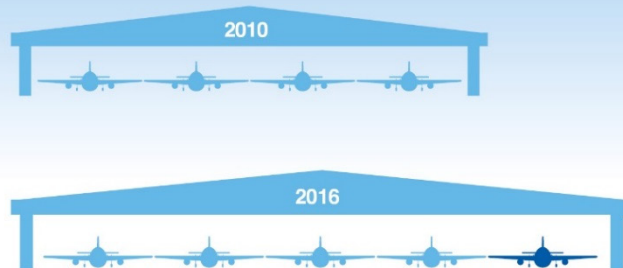
2010

2016

LCC

Within Europe, LCCs accounted
for approximately

76%

of growth across all airports, and
were the largest source of growth
across all airport sizes

FSCs have increasingly adopted
the business model of LCCs on
short-/medium-haul routes

LCC

FSC

Middle East

2016
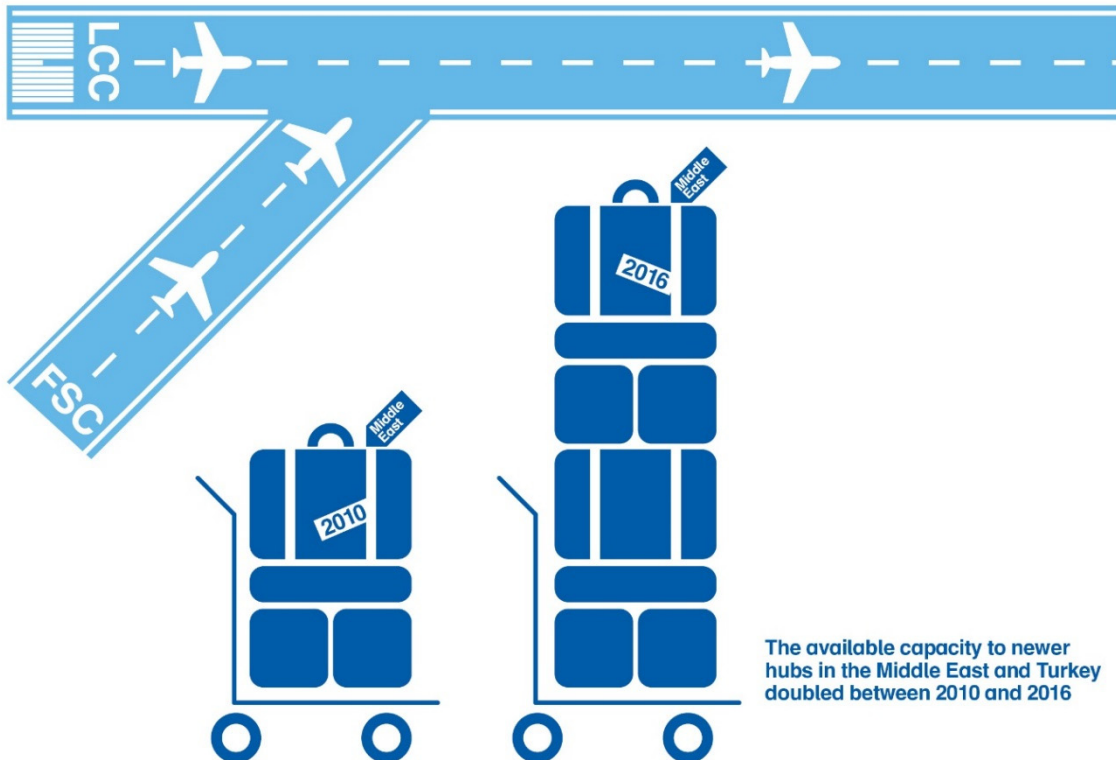
Middle East

2010

The available capacity to newer
hubs in the Middle East and Turkey
doubled between 2010 and 2016

2. Channels of airport competition

1.

Airport

Competition between airports for airline services on new and existing routes

Route churn has increased at medium and larger airports (airports with over 10mppa)…

…while remaining high (but stable) at smaller airports

2.

Airport

Competition between airports for connecting passengers

Destination

Large European airports are facing greater competition for connecting traffic from Middle Eastern hub airports, a trend that was only just emerging five years ago

3.

Competition for passengers in local area

The proportion of passengers who can use a nearby airport to reach the same destination has increased among medium and larger airports (airports with over 25mppa), while remaining high (but stable) at smaller airports

3. Market outcomes

←→ Airports have not been able to systematically raise charges, with an approximately even divide between those seeing real-terms increases and decreases in aeronautical revenues per passenger

↑ Airports—particularly the largest—have improved levels of service quality and invested in substantial additional capacity, highlighting the importance of non-price competition

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Executive summary

Competition between airports is an important feature of the European aviation market. Airline deregulation and privatisation of a number of major European airports in the 1980s and 1990s began the process of the liberalisation of the airport market in Europe.[1]

Investigating this market in depth, in 2012 ACI EUROPE published a study looking at how developments in the European aviation market over the preceding ten years had influenced competition between Europe's airports. The study concluded that, with the opening up of that market to competition and the subsequent emergence of low-cost carriers (LCC), airports were facing greater competitive constraints than ever before.

Since 2012, the European aviation market has continued to grow, driven primarily by the LCCs and the provision of services to non-European markets. Airline business models have further evolved, with the business models of LCCs and full-service carriers (FSCs) increasingly converging on short-/medium-haul routes, and through large airline groups making greater use of multiple hubs. Therefore ACI EUROPE commissioned Oxera to assess the implications of these developments for airport competition in Europe.

Airports now compete with each other in three main ways:

- on a pan-European scale, as a result of pressure from airlines on where those airlines locate their services—in particular, in a growing market where new capacity is being introduced, but also for the retention of existing services;

- for connecting passengers—in addition to this competition among some airports, it also takes place between airports that are geographically distant from each other;

- for passengers in the area local to their airport.

Oxera's study draws on a wide range of analysis and provides key industry-level findings, as outlined below.[2]

Key market developments

The aviation market has continued to expand, with growth particularly driven by LCCs

Overall capacity of airlines on flights to, from and within Europe (measured by the number of seats) was 25% higher in 2016 than in 2010, with most of this growth occurring after 2013. On flights within the EU, airlines that are not members of alliances[3] (primarily LCCs) have accounted for approximately 111 million seats per annum (mspa) of growth. Given that alliance traffic fell by approximately 15mspa in this period, this shows that all net growth in capacity accrued to such airlines.

Non-alliance airlines accounted for the majority of growth at airports of all sizes. As LCCs are typically more able to switch routes and aircraft between airports

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[1] For example, major UK airports were privatised in the 1980s and several other European airports were wholly or partly privatised in the 1990s, such as Vienna (1992), Copenhagen (1994), and Rome (1997).
[2] This report considers trends in the European aviation market and their implications for competition between airports. Understanding the change in competitive conditions at any given individual airport would require an assessment of the local conditions of that airport.
[3] Alliance membership is used as a proxy for a carrier being an FSC.

than FSCs, this growth has significantly increased the extent of airport competition for the services of the LCC airlines.

The number and capacity of connections to the Middle East and Turkey have increased rapidly

The number of flights and seats provided to Middle Eastern and Turkish hubs have increased for every airport size category across Europe. The change since 2010 is shown below.

Figure S.1 **Footprint of airports with connections to the Middle East and Istanbul, 2010 vs 2016**
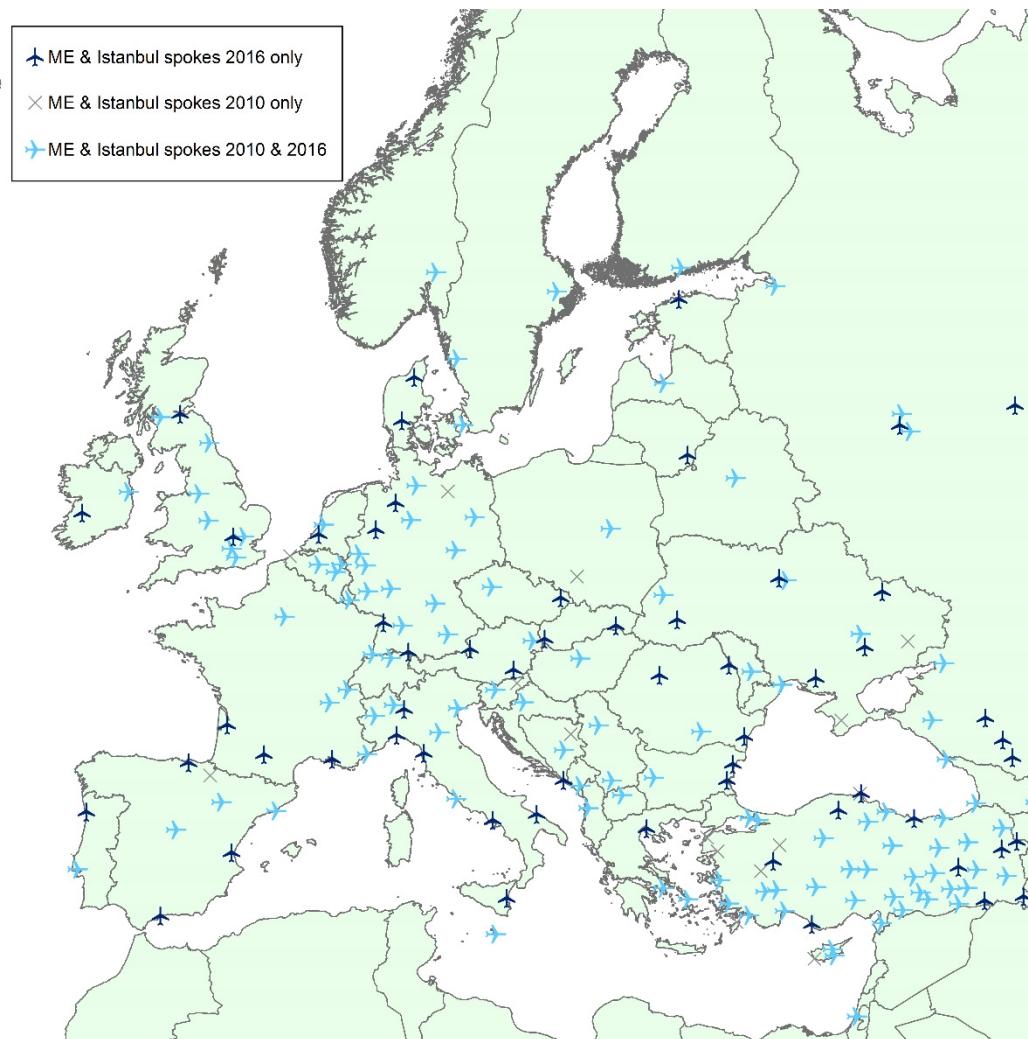
Notes: Only airports within European countries are shown. European countries are defined as the 45 countries with at least one airport that is a member of ACI EUROPE, based on ACI EUROPE's member list.

Source: Oxera analysis of OAG data.

As each new connection will have been subject to a degree of competition between European airports, this illustrates the extent to which competition for services to and from the Middle East has been a material part of the competitive environment for airports of all sizes in Europe over the past six or seven years.

Airline business models have continued to evolve, with developments in the services of FSCs and LCCs, the expansion of LCCs into low-cost long-haul, and the increased use of multi-hub strategies by large airline groups

Airline business models have developed in a number of ways since the 2012 study. In particular, FSCs have deviated from a traditional 'hub and spoke' model by expanding their presence in airports other than their traditional hubs; a number of large airline groups now operate multiple hubs; and there are now recent examples of these groups moving aircraft between these hubs. As a result of these developments, these groups have greater buyer power than they did in the past.

In addition, LCCs are starting to provide feeder services connecting to long-haul networks, and to offer low-cost long-haul services that often bypass traditional hub airports.

Impact on airport competition

Route churn has increased at medium-sized and larger airports (airports with over 10 million passengers per annum, mppa), a result of the increased importance of LCCs at these airports, while remaining high (but stable) at smaller airports

The extent to which airlines can influence the behaviour of airports is largely determined by their ability to switch airports if a commercial deal is unsatisfactory. Indeed, a credible threat to move may be as important as actually moving if that threat helps in the negotiations.

Evidence on the extent of route churn suggests that there is considerable scope for competition between airports, with routes opening and closing regularly, a consequence of the increased importance of LCCs. Such switching behaviour has increased at medium-sized and larger airports, especially at those between 10 and 25mppa, which now exhibit route opening and closure rates in line with those at the smallest airports. This is a material change from the 2012 study.

Competition between airports for airline services will often be pan-European, as LCCs in particular seek to optimise their route structures across their entire networks. The figure below gives such an example, showing how one LCC, Ryanair, has expanded across Europe.

Figure S.2   Growth in airports served by Ryanair
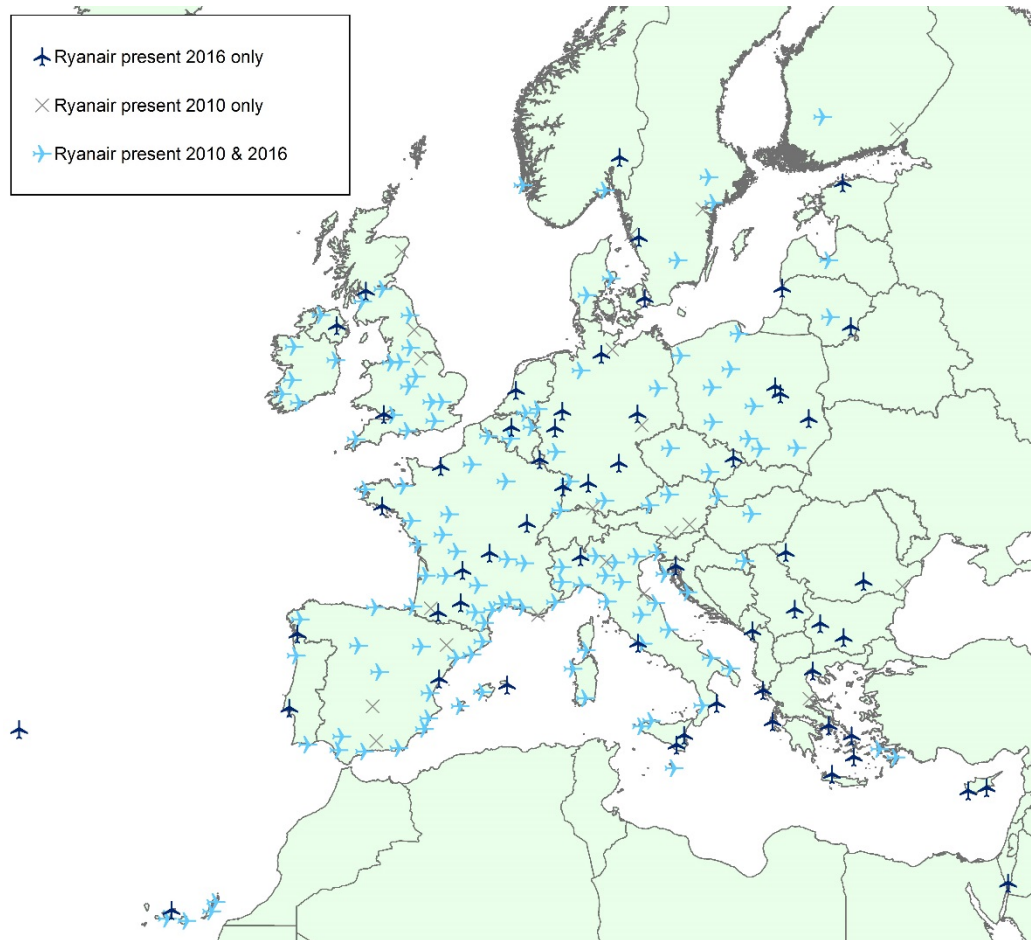
Notes: Only airports within European countries are shown. European countries are defined as the 45 countries with at least one airport that is a member of ACI EUROPE, based on ACI EUROPE's member list as at 20 June 2017.

Source: Oxera analysis.

Overall, the change in route churn rates between the different airport categories is indicative of increasing competitive pressures across the airport industry in Europe.

Large European airports are facing greater competition for connecting passengers on many dimensions

Competition from Middle Eastern and Turkish airports has increased substantially over this period. The number of routes from European hubs that are now competed by routes from the Middle East almost doubled between 2010 and 2016. Of all possible flights with a connection in Europe, 19% can now be taken with a connection in the Middle East or Turkey, an increase from 10% of connecting routes in 2010.

Hub bypass developments are also affecting large European airports, with passengers now having greater choice to fly directly between their origin and destination airports where previously they would have needed to change flights at a hub. In 2010, for example, there were 2,295 connecting flights through Frankfurt for which no direct option existed; by 2016, direct flights were possible on 343 of these. Today, direct routes are available from between 10% and 25% of all hub connecting routes at major European hubs where no such direct route

was available in 2010. Overall, there are around 1,500 examples where a direct flight is now available that was not available in 2010.

Another development is self-connection and the creation of assisted connection programmes offering passengers an alternative to traditional hubs (e.g. GatwickConnects or ViaMilano). A closely related development is the emergence of partnerships between LCCs and other carriers for the LCC to provide connections, such as between Ryanair and Air Europa.[4]

In total, these developments have resulted in a material increase in the extent of competition facing the large European airports for connecting passengers.

Competition in the local area has increased for medium and large airports

Over 20% of the routes offered at an airport are available at another airport within 100km for all but the ten largest airports. By comparing the results between 2010 and 2016, we see that the increase in competition has been most significant for airports with more than 25mppa, with small declines (from high levels) for airports with less than 25mppa.

Table S.1   Proportion of routes with an alternative available within 100km, by airport size, 2010 vs 2016

Airport seat capacity (2016)	2010	2016
0–5m	32%	28%
5–10m	23%	23%
10–25m	21%	21%
25–40m	24%	30%
40m+	11%	15%

Note: Alternatives are required to have a frequency equivalent to at least 50% of that of the reference route. Based on traffic between ACI member states. Airport sizes are based on passenger levels in 2016 (2015 where 2016 data not available). Distances are based on straight-line measurement.

Source: Oxera analysis of OAG data.

Market outcomes

Market outcomes show a mixed picture in terms of airports' ability to raise charges, with an approximately equal divide between those raising charges in real terms and those lowering them. This suggests that there is no systematic ability for airports to raise charges, which is consistent with the other findings in this study on the way competition has developed between airports in Europe.

Price is only one component of the service that airports provide to airlines and passengers: quality and capacity are also important. Service quality (as measured by passenger satisfaction) has increased across all airports, with the rate of increase being greatest at airports with over 25mppa since 2009. These larger airports have also increased their capacity. These developments are consistent with increasing competitive pressures among these airports, suggesting that competition on service quality and capacity as well as price is important for them.

Trends

As many of the trends explored in this report date back to the period covered by the 2012 study, they are therefore now well established and are driving

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[4] Powley, T. (2016), 'Ryanair and easyJet eye work with rivals', *Financial Times*, 12 January.

increasing competition in the European aviation market. While the future of some more recent innovations, such as low-cost long-haul and self-connection, may be unclear at this point, the major drivers of the airport competitive environment look set to continue on the basis of published airline and airport strategies, and aircraft acquisitions. These drivers are the growth of LCCs, the continuation of route churn, the optimisation of routes across European networks, and the growth of hubs in the Middle East and Turkey.

Conclusions

Overall, Oxera's analysis shows that the European aviation market has continued to see an increased competitive dynamic between airports. The high route churn, extensive competition between airports for new and existing capacity on a pan-European basis, and competition for passengers in the local area that was found in ACI EUROPE's 2012 study have continued for small airports (those with less than 10mppa). However, our analysis provides evidence that these competitive pressures are increasingly affecting medium-sized airports as well and, albeit to a lesser extent, larger airports. For airports with over 40mppa, competitive pressures have also increased, although the source of these pressures is different, in particular being supplemented by greater competition for connecting passengers.

These findings are summarised below.

Table S.2   Direction of changes in airport competition since 2010 by type of competition and airport size

Airport size (mppa)	New/existing routes	Connecting passengers	Local catchment
0–5	↔	n/a	↓
5–10	↔	n/a	↔
10–25	↑↑	n/a	↔
25–40	↑	n/a	↑↑
40+	↑	↑	↑↑

Source: Oxera.

The competitive landscape of the airport market in Europe continues to evolve rapidly. In an industry with largely fixed costs and long design periods, airports, their customers and government stakeholders will need to address this 'new normal'.

1   Introduction

Competition between airports is an important feature of the European aviation market. Airline deregulation and the privatisation of a number of major European airports in the 1980s and 1990s began the process of the airport market in Europe opening to competition.[5] Investigating this market in depth, in 2012 ACI EUROPE published a study that examined the extent to which airports in Europe were competing with each other.[6] The study concluded that 'the flexibility and choices available to airlines constrained the commercial behaviour of airports'[7] and that 'Europe's airports are now more commercially focussed.'[8] It looked at the developments in the European aviation industry over a ten-year period, finding that:

- changes in passenger behaviour between 2002 and 2012 had led to increased passenger choice of airports, thereby reducing the extent of any commercial advantage that airports could derive from passengers;

- an additional 500 routes were opened and closed in 2011 relative to 2002, demonstrating an increase in airlines' willingness to switch. Moreover, the number of hub airports hosting multi-hub airlines (with the ability to switch capacity between hubs) had increased since 2002;

- the entry of new airports and expanded capacity at existing airports (including Middle Eastern hubs) had increased choice for both airlines and passengers, thereby further increasing the extent of competition between airports;

- in response to these increased competitive pressures, airports had increased marketing activities, improved quality, and engaged in price competition.

Overall, the 2012 study concluded that the changes to airline business models and the consequent increase in competition between airlines had implications for airports: with airlines freer to move assets than they had been historically, airports were subject to increased competitive pressures and had responded by becoming more commercially focused.

Since the publication of the 2012 study, there have been a number of reports that have considered the extent of, and benefits from, competition between airports. In particular, the UK Competition and Markets Authority has reviewed the changes in competition that arose following the break-up of BAA, concluding that the London airports now compete with each other along a number of dimensions, including service quality, the level and structure of charges, and the provision of additional capacity.[9] Other studies, commissioned by both airlines and airports, have also considered these issues.[10]

In the five years since the publication of the 2012 study, the European aviation market has continued to grow (mostly driven by LCCs and flights to non-European airports), and airline business models have continued to evolve (with the business models of LCCs and FSCs increasingly converging on short-/ medium-haul routes, the emergence of low-cost long-haul travel, and the

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[5] For example, major UK airports were privatised in the 1980s and several other European airports were wholly or partly privatised in the 1990s for example Vienna in 1992, Copenhagen in 1994 and Rome in 1997.
[6] Copenhagen Economics (2012), 'Airport Competition in Europe', June.
[7] Ibid., p. 3.
[8] Ibid. p. 6.
[9] Competition and Markets Authority (2016), 'BAA airports: evaluation of Competition Commission's 2009 market investigation remedies', 16 May, pp. 4–5.
[10] Copenhagen Economics (2016), 'Airport competition in Germany: airport and airline market power', 4 November; CMS and Frontier Economics (2017), 'Keep Tegel open: legal and economic analysis commissioned by Ryanair', June.

increasingly active use of multi-hub strategies by large airline groups). Therefore, ACI EUROPE asked Oxera to update the analysis from the 2012 study and to assess the implications of this updated analysis for how airports in Europe compete.

Throughout this report, key messages and statistics are included in a box at the start of each section.

The structure of this report is shown in Figure 1.1.

Figure 1.1   Report structure

Section 2: Economic framework	• how does the aviation industry function from an economic perspective? • what competitive constraints can airports face?
Section 3: Development in the European aviation market	• recent developments affecting competition between airports
Section 4: Competition for airlines' services on new and existing routs	• airline switching • growth in leisure market
Section 5: Competition for connecting passengers	• proportion of competed routes • alternative forms of connection • hub bypass
Section 6: Competition for passengers in the local area	• proportion of competed routes • improvements in surface access
Section 7: Market outcomes	• aircraft/passenger charges and aeronautical revenue per passenger • service quality • capacity enhancements
Section 8: Future developments	• industry growth • airline business models
Section 9: Conclusions	• key findings

Source: Oxera.

2 Economic framework

This section provides an introduction to the economics of the aviation industry and sets out an economic framework for analysing competition between airports.

The interactions between passengers, airlines and airports are the main factors shaping competition between airports. The main characteristics of these groups are as follows.

- Passengers decide whether to travel and, if so, whether to fly or travel by another mode. They also decide where to fly from and to.

- Airlines allocate their (mobile) assets where they will be most profitable. Many airlines can allocate their capacity relatively freely across Europe, by changing route structures or (with potentially more cost) switching bases. New aircraft provided to serve a growing market can be allocated even more freely.

- Airports are capital-intensive businesses with two main income streams: aeronautical and commercial revenues. These features give airports incentives to increase passenger volumes within the limits of capacity and regulation in order to maximise profitability.

In this industry structure, even relatively small changes in where airlines fly or base new or existing aircraft can have a material impact on the profitability of both airports and airlines. Therefore, the key drivers of competition between airports are the competition for new aircraft and the (actual or potential) switching of airline routes and bases, and of passengers between airports.

This competition occurs through three main channels: competition for airlines' services; competition for connecting passengers; and competition for passengers in local areas.

2.1 The European aviation market

Before considering how competition between airports may arise, it is helpful to understand how different players in the aviation industry interact with one another. There are three types of players in the industry that are particularly relevant to airport competition:

- passengers, who decide whether to travel and, if so, whether to fly or travel by another mode. If they do want to fly then they also need to decide where/when to fly, which airline to fly with and which airport to fly from/to;[11]

- airlines, which decide where/when to operate services, how often those services operate, what capacity those services have and what fares/product offerings are available on those services;

- airports, which provide locations to airlines to fly from/to and a range of aeronautical and non-aeronautical services to airlines and passengers.

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[11] Airlines also transport freight in two main ways: in the hold of passenger aircraft and through dedicated freighter aircraft. However, we do not consider freight transport in this report, since: a) belly hold freight tends to follow passenger demand, and b) dedicated freighter aircraft often fly to different locations and have very different economic characteristics from passenger aircraft.

Airports decide which services to offer passengers/airlines and what price to charge for them.[12]

While there are many other players in the aviation industry (such as economic and safety regulators, air traffic controllers), the dynamics of competition between airports can be understood without assessing the additional complexity of these players.

In considering how airports compete, important distinctions need to be drawn between these three main players.

- Passengers travel for different reasons and will therefore have different willingness (and ability) to switch between travelling and not travelling, travelling at different times or from/to different locations. They pay airlines' air fares and also contribute revenue to airports through non-aeronautical revenue, for example, purchasing food and beverages or other retail products at the airport.

- Airlines earn revenues by offering passengers a way to reach their destination. They compete with other airlines and modes of transport for passengers, maximising yield through revenue management, and driving down costs. Airlines' costs vary, but approximately 50% of airline costs are direct operating costs (e.g. crew costs, fuel); approximately 10% are station and ground services; 5% are navigation charges, and 5% airport charges; and the remainder are system operating costs (e.g. marketing).[13,14]

  Airlines negotiate with airports on the discounts available on airport charges, the incentives that can be offered to operate services from that airport, and the services that the airport can offer. As the aircraft that the airlines operate are mobile assets and there are typically limited contractual commitments between airports and airlines,[15] airlines undertake regular reviews to optimise their network by relocating some or all of their capacity on a route, accounting for the costs that are incurred from reallocating those assets (for example, the costs involved in relocating staff, support material, etc.). The areas that airlines can operate in are governed by international law, but any airline registered in the ECAA is entitled to operate between any two points within the ECAA, giving considerable scope for flexibility in network configurations to those airlines across Europe.

- Airports enable airlines to move passengers to their preferred destination. They earn revenue in two main ways: from airlines/passengers through aeronautical charges; and from passengers via non-aeronautical activities (such as car parking or the purchase of food and drink at the airport).[16] This means that airports have the potential to gain revenue from two sources as additional passengers travel through the airport. While airport revenue varies, therefore, depending on passenger and airline traffic at the airport, airport costs are largely fixed in the short term due to the capital-intensive nature of the business. There are also some components of operating costs (such as security) that are unlikely to vary proportionally with passenger volumes. There are a range of estimates of how airport costs vary with passenger

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[12] In some cases, these decisions will be influenced by economic or other types of regulation at an airport.
[13] ICAO (2017), 'Airline operating costs and productivity', 20–23 February, p. 7.
[14] The exact proportions are likely to according to airline and its operating model and also over time.
[15] In some cases there are contractual commitments on property leases.
[16] The importance of dual revenue streams to airports has long been recognised in the economics of aviation. See, for example, Starkie, D. (2002), 'Airport regulation and competition', *Journal of Air Transport Management*, **8**, pp. 63–72.

volumes, which tend to cluster between 0.1 and 0.6; this means that for a 10% increase in passenger volumes airport costs increase by between 1% and 6%.[17] Airports are therefore incentivised by their cost structures to take commercial actions to attract traffic and increase passenger and airline volumes within the constraints of regulation and capacity (the impact of capacity constraints on airport incentives is explored further in the box below).

Box 2.1   Impact of capacity constraints on airport incentives to compete

If an airport is capacity-constrained, then the incentives on that airport to compete with other airports to attract additional airlines and passengers may be reduced, for the following reasons.

- The existence of a capacity constraint implies that demand to travel from that airport is greater than the available supply. Therefore, if an airline decides to leave the airport, there is likely to be another airline willing to replace it, reducing the impact on airport profitability from the departure of the first airline. The strength of this effect may depend on the existence of spare capacity at competing airports.

- The excess demand results in the price that airlines can charge being driven up to 'clear' the passenger market (i.e. to balance demand and supply). In cases where economic regulation prevents airport charges from rising to market clearing levels, those scarcity rents accrue to the airlines operating at that airport,[18] thus increasing their profits at that airport. In this environment, the airlines' ability to switch to another airport offering equivalent profit is correspondingly reduced. Airports in this context may focus on increases in capacity and on attracting airlines or routes with higher load factors, depending on the nature of the capacity constraint.

Source: Oxera.

2.2   The importance of the allocation of new growth and switching

This description of the market demonstrates that the key drivers of airport competition are:

- the ability of airlines to allocate capacity to a number of different airports, thus forcing those airports to compete for those aircraft;

- the ability of airlines to switch (or credibly threaten to switch) some or all capacity between airports (whether the airline is based at that airport or elsewhere);

- the ability or willingness of passengers to switch routes, airports or modes (or to forgo travel altogether).

All airlines are able to choose where to allocate new capacity introduced to grow the market to some extent (although LCCs will often have greater flexibility than FSCs); hence they can make airports compete for that capacity. However, some airlines are better able to switch some or all existing capacity to a different airport than others (and the greater the ability to switch, the more credible the threat of switching is): the ability of an airline to switch will be determined by the profitability of alternative options. In turn, this profitability will be influenced by the switching costs that an airline would experience. These switching costs will depend on the airline's business model and the role played by the airport for that

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[17] Commission for Aviation Regulation (2014), 'Maximum level of airport charges at Dublin Airport', para. 4.8; Cambridge Economic Policy Associates Ltd (2013), 'Scope for efficiency gains at Heathrow, Gatwick and Stansted Airports', April, p. 6.
[18] For a further explanation, see Airports Commission (2015), 'Economy: transport economic efficiency impacts', July, para. 3.10.

airline (for example, whether the airline has aircraft based at that airport, whether the airport is at the end of a route with aircraft based elsewhere, or whether the airline uses the airport as a hub). Switching costs fall into two main categories:

- financial costs, such as those incurred in the relocation of assets to a new airport, staff costs including relocation, and marketing of new routes;[19]

- the opportunity costs of closing a route and opening a new one, as there may be a period of bringing a route to maturity when yields are lower.

Airports often provide incentives to airlines to mitigate some of these switching costs, for example by providing support with marketing or reductions in charges while the route is developing. This in itself is a reflection of airport competition and is explored in more detail in section 4.2.

Some passengers are also better able to switch than others, for example if they are based roughly equidistant from two airports.

Any development in the European aviation market that increases this ability of airlines or passengers to switch will increase the competitive constraints on airports. This increase may come from one or more of three sources:

- an increase in the number of airlines (or passengers) that are able to switch (an increase in the number of marginal airlines or passengers);

- an increase in the ability of the airlines (or passengers) in the margin to switch in response to airport decisions;

- a decrease in the ability of airports to differentiate between airlines (and passengers) that can easily switch and those that face higher switching costs, as this means that airlines face low switching costs that in effect constrain airport decisions across the entire customer base.

2.3 Impacts of switching on airlines and airports

The previous sub-section outlined that the ability to locate growth elsewhere or (credibly threaten to) switch some or all existing capacity is the important element of competition between airports and that decisions by airlines and passengers 'at the margin' may effectively constrain an airport's behaviour across its customer base. However, the question remains as to how significant marginal decisions are for airlines and airports, and, therefore, the extent to which this drives commercial behaviour.

2.3.1 Marginal decision making for airports

When making commercial decisions, an airport will assess the likely impact on its profit of changing its charges to airlines (or the services it offers). In particular, an airport will need to assess what the impact is likely to be on its volumes (i.e. the passengers and aircraft using its airport) and how this will affect revenue from both aeronautical and non-aeronautical activities and costs (and hence profit).

To illustrate the extent to which changes in charges could affect profitability, given the economic characteristics of airports discussed above, below we seek to replicate the commercial analysis that an airport could undertake to inform its pricing decision.

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[19] IATA (2013), 'Airport competition: IATA Economics Briefing No. 11', November, p. 17.

To do this, we consider the case of a small but significant non-transitory increase in price (SSNIP), a standard applied by competition authorities. For a hypothetical airport, we examine the commercial attractiveness of two alternative airport charge changes: a 5% increase and a 10% increase. This is also known as a 'critical loss analysis': an assessment of the volume loss that would make a price rise unprofitable.

We estimate the fall in the annual volume of passengers using an airport with 25mppa such that the price increase would become unprofitable. We then translate this into an equivalent number of aircraft serving the airport.[20] The details of this calculation are provided in Appendix A2.

Since airports have such a high proportion of fixed costs, they are heavily reliant on volumes to drive revenue to cover these costs and contribute to profit. Therefore, even relatively modest losses of passenger numbers can lead to a loss of profit as a result of a price increase. In our example, we find that passenger losses of less than 6%, or around 7–10 aircraft, would be enough to deter an airport from increasing charges by up to 10%. The anticipated volume losses would not have to be this high for a price increase to be unprofitable in the other scenarios included in Appendix A2. In the context of an airport with 25mppa, the loss of six aircraft (and some 5% of passengers) could be considered a relatively small airline response that would render a change in charges unprofitable. This illustrates the importance of the marginal airlines (i.e. those with the ability to switch) in affecting airport profitability.

Likewise, the same logic applies in reverse, with airports having incentives to reduce charges to attract airlines and passengers (either from new capacity into the market or services currently operating at another airport).

2.3.2   Marginal decision making for airlines

The next question, therefore, is what is the likely impact of a price rise on aircraft volumes—i.e. how likely is it that an airline will relocate its aircraft when faced with an increase in airport charges?

One way of considering the incentives on airlines to respond is to consider the margins earned by the airlines. Return on capital (adjusted for operating leases) analysis produced by IATA[21] indicates that returns in this sector have been between 4% and 10% since 2010. For European airlines, the range has been slightly wider, between 2% and 12%.

This return on capital needs to be compared with the return required for investing in this sector—the WACC. IATA also estimates the WACC for the sector and compares this with actual returns earned since 1994. On average, the returns generated by the sector have not met this level, although returns in more recent years have exceeded it. This suggests that airlines have a strong incentive to react in response to changes in airport charges. The form of the reaction will differ depending on the profitability of the routes affected and the switching costs to the airline.

2.3.3   Conclusion on the importance of marginal changes

Our analysis suggests that an airport will consider a price increase only if it anticipates a moderate adverse impact on passenger and aircraft volumes.

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[20] We do this by using assumptions about: aircraft capacity, average occupancy rate, aircraft movements through the airport per day and number of days in a year that the airport is served by that aircraft. This gives an estimate of the total airport passengers that come from that aircraft a year (and hence the number that would be lost if that aircraft no longer served that airport).

[21] IATA (2017), 'Economic performance of the airline industry: Mid-year 2017 update'.

Given that airlines have relatively thin margins, they will be sensitive to increases (or decreases) in charges and increasingly have the ability to relocate or threaten to relocate some of their capacity to alternative airports. Decisions by those airlines that can most easily do this can therefore protect the remainder. Given the growing market and importance of marginal decisions on where airlines locate capacity, airports can compete for both growth and existing capacity.

The next sub-section explores the nature of competition between airports in more detail.

2.4 The nature of competition between airports

So far, this economic framework has set the scene for an industry where competition for both growth and existing capacity is important and can have a material impact on the commercial success of both airports and airlines. It is therefore useful to consider how airports can compete.

To attract airlines and passengers in order to increase profitability, airports can compete with one another along several dimensions, as illustrated in Figure 2.1. We expand on these forms of competition below.

Figure 2.1   Types of competition between airports
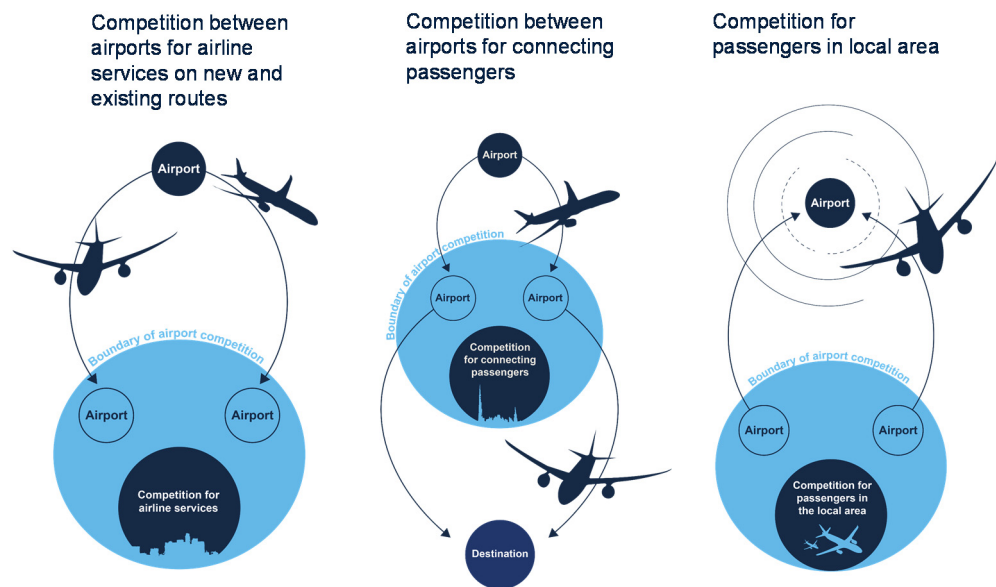
Source: Oxera.

- **Competition for airline services on new and existing routes**. Airports may compete with one another to attract airlines to operate routes and/or base their aircraft at their airport. These airlines could originate from across Europe or (in the case of routes that start or end outside Europe) beyond. The allocation of new aircraft and actual or threatened switching by airlines can therefore act as a competitive constraint on the behaviour of airports. The more substitutable airports are, the easier it is for airlines to switch between them in response to price/service offers (either when bringing new capacity to market or for reallocating existing capacity) and therefore the greater buyer power airlines have in negotiations with airports.

- **Competition for connecting passengers**. Airports may compete for traffic transferring between flights. This primarily consists of traffic transferring

between intra-European flights and intercontinental flights. While this comprises a small proportion of traffic for most airports, it is a significant part of the passenger base for hub airports (for example, London Heathrow, Frankfurt and Amsterdam Schiphol). Competition for transfer traffic is likely to be with a geographically distant airport within or outside Europe. Where airlines operate multi-hub strategies, they can engender competition for new and existing services from those hubs.

- **Competition for passengers in the local area**. Competition between airports has traditionally been considered mainly in terms of the extent to which more than one airport serves a given catchment area of potential passengers. Where two or more airports serve a particular catchment area, local passengers may be able to switch between these airports. For passengers to be able to exercise this choice, they need to be aware that the choice exists, and the development of price comparison websites is an important development in this context.

While it is useful to distinguish between these different types of competition, they are closely linked. As outlined above, airlines are driven by maximising profits and so there is an interaction between passenger preferences/actions (and therefore their willingness to pay), the costs incurred by airlines (including airport charges) and the actions of airlines.

As in any market, the competition between airports may take place along several dimensions, including price and service quality. Service may be offered both to passengers directly (in the form of lounge facilities, retail offerings, terminal ambience) and to airlines (in the form of operating processes that improve airline efficiency and reduce costs).

2.5 Features to consider in assessing airport competition

As alluded to above, competition between airports will only occur if at least one of the following applies:

- at least some airlines can allocate new capacity at a range of airports (which is almost always the case);

- airlines can switch (or threaten to switch) some or all of their capacity at an airport to another airport;

- some passengers can switch, because they view the relevant airports as reasonably close substitutes.

Competition will therefore be determined by the availability of alternatives and the extent of any switching costs. Effective competition does not necessarily require all airlines to be able to switch or threaten to switch all routes. Indeed, the effect of a small number of airlines switching a limited number of services on an airport's profitability could be significant (due to fixed costs and loss of aeronautical and non-aeronautical revenue), and therefore even limited switching could act as a constraint on airport behaviour. In the airport market, effective competition often works at the margins.

Airports may either 'compete for growth' or 'compete for the existing market'. The former arises when an airline has additional capacity that it wishes to deploy in the market and airports compete for those aircraft, while the second arises when airports compete for airline capacity that is already deployed in the market. Both are important forms of airport competition.

The next section outlines the developments in the European aviation industry since the 2012 study that are relevant to airport competition.

3   Developments in the European aviation market

There have been a number of important developments in the European aviation market since the 2012 study that are relevant to the extent of competition between airports. The most important of these relate to the continued growth of the aviation market and the continued changes in airline business models.

The key developments are:

- the European aviation market grew by 25% between 2010 (which is largely when the analysis for the 2012 study ended) and 2016. Most of this growth came from LCCs and services to non-European countries;

- within Europe, LCCs accounted for approximately 76% of growth across all airports, and were the largest source of growth across all airport sizes;

- the available capacity to Middle Eastern and Turkish airports increased by between 85% and 120% between 2010 and 2016;

- growth in the leisure market continues across a range of European countries;

- FSC and LCC business models have converged on short-/medium-haul routes, with LCCs increasing aspects of service quality and FSCs often reducing it, and FSCs opening their own LCCs;

- there has been increased use of multi-hub strategies by large airline groups;

- LCCs have entered into the long-haul market with low-cost long-haul flights.

The implications of these developments for airport competition are explored in later sections of this report.

Over the last five years there have been important developments in the European aviation market that affect the extent to which airports compete. This section identifies how the market has grown and the sources of that growth (section 0), before examining how airline business models have evolved (section 3.2) and other, less material, developments (section 3.3). The subsequent sections of this report then relate these developments to the economic framework developed in section 2 in order to assess their implications for competition between airports.

3.1 Growth of the market

The aviation market has continued to grow since 2010—see Figure 3.1.[22]

Figure 3.1   Market growth (mspa), 2010–16
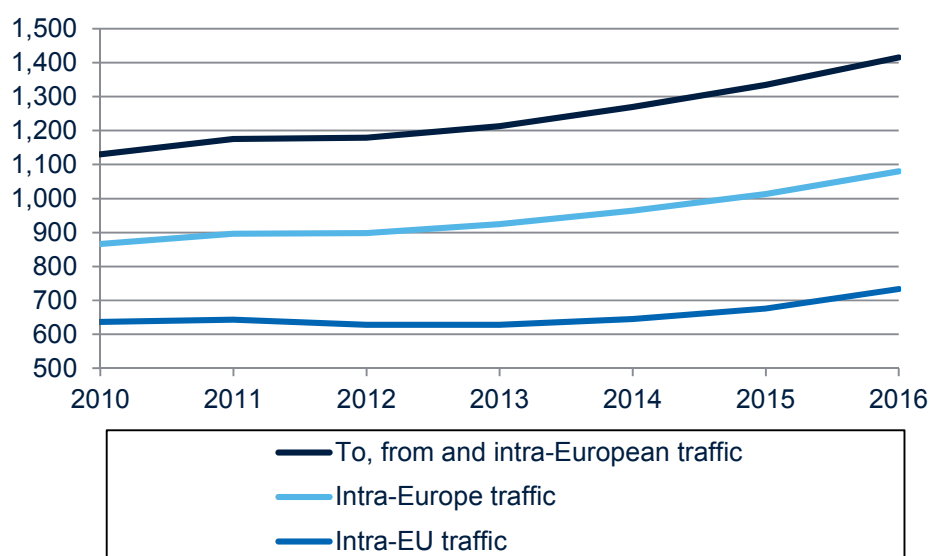
Note: mspa, million seats per annum. European countries are defined as the 45 countries with at least one airport that is a member of ACI EUROPE, based on ACI EUROPE's member list as at 20 June 2017 (as detailed in Appendix A3). Intra-Europe traffic is defined as traffic with both an origin and destination within these countries. Intra-EU traffic is defined as traffic with both an origin and destination that are members of the EU as at May 2017.

Source: Oxera analysis of OAG data.

Overall airline departure capacity from airports in European countries in 2016 was 25% higher than it was in 2010, with the majority of this growth occurring since 2013. While this growth is primarily attributable to an increase in aircraft capacity (i.e. the number of seats per aircraft), it was also partly driven by a 9% increase in the number of ATMs. This implies a significant number of aircraft have been introduced to the market, providing scope for airports to compete for growth. The implications of this are considered in section 4. The sources of this growth are discussed in the following sub-section.

3.1.1   Growth from LCCs and Middle Eastern carriers

The composition of growth in the European aviation market has potentially important implications for competition between airports.

Figure 3.2 below shows how each type of airline has contributed to growth since 2010, showing the importance of LCCs and the Middle Eastern 'super connectors'. For context, total seat capacity for flights to, from or within Europe in this period expanded by 285m. In this analysis, we classify airlines according to their alliance status, as no comprehensive definition of LCCs exists. However, a review of the most important non-alliance airlines suggest that the large majority of these are likely to be LCCs.[23]

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[22] Most of the data for the 2012 study is from before 2010, so we have used 2010 as the base year for the analysis in this report wherever possible.
[23] Of the 10 largest non-alliance airlines by seat capacity in 2016, 93% of capacity was on flights operated by eight airlines which would typically be seen as LCCs.

Figure 3.2   **Share of incremental seat capacity at all airports, by type of carrier, 2010–16**
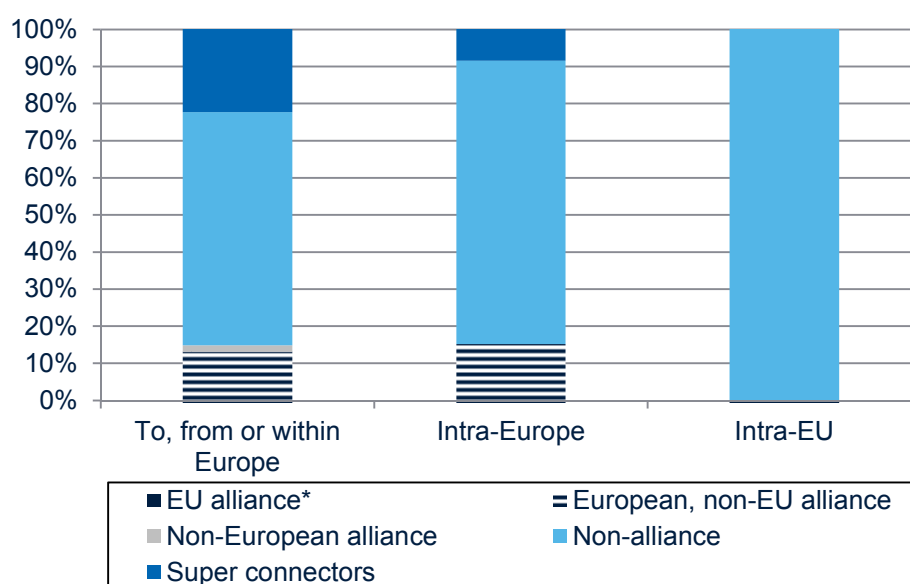
Notes: * Alliance traffic for EU-based airlines contracted between 2010 and 2016, and so does not appear on these charts. Growth of other categories of traffic therefore exceeds overall industry net growth. Alliance status is based on airline membership as at May 2016. 'EU alliance' airlines are defined as those originating from countries that are members of the European Union; 'European, non-EU alliance' airlines are defined as those originating from countries that are part of Europe but not the European Union. Europe is defined as any country that contains an airport that is a member of ACI EUROPE (see Annex A3). Super connectors are classed as Emirates, Qatar Airways, Etihad Airways and Turkish Airlines; these are excluded from the alliance and non-alliance categories.

Source: Oxera analysis of OAG data.

This analysis can be further broken down by airport size.[24] Figure 3.3 looks at the sources of growth between 2010 and 2016 for capacity within Europe. It shows that traditional alliance airlines account for only a small proportion of growth across all sizes of airport. Additionally, where alliance airlines have generated growth, we observe that this is typically from airlines originating from nations that are outside of the EU, with EU-based alliance airlines achieving no overall net growth in capacity in this time period. This trend is a continuation of one that was identified in the 2012 study, where it was noted that point-to-point airlines increased their capacity share on intra-European routes from 27% in 2002 to 41% in 2010.[25] A particularly interesting feature of recent years has been the relative growth of LCCs at larger airports.

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[24] Airport sizes are based on millions of passengers to/from that airport in 2016 or, where 2016 data was not available at the time of the analysis being conducted, 2015 levels. Immediately prior to finalisation of this report, 2016 passenger data became available for more airports. This has not been included in this report. However, analysis showed that this affects the categorisation of only a very minor set of airports, and would therefore not significantly alter the results of any analyses.
[25] Copenhagen Economics (2012), 'Airport Competition in Europe', June, Section 3.

Figure 3.3   Proportion of growth in capacity to, from or within Europe, by airport category, 2010–16
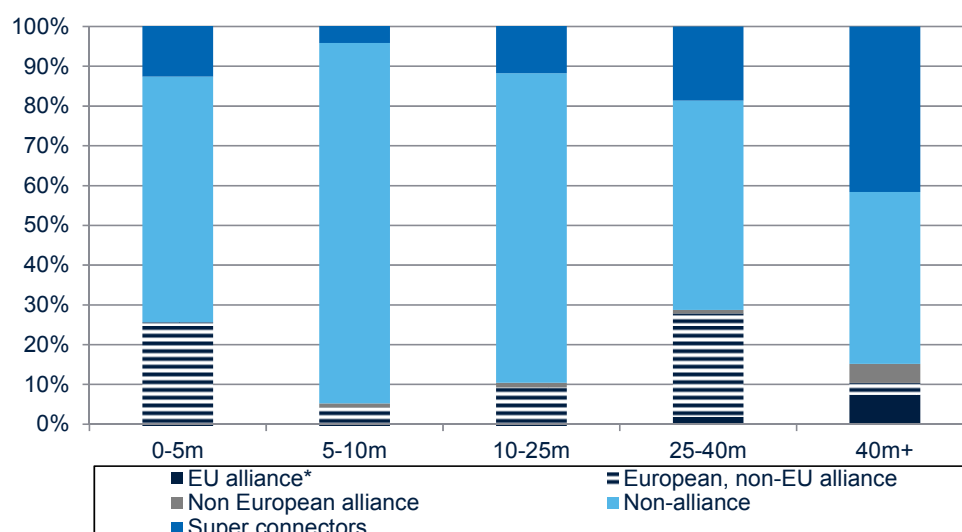
Notes: *Alliance traffic for EU-based airlines contracted between 2010 and 2016 at airports in the 0–5m, 5–10m and 10–25m categories, and so does not appear on these bars. Growth of other categories of traffic therefore exceeds overall industry net growth for these categories. Based on traffic to, from or within Europe. Europe is defined as any country that contains an airport that is a member of ACI EUROPE (see Annex 9.3A3), which explains why the super connectors are providing growth on intra-Europe flights, as this category includes Istanbul. Alliance status is based on airline membership as at May 2016. 'EU alliance' airlines are defined as those originating from countries that are members of the European Union; 'European, non-EU alliance' airlines are those originating from countries that are part of Europe but not the European Union. Super connectors are classed as Emirates, Qatar Airways, Etihad Airways and Turkish Airlines; these are excluded from the alliance and non-alliance categories.

Source: Oxera analysis of OAG data.

Within the EU, such an analysis yields even more pronounced results. While super connectors are not a factor within this definition, non-alliance airlines account for all net growth across all airport size categories.

The importance of the growth in LCCs is in particular explored in section 4.1, while the emergence of super connectors is discussed in sections 4.3 and 5.1.

3.1.2   Connections to Middle Eastern and Turkish hubs

There has been a significant increase in the traffic of Middle Eastern 'super connector' airlines, and the base airports of these airlines. This is illustrated in Figure 3.4 below, which shows that seat capacity to and from Abu Dhabi, Doha and Dubai airports increased by 106%, 119% and 85%, respectively, between 2010 and 2016. Istanbul Airport also more than doubled its total seat capacity during this period. The implications of this for competition between European airports are examined in section 5.1.

Figure 3.4   Capacity (seats) departing and arriving at selected airports, 2010 vs 2016
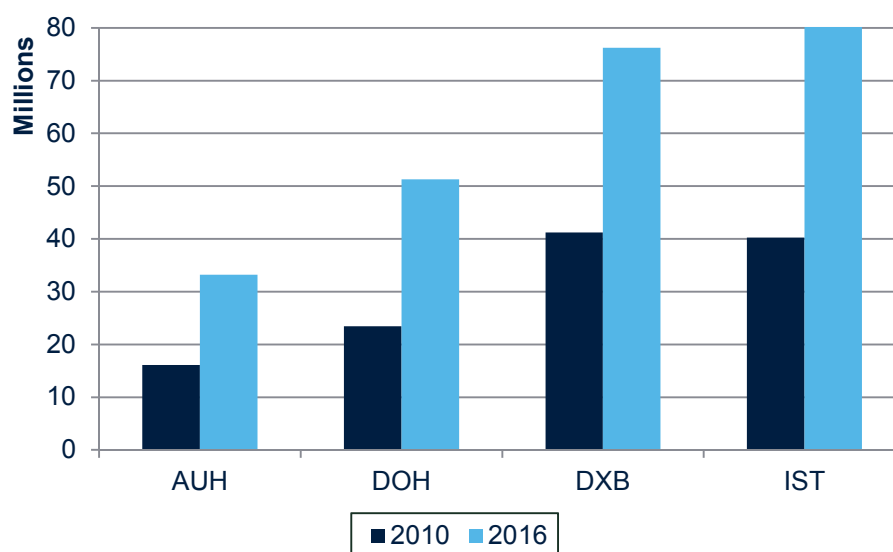
Source: Oxera analysis of OAG data.

3.1.3   Growth in the leisure market

Comprehensive European-level datasets on passengers' purposes for travel do not exist, but the 2012 study noted that a number of countries demonstrated an increased share of leisure travel in the period prior to that study.[26] This trend has continued between the period covered by that report and today, as set out below.

Table 3.1   Trends in journey purpose in selected European markets

Market	Period	Business share	Holiday share	VFR share
Germany[1]	2008 to 2014	39% to 35%	32% to 39%	29% to 26%
France	2010 to 2015	32% to 28%	41% to 43%	23% to 27%
UK[2]	2010 to 2015	23% to 21%	41% to 43%	35% to 36%
Norway	2010 to 2016	37% to 32%	Holiday share increased from 63% to 68%*	
Netherlands[3]	2011 to 2015	33% to 34%	Leisure and VFR joint share from 62% to 66% *[4]	

Notes: * Disaggregated leisure and VFR shares were not available for at least one of 2010 and 2016 in these markets and have therefore been combined in order to ensure comparability.
[1] Based on departing passengers only, excluding connecting passengers. [2] Based on London Heathrow, London Gatwick, Manchester, London Stansted and London Luton airports. [3] Based on Amsterdam Schiphol Airport only. [4] 2011 figures are comprised of 42% leisure and 20% VFR, combined into the 62% figure for 2011. 2015 is reported simply as 66% leisure.

Source: ADV (2015), 'Airport Travel Survey 2015'; Ministère de la Transition écologique et solidaire, Enquête Nationale auprès des Passagers Aériens; UK Department for Transport, 'Purpose of travel at selected UK airports'; Statistics Norway, Travel Survey; Schiphol Group, 'Facts and Figures 2011' and 'Facts and Figures 2015'.

The increases in the leisure share of passengers are in line with other related statistics. For instance, Eurostat estimates that the number of EU residents participating in tourism increased by around 2.2% between 2012 and 2015.[27] The implications of this increase in the leisure market are explored in section 4.1.

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[26] In particular, the UK, Norway, Sweden, Belgium and the Netherlands.
[27] Eurostat (2017), 'Participation in tourism for personal purposes (number of tourists)', 2 August.

3.1.4   Summary

In summary, the growth in the European aviation market has been driven by:

- the growth of LCCs (which has implications for the way in which airports compete for airline services for new and existing routes, as explored in section 4);

- increased connections to the Middle East (which has implications for the number of airports competing for connecting passengers, as analysed in section 5, and the competition between airports for connections to those Middle Eastern airports, as assessed in section 4);

- an increase in the size of the leisure market (which has implications for the way in which airports compete for airline services for new and existing services, as analysed in section 4, and for passengers in the local catchment areas, as considered in section 6).

3.2   Development of airline business models

Since 2010, there have been several changes to the way in which airlines operate. The key changes, which are relevant to the development of airport competition, are outlined below.

3.2.1   Increasing convergence of airline business models

The 2012 study found that LCCs are 'footloose', often flying out of multiple secondary airports and with a higher propensity to switch between airports than FSCs.[28] In addition, the point-to-point model adopted by LCCs enabled higher aircraft utilisation rates compared with FSCs, which were more likely to use a hub-and-spoke model.[29]

Since that study was completed, FSCs have deviated somewhat from their traditional model by expanding their presence in airports other than their traditional hubs. For example:

- British Airways now flies out of four London airports, having begun to fly out of London Stansted;

- Air France has regional bases in Marseille, Bordeaux, Toulouse and Nice and has expanded the number of seats offered by its regional subsidiary, 'Hop!', in each of these airports;

- FSCs have developed their own lower-cost airlines to pursue growth—for example, International Airlines Group introduced Level, Air France is about to launch Joon, and Lufthansa introduced Eurowings.

However, changes in the business model are not all in the direction of FSCs adopting practices that were historically the domain of the LCCs. Convergence in airline behaviour between FSCs on short-/medium-haul routes and LCCs has also taken the form of competition in terms of service levels. In keeping with their core objective of keeping costs low, LCCs have traditionally operated flights with no frills such as beverages or meals, only one class of seat and predominantly non-flexible fares, no loyalty programmes or access to lounges, and surcharges for checking in bags. In an attempt to attract business passengers, most LCCs, and in particular easyJet and Ryanair, have modified their practices in these

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[28] Copenhagen Economics (2012), 'Airport Competition in Europe', June.
[29] The hub-and-spoke model typically involves maintaining a base in a large airport. ACI Europe (2016), 'Airport Industry Connectivity Report'.

respects. easyJet now offers a loyalty programme to its members, Ryanair has reduced its penalties for checking in a bag at the airport and offers a Business Plus service for a premium fare, while Vueling allows flyers to purchase access to lounges.[30]

These trends imply that LCCs are increasingly competing for business passengers, a demographic that traditionally flew with FSCs. Ryanair's Chief Marketing Officer described the airlines' pursuit of business travellers as driven by an understanding that 'what business travellers want' changed.[31]

In contrast, some FSCs have reduced their service quality to cut costs and increase ancillary revenues. In 2015, British Airways announced that it would charge passengers paying the lowest fare for selecting seats and in 2017 moved away from the provision of free refreshments on short haul flights; and, in 2016, Air France increased its baggage fee for European flights and started offering fares with no checked baggage allowances. This is part of a continued focus by FSCs on costs and revenues.

This increased convergence in business models is likely to have implications for the way in which airports compete for airlines' services (see section 4.2).

3.2.2 Use of multi-hub strategies

There are a number of large airline groups (particularly Lufthansa, Air France/KLM and International Airlines Group) that have multiple hubs, and there are many examples of these groups moving aircraft between these hubs. This provides an increase in these groups' buyer power compared with their historical position. For example, at the end of 2016, Lufthansa warned Fraport, Frankfurt's airport operator, that it could move some of its flights away from the airport due to its fee structure favouring rivals such as Ryanair.[32] In June 2017, this was followed by the announcement that Lufthansa would be moving five Airbus A380s from Frankfurt to Munich.[33]

In a different example, in 2016, Air France/KLM greatly increased its connectivity to Asia Pacific at Schiphol, yet underperformed competitors at Charles de Gaulle. Air France/KLM's connectivity to North America followed an almost identical pattern, with gains from Schiphol and losses from Charles de Gaulle.[34] These developments suggest that differences in the performance of the Air France and KLM led to a more Schiphol-focused development strategy, enabled by the flexibility of the group to shift capacity and flights between its key airports. The implications of this for airport competition are explored in sections 4.2 and 5.2.

3.2.3 Low-cost long-haul

LCC business models have continued to evolve since 2012. Carriers such as Norwegian Air Shuttle, Eurowings, WOW, Level, XL Airways and French Blue Airways have started competing on long-haul intercontinental routes. This has been enabled by new aircraft technology, which has greatly reduced operating costs for long-haul operations. As LCCs tend to operate from secondary airports, this trend increases passengers' choice of airports for long-haul departures,

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[30] Powley, T. (2015), 'easyJet targets business travellers with new perks', *Financial Times*, 10 November.
[31] Barrett, C. and Wild, J. (2014), 'Ryanair launches 'business class' as it aims for corporate market', *Financial Times*.
[32] Reuters (2016) 'Lufthansa threatens to reduce Frankfurt flights over fee row', 13 December.
[33] *Die Welt* (2017), 'Lufthansa verlegt fünf A380 von Frankfurt nach München', 14 June.
[34] ACI (2017), 'Airport Industry Connectivity Report 2017'.

reducing the market power of larger airports.[35] LCCs are beginning to explore the potential for connecting to long-haul networks by providing feeder services. For example, Ryanair has started to offer feeder flights for Air Europe's Latin American routes out of Madrid.[36] This development could enable a large number of connections through airports at which Ryanair has a significant presence, which were not previously available as a guaranteed connection (where passengers' luggage is checked for the entire journey). While in the early stages, this could have significant implications for competition for connecting passengers by, in effect, opening up new hubs. This is considered further in section 5.3.

3.3 Other relevant developments

There have been a wide range of other developments in the European aviation industry since 2012 that have had implications for competition between airports but are less material than those outlined above. This sub-section provides a brief summary of the more important of these developments.

3.3.1 The growth of online sales and flight comparison tools

The 2012 study noted the growing importance of online sales. While online was already firmly established as an important sales channel for airlines in 2012, its importance has continued to grow.

The growth of OTAs, which facilitate easy comparison of flights for customers, has been notable in recent years. Figure 3.5 below shows that the revenues of Skyscanner, one of the most notable OTAs, increased approximately five-fold between 2012 and 2016, while Google has consistently made additions to its own flight comparison tool, which was originally launched in 2011.[37]

Figure 3.5   Skyscanner revenues (£m), 2011–16

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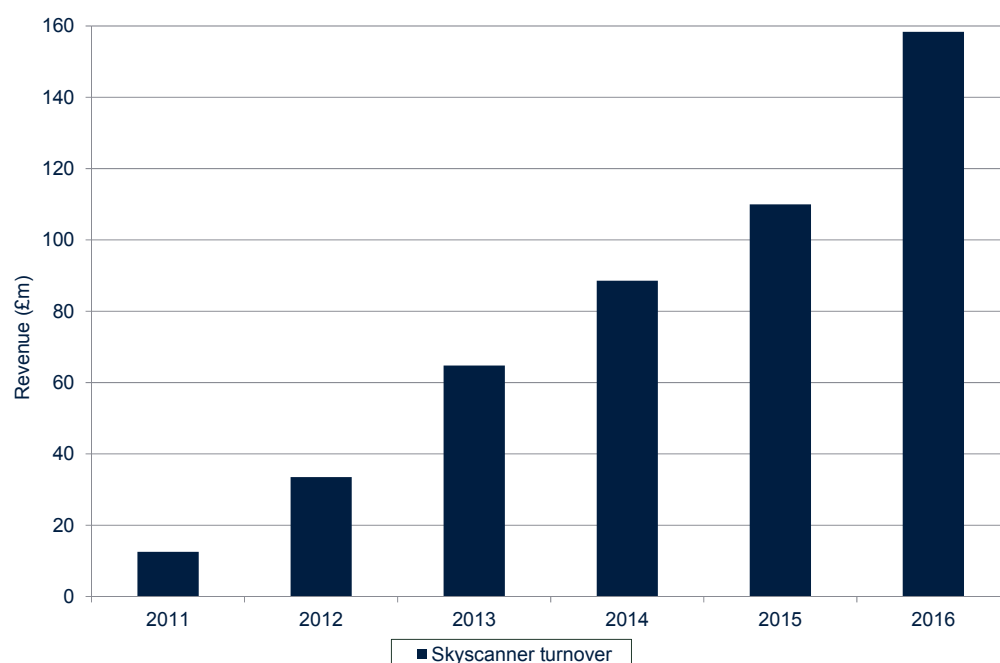
[35] For example, Eurowings operates UK flights from London Stansted and Manchester, and German flights from Leipzig Halle and Dresden. See Eurowings website, 'Route network'.
[36] Ryanair (2017), 'Ryanair website to sell Air Europe long haul flights', 23 May, press release.
[37] Paris, N. (2015), 'Google Flights tool improved for people 'not sure where they want to go'', *The Telegraph*, 27 February.

Source: Skyscanner statutory accounts, sourced from Companies House.

The growth of OTAs has several implications for the aviation sector. First, there is evidence that airlines achieve lower yields on tickets sold via OTAs,[38] thereby increasing the pressure on airline margins, which are likely to be reflected in the negotiations between airlines and airports as airlines look to preserve margins. Fares are just part of a broader range of information that can be provided to passengers by these websites: they also provide information that makes it easier for passengers to arrange 'self-connections' and increase awareness of alternative options such as flying from different airports. The implications of this awareness are discussed in section 5.4.

3.3.2   Growth in self-connection

As part of this study, in section 5 we examine the evolution of competition for 'traditional' connections, made by changing flights at large airports between airlines which operate traditional hub-and-spoke models. However, we also consider recent developments that are beginning to challenge this model. For instance, the evolution of digital tools that allow passengers to compare and 'mix and match' flights with greater ease than before is likely to have enabled more self-connection. Innovative services launched by airports, whereby they (rather than the airline) take responsibility for guaranteeing the connection of passengers, are also likely to have contributed to this trend.

3.4   Continuing limits on capacity expansion

Environmental concerns have increasingly constrained planned airport expansion. As part of its expansion, Frankfurt Airport was required to cease night take-offs. More recently, an Austrian administrative court barred the planned expansion of Vienna Schwechat Airport, stating that the climate change implications of increased capacity would outweigh any benefits. While the Austrian constitutional court has returned the case to the administrative court, this example illustrates the pressure that environmental concerns are exerting on capacity expansion. These trends might have restricted the ability of airports with capacity constraints to grow and compete, although they may also provide an incentive for airports to find other ways to increase capacity, for example through operational enhancements and by focussing on routes and airlines with higher load factors.

This section has provided an overview of the main developments in the aviation industry since the 2012 study that have an influence on competition between airports. Many of the trends identified in the 2012 study as contributing to the development of airport competition have continued to develop, some substantially so. Sections 4 to 6 examine the implications of these developments for the three main aspects of competition, as set out in section 2.

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[38] IATA (2016), 'The Future of Airline Distribution 2016-2021', p. 39.

4 Competition for airlines' services on new and existing routes

There has been increasing competition for airlines' services on new and existing routes from all but the smallest airports (which started from a high base), with this increase being particularly notable for airports with between 10mppa and 25mppa.

This section considers how the industry developments outlined in the previous section affect competition between airports in Europe for airline services on new and existing routes. The main developments of interest are the continued growth in Europe, and the further development of LCCs as well as the rapid growth of the aviation market in the Middle East and Turkey. The key messages and facts from this section are as follows.

- LCCs have continued to expand rapidly between 2010 and 2016, with Ryanair expanding its total seat capacity by 42%, easyJet by 36%, Vueling by 104%, Wizz Air by 90% and germanwings by 70%. Four of the five fastest-growing airlines in Europe over that period were LCCs.

- The rate of route churn (which indicates the potential for competition between airports for new and existing routes) has remained high and roughly stable for airports with less than 10mppa, and has increased substantially for medium and large airports with over 10mppa, with this being particularly pronounced for airports with between 10mppa and 25mppa.

- There is evidence of an increase in the size and coverage of airports' incentive schemes, with many more airports now advertising their schemes.

- There has been growth in the number of European airports with connections to airports outside Europe. In particular, connections to the Middle East and Turkey have increased, with the number of flights increasing by almost 80% between 2010 and 2016. This increase has been spread across all airport sizes.

Section 2 outlined an economic framework for considering how airports in Europe compete, while in section 3 we explored a number of developments in the aviation industry with implications for this competition. In this section—the first of three to look at how those developments have influenced airport competition in Europe—we discuss the ways in which airports compete with one another to attract airlines' services (inbound and outbound).

The key developments in the European aviation industry that are relevant here are:

- growth in the market (which creates the potential for airports to compete for that growth);

- growth of LCCs (which have a greater tendency to move aircraft, and the opportunity to do so across pan-European networks, which in turn improves their negotiating position with respect to airports);

- convergence in airline business models (with FSCs adopting negotiating tactics that resemble those historically used by LCCs);

- growth in the Middle Eastern hubs (creating competition among European airports for spoke services from those hubs).

Our analysis of these developments is split into three sub-sections: section 4.1 considers changes in route churn as an illustration of the evolving negotiating position of airlines; section 4.2 considers the negotiations between airports and airlines for new and existing routes; while section 4.3 reviews the competition for spokes to Middle Eastern and Turkish hubs. Section 4.4 concludes on how competition for airlines' services has evolved.

4.1 Airline switching: driven by LCCs

Each time an airline opens a new route, it has the ability to choose the route that offers the greatest profitability, and the airport cost is one factor that the airline considers. The ability of airlines to choose between airports puts those airports in competition with each other to make the best offer. LCCs can most easily close and open new routes, and it is LCCs that have driven the growth of the European air transport market, as shown in section 3.

The 2012 study found that the development of low-cost point-to-point services meant that airlines were footloose, in the sense that they were becoming more flexible in deploying their fleet and repositioning aircraft in search of the highest yield possible, thus driving airports to compete with each other for their services. It found that the number of routes opening and closing each year increased in absolute terms, although the rate of increase was outpaced by the overall growth in route stock, meaning that route churn rates declined slightly.[39] In this section, we find evidence that this trend has continued, still driven by the growth of LCCs.

4.1.1 The continued growth of point-to-point airlines

In section 3, we demonstrated that the majority of growth in the market has come from point-to-point or non-alliance airlines. This is reinforced by examining the five largest airlines in Europe in 2010—see Figure 4.1 below. Lufthansa and Air France—the second and third largest airlines in 2010—declined in terms of seat capacity between 2010 and 2016, but Ryanair and easyJet expanded by approximately 42% and 36%, respectively.

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[39] Copenhagen Economics (2012), 'Airport Competition in Europe', June, chapter 3.

Figure 4.1   Seat capacity (m) of Europe's five biggest airlines, 2010–16
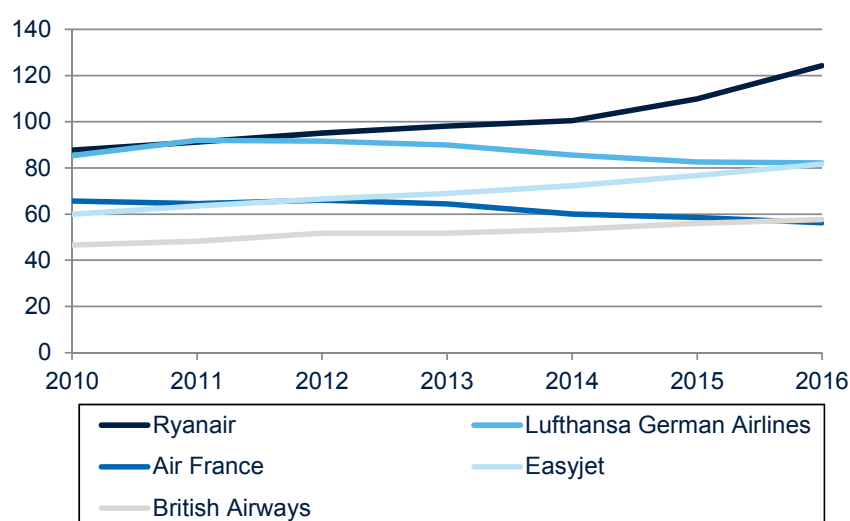
Note: Based on seat capacity to, from or within European countries. European countries are defined as the 45 countries with at least one airport that is a member of ACI EUROPE, based on ACI EUROPE's member list as at 20 June 2017, as detailed in Appendix A3. The five airlines shown were the five largest under this metric in 2010. By 2016, Turkish Airlines had moved from being the seventh largest airline in Europe to the second, meaning Air France was the sixth largest airline by this point.

Source: Oxera analysis of OAG data.

More detail on the growth of Ryanair and easyJet is presented in Table 4.1, and shows that the two airlines grew in different ways. While both expanded their overall capacity by a similar amount, we observe that Ryanair expanded its number of routes by less than it did overall seat capacity (25% vs 42%), meaning that growth was driven by adding more capacity to each route. On the other hand, easyJet increased the number of unique routes by 52%, exceeding its overall 36% growth rate, and suggesting that growth was more due to an expansion in its route portfolio. easyJet did not increase the number of airports it serves by a large amount (approximately 7%), suggesting that its route expansion was driven by offering more services between airports it already served, thereby filling in its network, whereas in Ryanair's case the number of airports and routes served both increased by around 25%.

Both types of expansion present opportunities for airlines to negotiate with airports. An airline expanding the traffic volume on its routes will seek volume-based incentives or discounts from an airport on passenger charges. An airline expanding its network will seek to negotiate incentives based on new route development from the airport.

Table 4.1   Breakdown of the growth of Ryanair and easyJet, 2010 versus 2016

	Airports served			Unique routes			Seats (millions)		
	2010	2016	Growth	2010	2016	Growth	2010	2016	Growth
Ryanair	161	199	24%	2,420	3,017	25%	88	124	42%
easyJet	129	138	7%	1,116	1,696	52%	60	82	36%

Notes: Based on departures to, from or within Europe. One unique route is counted as a service between A and B, therefore if an airline operated from A to B as well as from B to A, this would count as two routes.

Source: Oxera analysis of OAG data.

Figure 4.2 shows the significant expansion in the number of destinations served by Ryanair. The dark blue symbols represent airports served by Ryanair in both 2010 and 2016, whereas the light blue symbols represent airports that are new in 2016 (compared with 2010), showing the large expansion in Ryanair's footprint that has driven its growth. The grey symbols represent a small number of airports that were served by Ryanair in 2010 but not in 2016.

Figure 4.2   Growth in Ryanair airports served, 2010 versus 2016
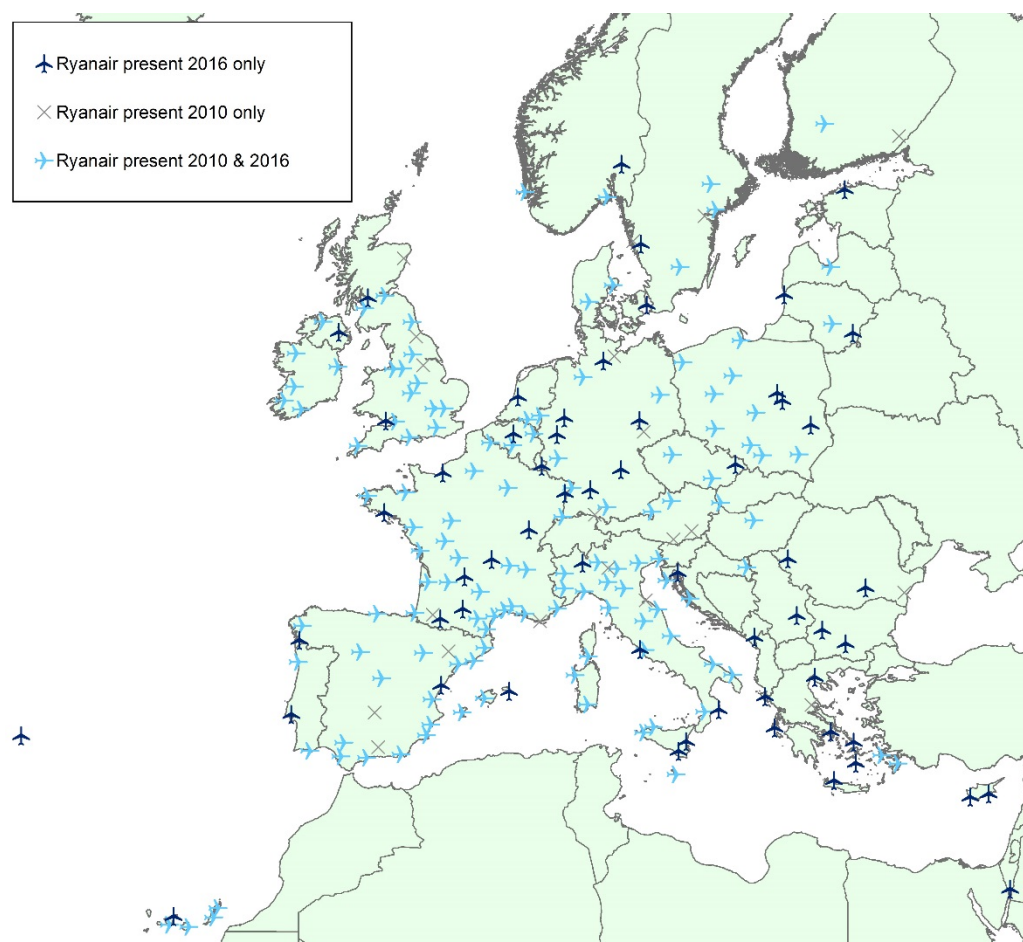
Notes: Only airports within European countries are shown. European countries are defined as the 45 countries with at least one airport that is a member of ACI EUROPE, based on ACI EUROPE's member list as at 20 June 2017, as detailed in Appendix A3.

Source: Oxera analysis of OAG data.

The continued pan-European growth of Ryanair can easily be seen in the figure above. It is also a feature of LCCs more generally: four of the five fastest-growing airlines between 2010 and 2016 for intra-EU traffic are LCCs, as presented in the table below. SAS, the sole 'legacy' carrier on this list, is perceived as having shifted its business model towards more of a low-cost operation over this period.[40]

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[40] See, for instance, Reuters (2017), 'Scandinavia's SAS targets staff costs with hubs in London, Spain', 1 February.

Table 4.2   Fastest-growing airlines, intra-EU traffic, 2010 versus 2016

Airline	Seats (m), 2010	Seats (m), 2016	Growth, 2010–16
Vueling Airlines	15	31	104%
Wizz Air	11	20	90%
germanwings	9	16	70%
Ryanair	82	119	45%
SAS Scandinavian Airlines	14	20	44%

Note: Based on departing seats within EU countries. Analysis is restricted to airlines that offered capacity equivalent to at least 5m seats in 2010.

Source: Oxera analysis of OAG data.

The result of this growth has been the development of pan-European networks: Ryanair is by no means unique. Figure 4.3 below shows the expansion of Wizz Air, which has been distributed across much of Western, Central, Eastern and Mediterranean Europe. This further demonstrates the willingness of such airlines to operate across the continent—and the wide variety of alternative options this gives them when negotiating with airports on disposition of their routes.

Figure 4.3   Growth in Wizz Air airports served, 2010 versus 2016
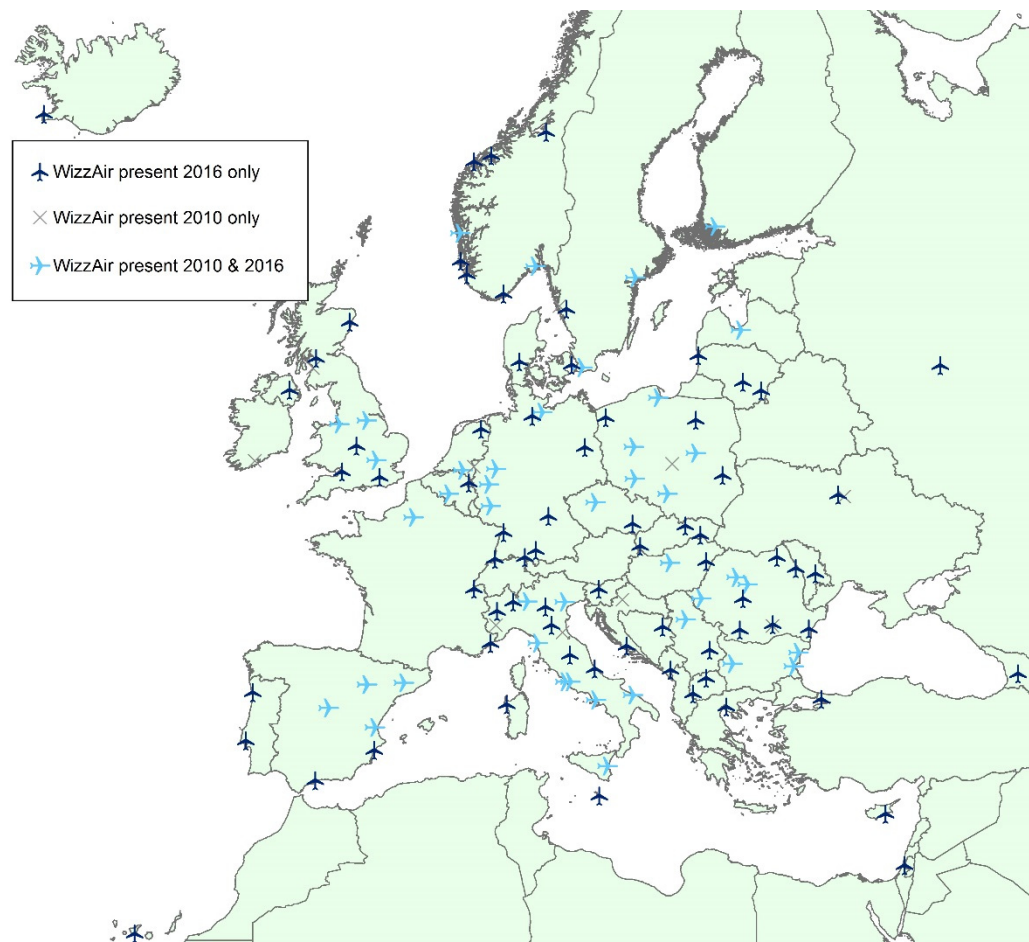
Notes: Only airports within European countries are shown. European countries are defined as the 45 countries with at least one airport that is a member of ACI EUROPE, based on ACI EUROPE's member list as at 20 June 2017 as detailed in Appendix A3.

Source: Oxera analysis of OAG data.

The aviation industry has therefore grown significantly since 2010, mostly due to growth from LCCs (and non-traditional FSCs). These LCCs have grown in different ways—for instance, filling in their network or adding capacity on existing routes—but in particular have shown a high degree of willingness to operate across the whole of Europe, building extensive networks and thereby increasing their flexibility as to where to fly routes and base planes.

4.1.2   Growth in the leisure market

As set out in section 3, leisure passengers represent an increasing share of passenger journeys. The characteristics of leisure passengers are likely to affect the competitive landscape between airports in at least two ways.

- Leisure passengers are generally less time-sensitive than business passengers and are therefore likely to be willing to travel further to access low airfares. For instance, 2011 analysis by the UK CAA showed that while both business and leisure passengers' most frequently given reason for airport choice is that it is their closest airport, the relative importance of price in comparison to this was much lower for business passengers.[41] As such, the increased share of leisure travellers will have tended to increase the catchment area of airports, potentially leading to more competition between them. Time-insensitivity is also likely to increase the options for passengers transferring through hub airports: leisure passengers may accept longer wait times for connections, or transfer to another airport in the same area. Passengers may also substitute between direct and indirect flights. This is likely to have increased competition between airports for passengers in local catchment areas and for connecting passengers.

- Leisure passengers may have a choice over destinations, choosing between locations for sun holidays, ski trips or city breaks.[42] This increases competition between destination airports, which must attract airlines by providing services to passengers with a higher willingness to switch.

4.1.3   Analysing route churn

Above, we outlined how aviation growth in Europe has been driven by low-cost point-to-point airlines that have built pan-European businesses, with the resulting potential to open and close routes across Europe. Their ability to do this is likely to have been supported by two factors: the limited contractual commitments between airports and airlines (as noted in section 2); and the growing proportion of leisure passengers, who, as described above, are more likely to be willing to switch between destinations. In this section, we look at how this potential to open and close routes (and that of more traditional airlines) has translated into levels of route churn.

While overall route churn rates have remained broadly stable since the 2012 study (as illustrated in Figure 4.4 below), there have been some interesting changes in how this impacts airports of different sizes, pointing to increased airport competition.

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[41] In particular, this paper suggests that 'Nearest to home' is the top reason for airport choice for 31% of passengers, but that cost is also a significant factor (15%). For business passengers, proximity to home is a more important factor (33%), and price less so (this is not cited as one of the top five reasons for UK based passengers, and must be below 10%). This therefore suggests the relative importance of proximity—as compared to cost—is lower for leisure passengers. See Civil Aviation Authority (2011), 'Passengers' airport preferences: Results from the CAA Passenger Survey', working paper, November. Tables 1-2.

[42] This type of substitution has long been acknowledged. See, for example, InterVISTAS (2007), 'Estimating Air Travel Demand Elasticities', prepared for IATA, December, p. 7.

Figure 4.4   Route churn rates, 2003–16
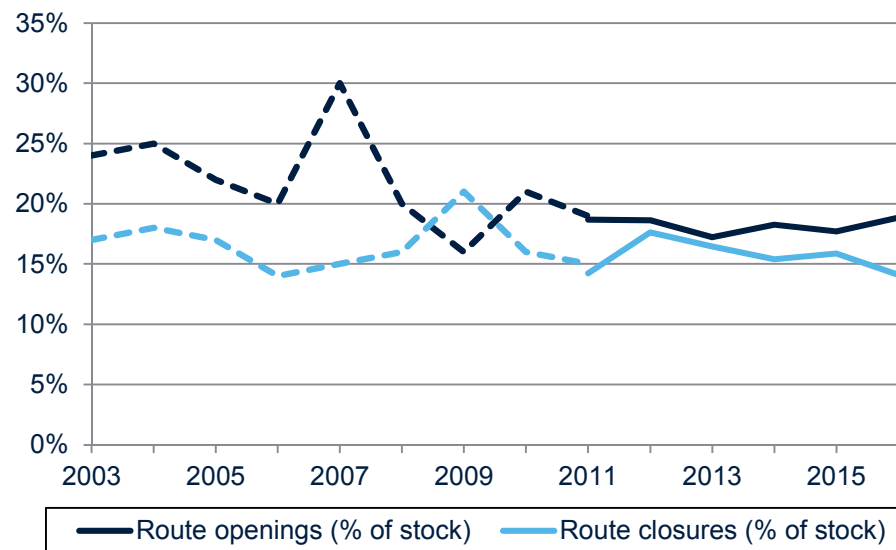
Source: Dashed lines represent results previously calculated by Copenhagen Economics. One route is defined as a service by a unique airline between a unique origin and destination. Based on traffic between European countries.

Source: Oxera analysis of OAG data, Copenhagen Economics (2012), 'Airport Competition in Europe', June.

These figures show that some 15–20% of routes are churned each year. Route opening rates are lower than in the period analysed in the 2012 study, indicating some maturing of the LCC model. Nevertheless, they have exceeded closure rates in every year except 2009 (the immediate aftermath of the global financial crisis), reflecting consistent growth in the aviation market. This has meant airports competing to attract a share of this growth (the types of effort undertaken in order to do so are discussed in section 4.2) as well as retaining existing routes. The total number of routes between European airports is now close to 18,000,[43] with the opening of over 3,000 routes and closing of 2,500 each year. This demonstrates the freedom airlines have to shift existing and allocate new capacity—which in turn translates into airport competition. The case study in the box below illustrates this ability of airlines to allocate capacity.

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[43] A route is defined as a service by a unique airline from one origin to a destination. In the case of an airline offering flights from A to B and B to A, this would be counted as two routes for the purposes of this analysis. 'European' is defined here as countries which contain at least one airport that is a member of ACI Europe.

Box 4.1   Response to North African security issues

The figure below shows the rapid reduction in growth rates for traffic from the UK and
Germany to destinations in Egypt, Morocco and Turkey in 2016. This contraction coincides
with concerns relating to security in these countries, and is likely to reflect airlines quickly
withdrawing capacity in response to falling passenger demand. Following this, there was a
noticeable surge in capacity growth from the UK and Germany to Spain: a country that
holiday passengers might see as an alternative destination with a warm climate.

**Figure 4.5   Year-on-year capacity growth from Germany and the UK
to Egypt, Morocco, Turkey and Spain, 2011–16**
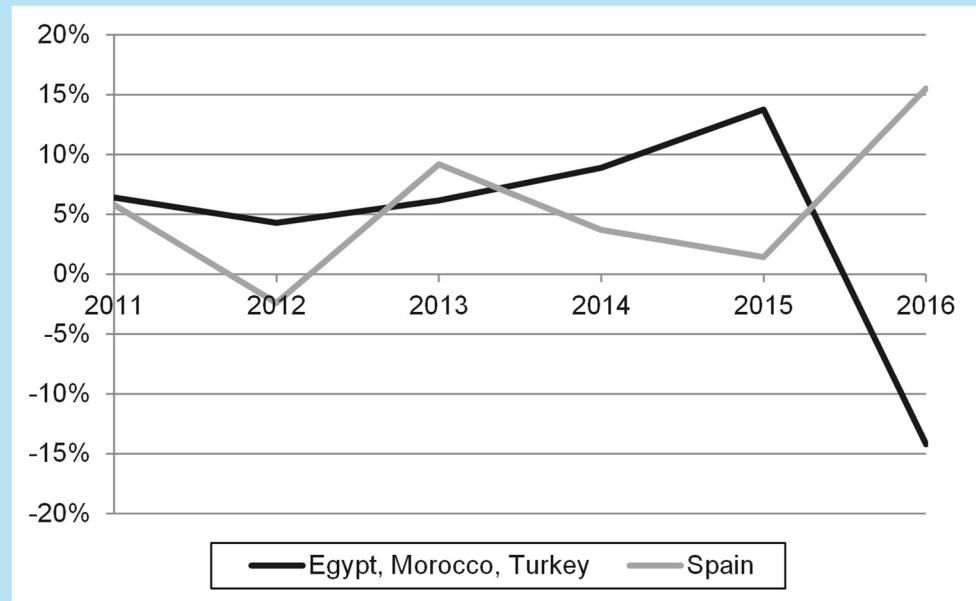
Source: Oxera analysis of OAG data.

There is evidence that route churn is higher among LCCs than more traditional
FSCs, which tend to be members of alliances. This is shown in Figure 4.6 below,
which demonstrates consistently higher route opening and closure rates among
airlines which are not members of alliances.[44]

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[44] This analysis excludes the Turkish Airlines and Qatar Airways (which are members of airline alliances) as
well as Emirates and Etihad Airways (which are not), as the strong growth of these airlines (and their
associated hub airports) could affect the overall picture.

Figure 4.6   Route opening and closure rates, by airline type (excluding super connectors), 2010–16
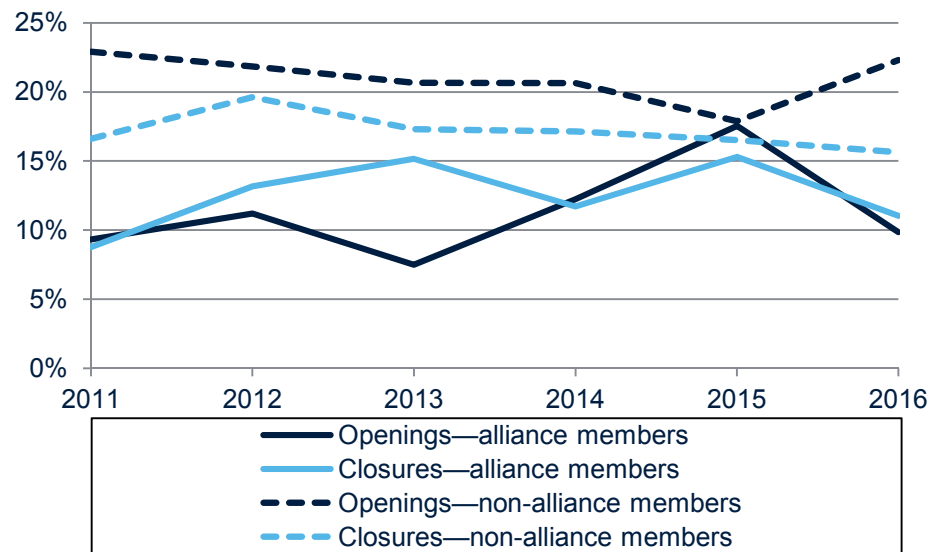
Notes: One route is defined as a service by a unique airline between a unique origin and destination. Based on traffic between European countries. Alliance status is based on airline membership as of May 2016. This analysis excludes four super connector airlines: Emirates, Turkish Airlines, Etihad Airways and Qatar Airways. The figures are the percentage change on the previous year, hence 2010 does not appear.

Source: Oxera analysis of OAG data.

The implication of the chart above is that it is only point-to-point (primarily LCC) airlines that have consistently generated net growth in routes, implying that airports seeking growth are most likely to have to seek it from those types of carrier.

It is also possible to analyse the changes in route churn by airport category. Figure 4.7 below depicts the change in route opening rates by different types of airport between 2010 and 2016. It shows that route opening rates have declined slightly at smaller airports, but at medium and larger airports (with over 10mppa), the tendency has been for an increase in route opening rates with airports with between 10mppa and 25mppa having levels of route churn that are similar to those at smaller airports. This is likely to be driven by the growth in LCCs operating at these airports (as shown in Figure 3.3) given the higher route churn for these airlines (as shown in Figure 4.6).

Figure 4.7   Route opening rates, by airport size, 2011 vs 2016
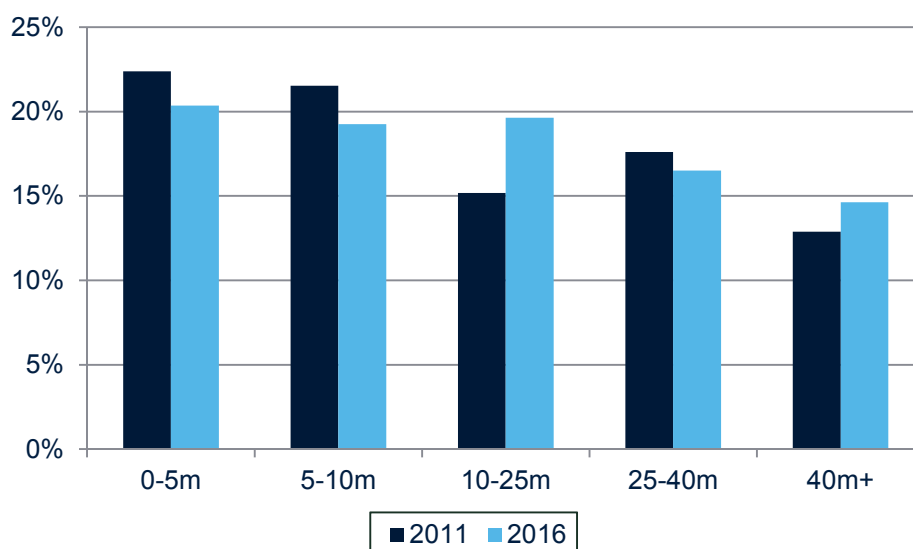
Notes: Airport size category is based on millions of passengers departing and arriving at that airport in 2016.

Source: Oxera analysis of OAG data.

In Figure 4.8, we repeat this analysis for route closure rates, finding a similar pattern but with the increase in closure rates at airports with more than 25mppa and less than 40mppa being particularly marked.

Figure 4.8   Route closure rates, by airport size, 2011 vs 2016
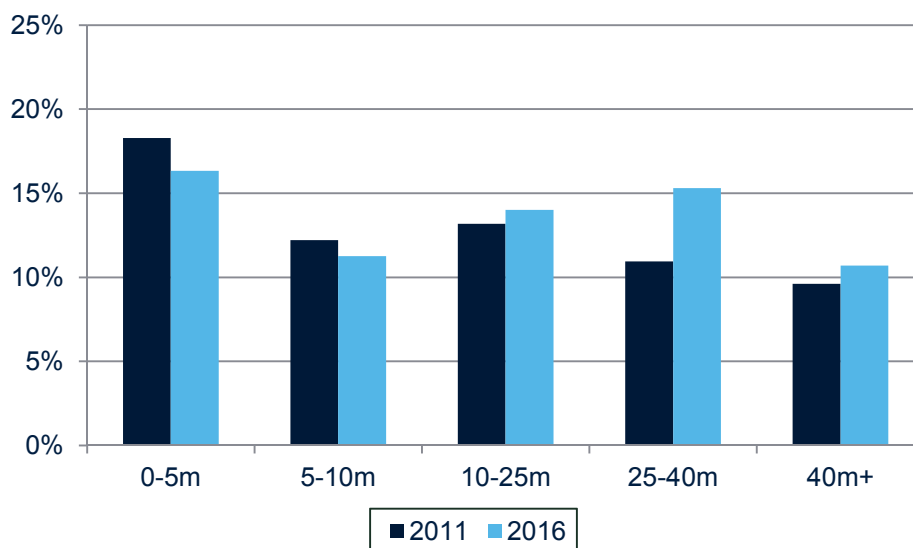
Notes: Airport size category is based on millions of passengers departing and arriving at that airport in 2016.

Source: Oxera analysis of OAG data.

This analysis suggests that the increased importance of LCCs among medium- and larger-sized airports is driving an increase in route churn at these airports, implying that the potential for competition between them has increased. That competition for routes will be European-wide, as LCCs compare airport offerings across their entire networks, each spanning much of Europe—see Figure 4.2 and Figure 4.3 above, for example.

While moving routes is one way in which capacity can be moved another, more costly, way is for the location of aircraft bases to be moved. For example, in June 2015 easyJet announced plans to decrease services from Rome Fiumicino in favour of other Italian airports. easyJet CEO Carolyn McCall gave the following explanation 'The worsening performance of the Rome Fiumicino base has been driven by high airport passenger charges, which have more than doubled since 2012 and will be burdened by further, above-inflation increases in the coming years.[45] As another example, in June 2017, easyJet announced it would end its operations in Hamburg as it had failed to attain a top two position at the airport.[46]

The frequency with which routes are opened and closed suggests that this is relatively costless, business as usual route optimisation for LCCs. There are likely to be more costs involved in the opening and closing of bases, due to the potential consideration of sunk costs in terms of facilities or staffing. Base changes are therefore rarer (while still being feasible–and more feasible for LCCs than FSCs).

4.2   Negotiations between airlines and airports

As outlined in section 2, airports negotiate with airlines to provide services to/from that airport. The details of these negotiations are confidential, but we have conducted a number of interviews with airports on their negotiations. One of the key elements in these negotiations is the incentives that airports offer to airlines for commencing or continuing services to/from that airport.

Many airports offer such incentive schemes. We have undertaken a review of these schemes where details are publicly available. The goal of these schemes is usually to increase passenger volumes, and/or to develop the airport's destination network. They nearly always include a rebate per departing passenger. For example, Budapest Airport offers a rebate on landing fees based on the number of departing passengers.[47]

Airport incentive schemes are nothing new: airports developed incentive schemes in response to airline deregulation and airport privatisation during the 1990s.[48] For example, the Irish Airport Authority offered a 90% discount for airlines setting up new routes in 1993.[49] However, since this time, the development of LCCs has generated competition for their business and with it the more widespread use of incentives.

The size of these incentive schemes is often substantial and the rebates offered by airports can represent a significant part of total airport charges. For example, Berlin-Tegel Airport offers an incentive on landing and passenger charges for new routes of 80% in the first year, 50% in the second year and 20% in the third year,[50] and most Spanish airports (those under Aena S.A.) offer a 75% rebate of landing fees in the first year of operation on new routes.[51] Such schemes are also widespread: in a sample of 25 Italian airports, we have found that 17 publicly advertise their incentive schemes. Similarly, a number of Irish airports

[45] *Air Transport World* (2016), 'easyJet decreases Rome service, expands Milan operations', 19 June.
[46] Reuters (2017), 'UK airline easyJet to shut Hamburg base in 2018', 6 June.
[47] Budapest Airport website, '<u>Incentives</u>'.
[48] Barrett, S. (2000), 'Airport competition in the deregulated aviation market', *Journal of Air Transport Management*, **6**:1, pp. 13–27.
[49] ibid.
[50] Flughafen Berlin Brandenburg, '<u>Charges Regulation Berlin-Tegel Airport</u>', 1 January. Section 2.5.
[51] Aena, '<u>Commercial incentives in Summer 17 and Winter 17</u>'.

have route development schemes,[52] and the three main airports around Paris offer incentives for traffic growth.[53]

Airports that we interviewed have consistently reported that the scope of their incentive schemes has broadened over time to include almost any channel through which additional passengers might be gained (e.g. new routes, larger aircraft or increases in load factors). Airports have also reported a high uptake of incentive schemes at their airports, with a majority of traffic at some airports attracting some form of incentive. Airports' marketing and route development activities have correspondingly been enhanced, with multiple airports reporting much greater investment in these activities. This is also partly because airports are now routinely required to undertake detailed market analysis in order to convince airlines of the demand for, and financial viability of, routes from their airport.

There are also examples of FSCs using the threat of switching airports as opposed to actually switching to increase their bargaining power and to secure better terms. One public example of this was BA's threat in 2016 to pull most of its aircraft out of London City Airport if the new owners attempted to raise airline charges.[54] There are also examples of FSCs moving aircraft in search of more favourable terms, for instance Lufthansa repositioning aircraft from Frankfurt to Munich (see section 3.2.2). This combination of an increased propensity of FSCs to switch airports and the ability to issue more credible threats to the same effect thus intensifies competition between airports to retain and attract airlines.

In addition to engaging in marketing to attract airlines to fly from their airports, supporting the marketing activities of airlines once routes are established is now more common among airports. This support ranges from press releases for new routes on airports' websites to a marketing budget per airline. In the latter case, the airport might either directly organise advertising for the airline or reimburse the airline for marketing expenses incurred.

Based on our review, there may be subtle differences between airports' incentive schemes depending on the focus of the airport. Large airports' incentive schemes often primarily focus on expanding their destination networks rather than passenger growth explicitly, while smaller airports are typically more focused on passenger growth irrespective of its source. For example, comparing the incentive schemes of the two Rome airports owned by Aeroporti di Roma, shows that Rome Fiumicino specifies that only flights on new routes and to some long-haul destinations receive a rebate,[55] while the smaller Ciampino Airport offers a rebate to all airlines that choose the airport to develop traffic volumes.[56]

In summary, the number and coverage of financial and non-financial incentives (such as marketing support) offered by airports to airlines for flying to/from their airport appears to have increased over the last five years, although our research suggests that this is the expansion of a trend rather than a new development. There is also some evidence that different types of airports have different priorities for incentive schemes, with larger airports focusing more on the growth of the network and smaller airports focusing on overall traffic growth.

[52] DAA website, 'DAA launches new incentive scheme to encourage growth at its three Irish airports'.
[53] ADP (2017), 'Fee schedule for services rendered as specified in Articles R224-1 and R224-2 of the Civil Aviation Code for the Paris–Charles de Gaulle, Paris–Orly and Paris–Le Bourget airports'.
[54] Topham, G. (2016), 'BA to launch summer flights from Stansted', *The Guardian*, 9 February.
[55] Aeroporti di Roma, 'ADR policy for air traffic development at Rome Fiumicino Airport'.
[56] Aeroporti di Roma, 'Ciampino airport incentive scheme to promote traffic development'.

The growth in the scale, depth and range of incentives offered by airports to airlines outlined in this sub-section is indicative of an increase in the level of competition between airports for airlines' services on new and existing routes.

4.3   Competition for spokes

Another element of pan-European competition between airports for airlines' services is competition for spokes to fast-growing hubs in the Middle East and Istanbul. Such spokes are particularly valuable because, through the onward connections they enable, they can significantly enhance an airport's connectivity and the range of destinations it therefore effectively serves.

The table below illustrates the scale of the change in connectivity to these hubs: the total number of seats between Europe and these hubs has more than doubled between 2010 and 2016.

Table 4.3   Connections to Middle Eastern hubs, 2010 vs 2016

	Number of airports with connections		Flights ('000s)		Seats to/from (m)	
	2010	2016	2010	2016	2010	2016
0–5m	75	109	36	75	5	12
5–10m	14	21	11	24	2	5
10–25m	25	29	55	99	10	22
25–40m	8	8	18	33	4	9
40m+	10	10	214	366	39	78
Total	132	177	335	597	59	125

Note: Considers connections to Dubai, Abu Dhabi, Doha and Istanbul. Based on countries that are members of ACI EUROPE.

Source: Oxera analysis of OAG data.

As can be seen from Table 4.3, there has been growth in the number of airports connecting to these Middle Eastern and Turkish hubs from every airport size except those over 40m, and the number of flights and seats provided to these hubs have increased for every airport size. Figure 4.9 illustrates the expansion of spokes to these airports between 2010 and 2016.

Figure 4.9   Footprint of airports with connections to the Middle East and Istanbul, 2010 vs 2016
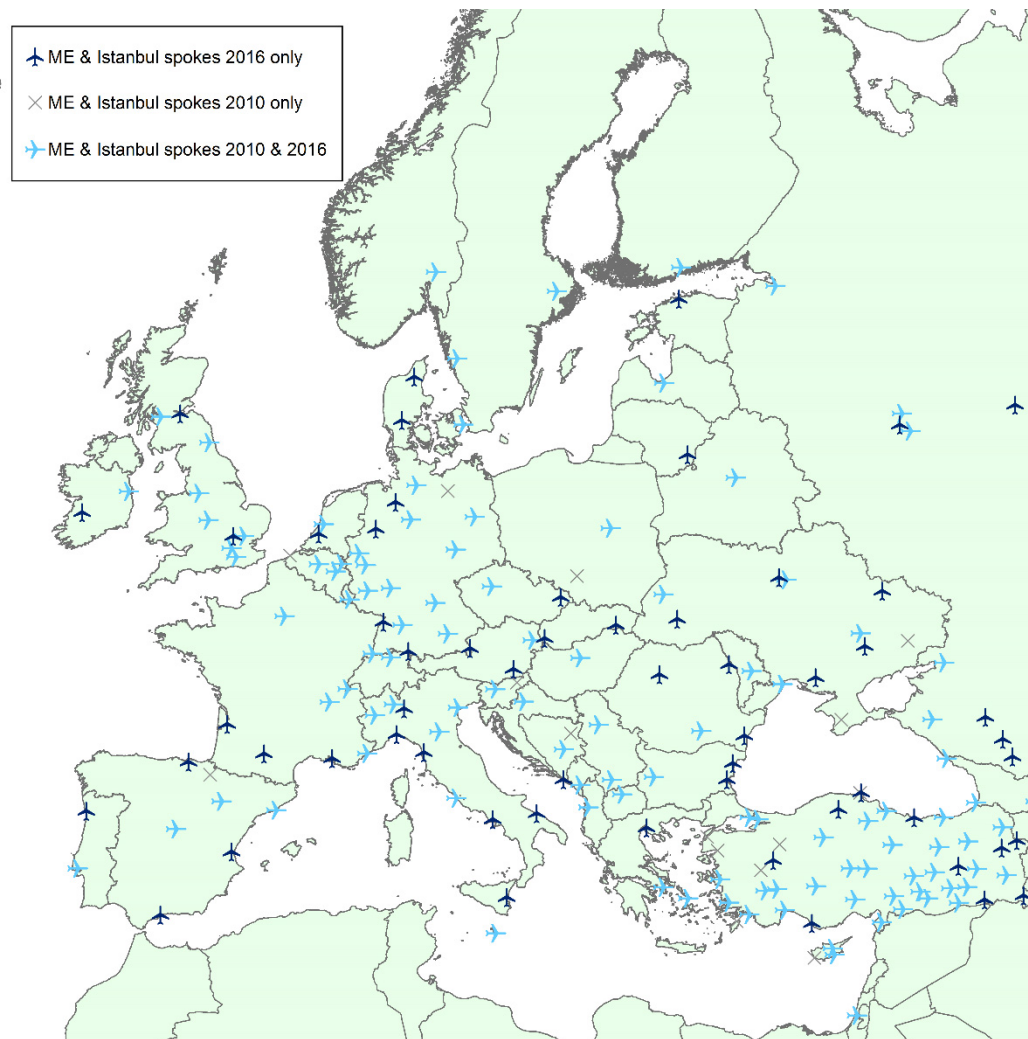
Notes: Only airports within European countries are shown. European countries are defined as the 45 countries with at least one airport that is a member of ACI EUROPE, based on ACI EUROPE's member list, as detailed in Appendix A3.

Source: Oxera analysis of OAG data.

As each new connection will have been the subject of a degree of competition between European airports for this service, this illustrates that competition for services to and from the Middle East and Istanbul have been a material part of the competitive environment in Europe over the last six or seven years. As an example of how this competition manifests in reality, Budapest airport has described competition between airports for long-haul traffic as 'harsh'.[57]

In addition, we note that competition between European airports for such spokes is not likely to be limited to just these airports in the Middle East and Istanbul, but would ultimately relate to non-European airports located in other regions of the world.

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[57] Charnock, W. (2017), 'Interview: what's next for Budapest?', 7 August.

4.4 Conclusion on competition for airlines' services on new and existing routes

The analysis presented in this section demonstrates that the growth in the European aviation market is largely due to growth in LCCs and connections to the Middle Eastern and Turkish hubs. Since LCCs have a higher propensity to reallocate capacity (across Europe), they have strong negotiating positions with airports. The increase in LCC traffic at larger airports (over 10mppa) and the increased route churn at such airports suggests that competition for airlines has increased for medium and large airports particularly. This is consistent with the evidence that the extent and range of incentives to airlines has increased across the range of airport sizes.

In addition, this section has demonstrated that the number and extent of connections from European airports to Middle Eastern hubs has increased materially. This growth is another important aspect of competition between European airports for airlines' services. This development also has significant implications for the competitive position of European hub airports, as explored in section 5 of this report.

Competition for LCC business and for 'spokes' effectively puts airports across Europe in competition with each other, with an airport working to put together a deal for the airline that is better than the deal offered by another airport which is often far outside of its local area.

Overall, the picture that emerges from this analysis is one of increasing competition for airlines at all but the smallest airports (which started from a high base), with this increase being particularly notable at airports with over 10mppa.

5   Competition for connecting passengers

There has been increased competition for connecting passengers from competing global hubs, hub bypass and changes in the way passengers are making connections.

This section reviews the changing environment in which airports compete for connecting passengers, who comprise an important segment of traffic for several major European airports. In particular:

- we find strong evidence of an increasing competitive constraint from 'non-traditional' hubs, located in the Middle East and Istanbul, which are likely to provide strong competition for inter-continental passengers;

- within Europe, the continued growth of LCCs increases the scope for passengers to take a direct flight from their origin to ultimate destination, bypassing the need to use a hub airport completely;

- LCCs are also beginning to become involved in making connections themselves;

- finally, we note that passengers are also able to self-connect, and in particular are likely to find this process increasingly easy thanks to assistance initiatives already adopted by certain airports.

As outlined in the economic framework (section 2), the competitive constraint faced by airports for connecting (transfer) passengers will typically come from much further afield than the local catchment area that might apply to origin–destination passengers, as connecting passengers are concerned about making the journey from their origin to their ultimate destination. If a journey is available through multiple airports offering a similarly attractive mix of price and quality (e.g. frequency, journey time and comfort) it is likely that such airports will be in competition with one another, regardless of the distance between them.

At the largest airports in Europe, connecting (transfer) passengers form a significant proportion of all traffic, and are therefore an important part of these airports' business models. For instance, 61% of passengers at Frankfurt Airport in 2016 were connecting passengers,[58] as were 38% of passengers at Amsterdam Schiphol,[59] and 30% of passengers at London Heathrow.[60]

This is a complex market, which has been influenced by developments in a number of areas. This section discusses the implications of several of these, including the increase in competition between European and Middle Eastern hubs (section 5.1); the development of airlines using a split-hub strategy (section 5.2); the development of point-to-point services that bypass hubs entirely (section 5.3); and the development of alternatives to traditional hubs through self-connection (or airport-assisted connection) and the emerging availability of connections via LCCs (section 5.4). Section 5.5 concludes on the changes in competition between European hubs for connecting passengers.

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[58] Fraport, 'Frankfurt Airport Air Traffic Statistics 2016', p. 17.
[59] Amsterdam Schiphol Airport, 'Monthly Transport and Traffic statistics December 2016'.
[60] Heathrow Airport (2016), 'Heathrow Facts and Figures'.

5.1   Proportion of competed routes

5.1.1   Competition with Middle Eastern hubs

Figure 5.1 below shows the number of origin–destination pairings served in 2010 and 2016 by a selection of major European airports—Heathrow, Frankfurt, Paris Charles de Gaulle, Amsterdam, Rome Fiumicino, Madrid and Munich—and the equivalent figures for the new/emerging hubs of Istanbul, Dubai, Abu Dhabi and Doha. In defining what constitutes an origin–destination pairing made possible by connecting through a different airport, various criteria have been used relating to connection times and airline alliance status (see Appendix A4). We have performed sensitivity analysis around the choice of connection times, and found that results are robust to a range of different values (see Appendix A5).

Figure 5.1   Number of origin destination pairings served by a connecting flight through selected airports (bars, left hand scale) and growth in these (percentage points, right hand scale), 2010 vs 2016
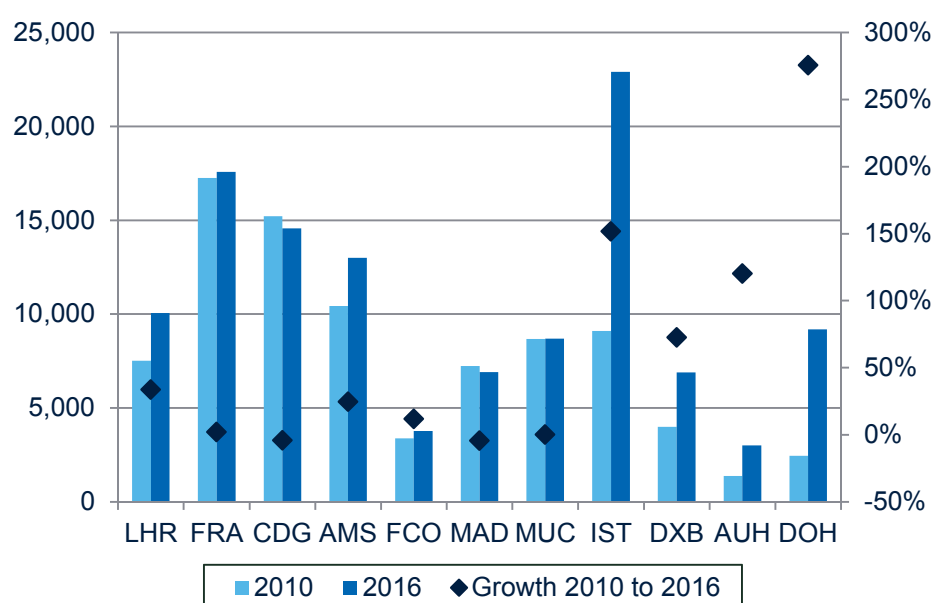
Notes: In assessing what defines a connecting flight, various restrictions have been imposed, as detailed in Appendix A4.

Source: Oxera analysis of OAG data.

The figure demonstrates that the number of origin–destination pairings offered through Istanbul, Dubai, Abu Dhabi and Doha have all increased (with Istanbul, Abu Dhabi and Doha more than doubling) since 2010. To assess the constraint that these airports impose on one another, we have considered the proportion of journeys that can be made via a given airport that could also be made via an alternative airport. For instance, Figure 5.2 shows that, from Frankfurt's perspective, 3% of connections that Frankfurt offered could also have been made via Doha in 2010. By 2016, this figure had risen to 8%. The most consistent competitor to Frankfurt throughout this period was Paris Charles de Gaulle, which was typically a viable alternative for between 32% and 36% of connections.

Figure 5.2 **Proportion of flights via Frankfurt that could be made via selected alternative airports, 2010–16**

Notes: In assessing what defines a connecting flight, various restrictions have been imposed, as detailed in Appendix A4. Rome Fiumicino, Madrid and Munich airports are not shown in this analysis.

Table 5.1 addresses the extent to which each European airport faced at least some competition on the routes for which it offered a connection possibility. The first panel recognises competition from each of the other airports discussed in this analysis. These results show that there is typically at least one option available for connecting passengers on approximately 60–80% of routes at most of these airports (with the exception of Madrid, which is lower at 32–35%). These figures have not changed significantly between 2010 and 2016.

The second panel focuses on the proportion of routes where each airport faced a competitive constraint from at least one of Doha, Abu Dhabi, Dubai or Istanbul. For instance, there was an alternative connection to a flight connecting through Paris Charles de Gaulle on approximately 13% of routes in 2010, a figure that had risen to 25% by 2016. Such a pattern is observed for all of these traditional European hubs, making it clear that the four emerging hubs considered are likely to impose a significantly greater constraint on these airports than they have previously.

Table 5.1 **Proportion of connecting routes where selected European airports face competition, 2010 vs 2016**

	Facing at least one competitor (all competitors)		Facing at least one competitor (Middle Eastern and Istanbul airports only)	
	2010	**2016**	**2010**	**2016**
LHR	82%	80%	26%	35%
FRA	66%	70%	17%	29%
CDG	59%	64%	13%	25%
AMS	63%	65%	15%	24%
FCO	63%	60%	14%	26%
MAD	32%	35%	3%	7%
MUC	76%	76%	16%	27%

Notes: In assessing what defines a connecting flight, various restrictions have been imposed, as detailed in Appendix A4. The first panel treats 'all competitors' as those airports listed in the left-

hand column, as well as Istanbul, Dubai, Abu Dhabi and Doha airports. The second panel treats 'Middle Eastern' competitors as Dubai, Abu Dhabi and Doha airports, and also includes Istanbul Airport.

Source: Oxera analysis of OAG data.

While the increasing presence of Middle Eastern and Turkish hubs is substantial in its own right, a significant number of connections facilitated by traditional European hubs are inevitably from one European destination to another. Given their geographic positions, it is unlikely that the Middle Eastern hubs and Istanbul will pose a constraint on such routes; rather, competition will come from entry by point-to-point airlines on these routes, as explored in sections 4 and 6. However, the new hubs are likely to prove particularly competitive in the market for inter-continental traffic. Figure 5.3 highlights this, showing the proportion of connecting flights offered by the traditional European hubs that are competed by the Middle Eastern hubs and Istanbul, excluding intra-European traffic. The increases in this metric are both significant—with the proportion of routes competed by non-traditional hubs increasing by a factor of two-thirds on average—and from a higher base than on all routes.

Figure 5.3   Proportion of connecting routes (excluding intra-Europe) at selected European airports competed by Middle Eastern airports and Istanbul, 2010 vs 2016
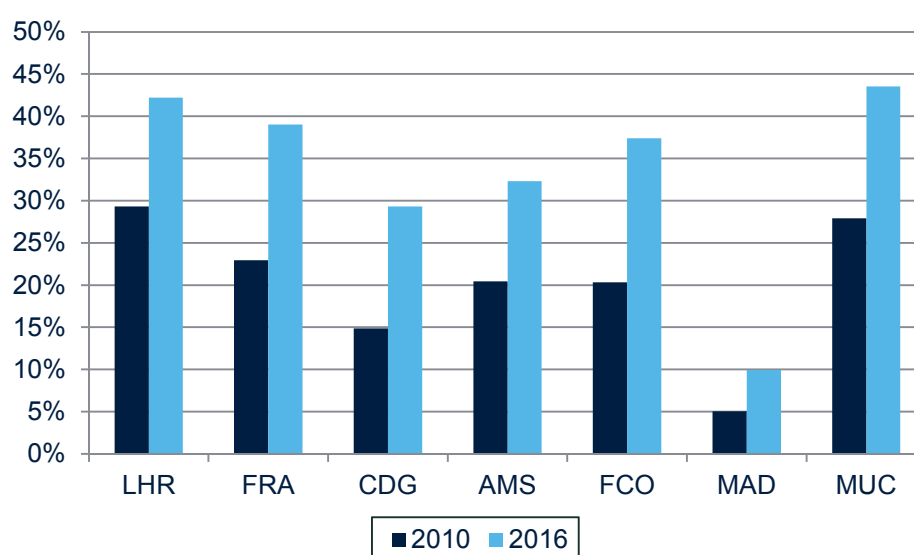
Note: Europe is defined as any nation containing an airport that is a member of ACI EUROPE.

Source: Oxera analysis of OAG data.

In addition, the new hubs also pose a particularly strong challenge to traditional European hubs on routes to and from the Asia-Pacific region, the second largest aviation market in the world (as measured by airport revenues in 2015), and the fastest-growing aviation market in the world (as measured by passenger growth).[61] On routes that have an origin or destination in this region (as defined by the ACI), the connectivity of these new hubs far outstrips that of the traditional European hubs, as shown in Figure 5.4 below.

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[61] ACI (2017), 'Airport Economics Report', section 1.

Figure 5.4   Number of origin destination pairings served by a connecting flight through selected airports, 2010 vs 2016, flights to or from Asia Pacific only
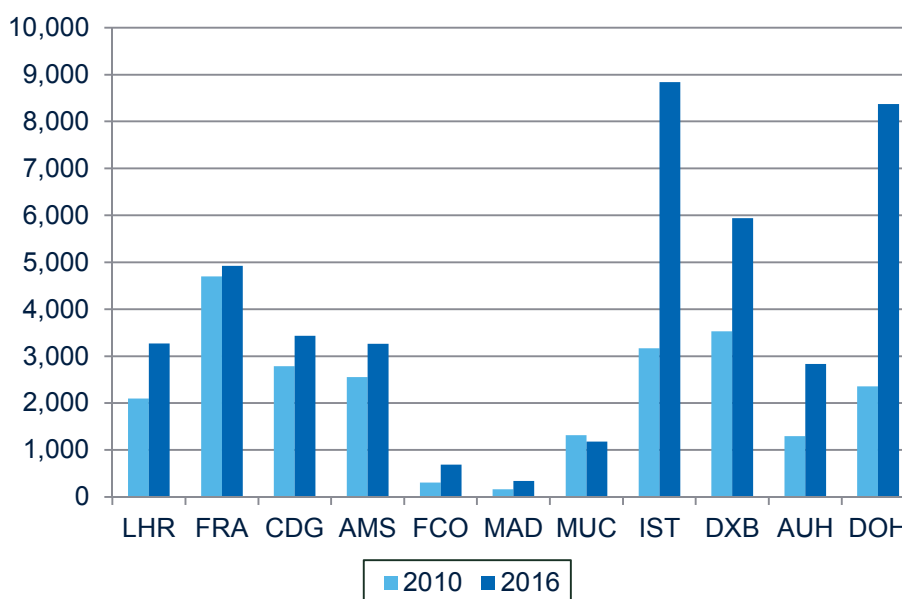
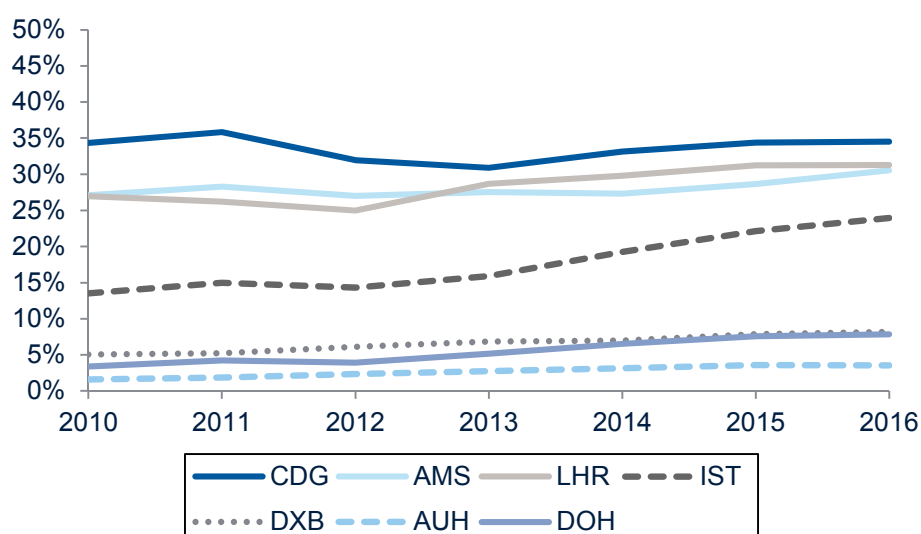

Notes: In assessing what defines a connecting flight, various restrictions have been imposed, as detailed in Appendix A4. The Asia Pacific region is defined as countries that are members of ACI's Asia-Pacific regional association, as detailed in Appendix A3.

The depth of connections available from these hubs to or from the Asia Pacific region mean that they impose a particularly strong constraint on European hubs for these traffic flows, with the traditional European hubs typically facing competition from the new hubs on between 50% and 60% of the routes, as shown in the figure below.

Figure 5.5   Proportion of connecting routes (to/from Asia Pacific only) at selected European airports competed by Middle Eastern airports and Istanbul, 2010 vs 2016
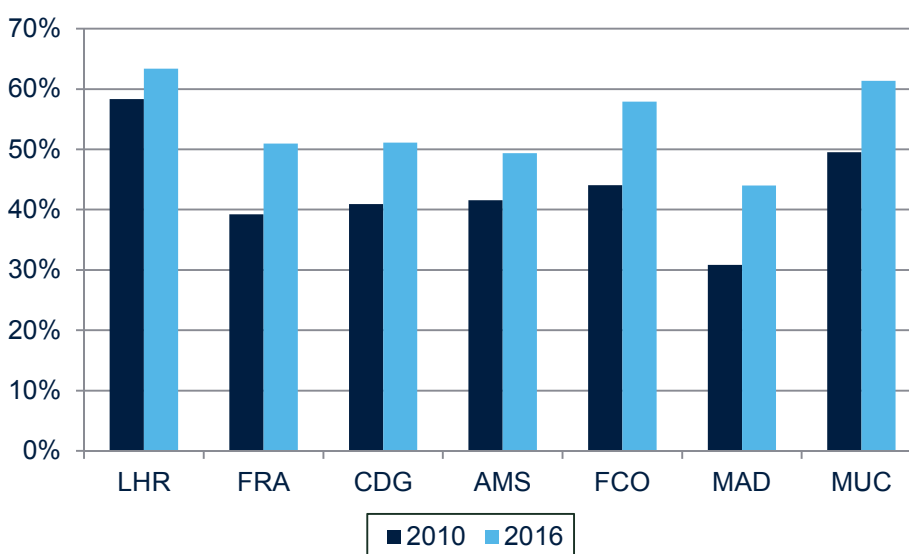

Notes: In assessing what defines a connecting flight, various restrictions have been imposed, as detailed in Appendix A2. The Asia Pacific region is defined as countries that are members of ACI's Asia-Pacific regional association, as detailed in Appendix A3.

These findings reinforce the findings set out above that the Middle Eastern hubs have significantly increased in the extent to which they compete for passengers with the largest European airports.

5.2   Change in airline business models to split-hub strategies

As outlined in section 3.2.2, many of the larger, hub-based airline groups have increased their use of multi-hub strategies, which enables them to move aircraft between these hubs more easily than was the case historically. Following its decision to relocate A380 capacity from Frankfurt to Munich, Lufthansa stated that 'there is no direct connection [to the Ryanair dispute] but growth will happen where the best conditions are, and costs are a factor.'[62] In turn, Fraport entered into a new agreement with Lufthansa which provided for reduced costs to Lufthansa.[63] Such examples illustrate the ability of airlines to use multi-hub strategies to demonstrate a credible threat of switching away from airports, enabling them to secure better conditions.

As outlined in section 2, developments that increase the ease with which airlines can move aircraft will increase their bargaining power in negotiations with airports and thus increase competition between airports.

5.3   Hub bypass

While section 5.1 makes clear that the traditional major European hubs face rapidly expanding competition for connecting passengers from hubs in the Middle East and Istanbul, this is not the only source of competition for these passengers. As noted in section 3, the growth of air traffic in Europe has been powered in particular by LCCs and through an expansion in the number of unique routes served. This increases the potential for passengers to take a direct flight between two airports for a journey that would have previously required them to change flights at a hub.

To examine this trend, we considered routes that were possible by connecting through a selection of major European hubs in 2010, and calculated the proportion of these routes on which a direct option would have been available in 2010 and the following years. We focused our analysis on within-EU connections. Figure 5.6 depicts the results of this analysis, showing that the availability of a direct flight as an alternative to a connecting flight increased across all of these major hubs between 2010 and 2016. For instance, the first bar of this chart shows that, in 2010, 58% of connection fights possible via Heathrow could have also been made via a direct flight: a figure which rose to 65% by 2016.

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[62] *Agence France Presse* (2017), 'Lufthansa snubs Frankfurt with A380 move to Munich', 13 June.
[63] Lufthansa (2017), 'Shareholder information, August 2017', p. 2.

Figure 5.6   Proportion of intra-EU connecting flights via European hubs where a direct flight was available from origin to destination, 2010 vs 2016
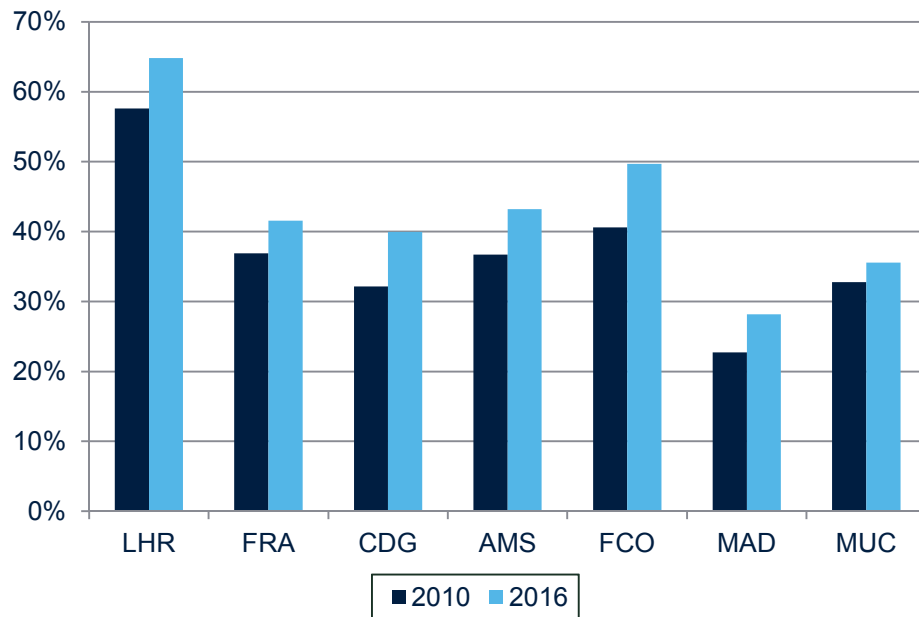
Source: Oxera analysis of OAG data.

Our analysis shows that, in addition to the increase in competition from Middle Eastern hubs outlined in section 5.1.1, there is another expanding source of competition for passengers at the largest European airports: a greater ability to fly directly, bypassing use of a hub altogether.

5.3.2   Routes with no previous direct connection

While the analysis set out above demonstrates an increasing competitive constraint for connecting passengers due to the growth of hub bypass, direct options were already available for many of these connecting flights. In this sub-section, we focus only on connections where passengers would previously have had no such option. Figure 5.7 shows the proportion of these flights that had no direct connection in 2010, but did in 2011 and 2016. For instance, on routes where a connection was possible via Heathrow in 2010 (and no direct flight was available), the first pair of bars show that 6% and 22% of these routes would have been possible via direct flights by 2011 and 2017 respectively.

As would be expected, route churn and opening mean that some of these routes did see direct options open in 2011—meaning that direct flights became available to passengers on between 3% (Amsterdam Schiphol) and 7% (Rome Fiumicino) of these connections. However, the results also show that this expansion has continued year on year, with significant increases in the number of connecting routes with direct connections across all of these airports. For instance, in 2010, there were 2,295 connecting flights through Frankfurt where there was no direct option possible; by 2016, direct flights were possible on 343 of these.

Figure 5.7   Proportion of intra-EU connecting flights with no direct options in 2010, but with direct options in 2011 and 2016
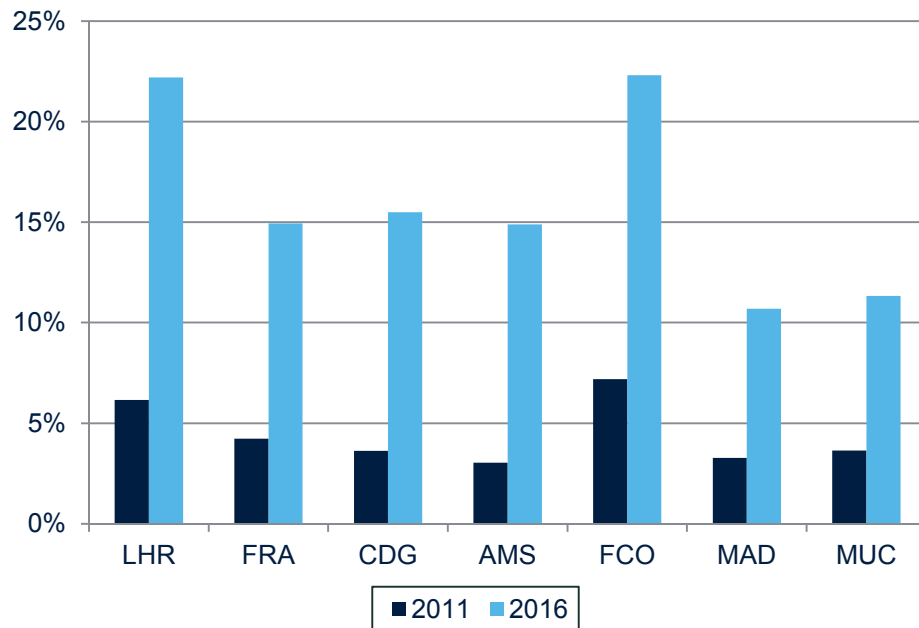
Source: Oxera analysis of OAG data.

The 'real life' results of this analysis are perhaps best illustrated by an example. In 2010, passengers wishing to travel between Hamburg and Athens would have needed to connect via an airport such as Frankfurt, Amsterdam Schiphol or Rome Fiumicino; now, they can simply use a direct service offered by easyJet or Aegean. Similarly, passengers wishing to travel between Manchester and Vienna would have previously needed to change flights at London Heathrow or Frankfurt; they are now able to use a direct flight provided by Jet2.

This increase in hub bypass has resulted in new travel options for passengers, which points to an increase in the intensity of competition between airports to attract these passengers.

5.4   Connection via LCCs, self-connection and assisted connection

In this sub-section, we discuss the emergence of various non-traditional approaches through which passengers are increasingly able to make connecting flights. In particular, we look at two concepts: LCCs' increasing willingness to connect passengers, and passengers' ability to self-connect, with or without the assistance of an airport.

5.4.3   Connection via LCCs

Traditionally, LCCs have focused purely on point-to-point operations, with no services typically associated with traditional alliance-based connections such as airside transfer, guaranteed connections or baggage being checked through from origin to destination. However, LCCs have started to change their approach in several ways. For instance, Ryanair has entered into a partnership with Air Europa and is in discussions with Norwegian to provide 'feeder flights' for these partners' long-haul routes.[64] Feeder flights are designed to ensure that passengers can connect to their next flight operated by the partner airline. While it was possible to use an LCC-operated flight in this way before the formal announcement of feeder-flight partnerships, the responsibility for connecting to

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[64] Powley, T. (2016), 'Ryanair and easyJet eye work with rivals', *Financial Times*, 12 January.

the second flight lay solely with the passenger, not the airline. This change has important implications for competition between airports. This is because the introduction of feeder flights allows travellers to fly from a secondary airport using an LCC to connect to a second flight from airports around Europe. In other words, major airports—both at the point of origin and those that serve as major connecting hubs (e.g. Frankfurt)—could face competition from smaller secondary airports with LCCs offering feeder and long-haul flights.

Furthermore, there is now initial evidence of LCCs beginning to offer connecting flights in much the same way as a traditional airline would. For instance, Ryanair has begun trialling connecting flights at Rome Fiumicino and Milan Bergamo, offering services such as luggage being checked through from origin to destination, airside transfer, and rebooking on to the next available flight if a connection is missed owing to a delayed first leg.[65] While Ryanair offers only a limited number of routes from Rome, it has signalled an intention to extend this offering to Stansted and Dublin airports, where it has much larger operations than at Rome Fiumicino.[66] In the case of Stansted, this would open up a large number of connection opportunities from the airport: Ryanair serves over 130 destinations from Stansted, and, based on the criteria set out in Appendix A4 and used in the analysis in section 5.1 of 'conventional' hubs, we estimate that Ryanair could serve approximately 2,400 unique different connecting flight options via Stansted. Even a more limited operation could offer significant competition to hub airports.

5.4.4 Self-connection and assisted connection

An alternative for passengers to making a connecting flight using a traditional 'through booking' is to book the respective parts of a journey separately. While comprehensive statistics on how widespread this practice is do not exist, research by ICF has estimated that such behaviour may account for around 16m journeys in Europe each year, with the most commonly cited reason for making such a journey being price.[67] However, the same evidence also revealed that passengers' biggest concerns with self-connection relate to the handling of luggage and the security of their connection.

In this light, it is notable that some airports have now developed programmes that assist passengers wishing to take advantage of self-connecting opportunities. This support can come in different forms: be it insurance against missed connections or smoothing the luggage transfer process. Recent examples include London Gatwick's GatwickConnects programme and Milan Airport's ViaMilano; the former is profiled in the box below.

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[65] Ryanair (2017), 'Connecting flights launched at Rome Fiumicino', 17 May.
[66] Reuters (2017), 'Ryanair says connecting flights trial going very well', 24 May.
[67] ICF (2016), 'Self connections: What are the models available, and what are the models available to airports?', 1 December.

Box 5.1   The GatwickConnects programme

GatwickConnects is a scheme that has been developed by Gatwick Airport following its initial introduction in 2012. The aim of the programme is to enable a more efficient self-connection process for passengers, following research that suggested that up to 1m passengers were making self-connections at Gatwick. The scheme has been developed in cooperation with a number of the largest airlines operating at Gatwick, with 16 airlines now participating, which ensures that the large majority of flights at Gatwick are captured under the scheme's umbrella. GatwickConnects features a number of aspects.

- First, any passenger arriving at Gatwick can use a GatwickConnects desk in the arrivals hall to check in any luggage for their next flight once they have collected it from their first. Dropping off baggage 'airside' eliminates the need for passengers to transport luggage through the arrivals area and then potentially needing to queue in the standard departures area to drop off luggage ahead of their next flight. This service is free to use for any passenger arriving at Gatwick, with no advance booking required.

- In a more recent development, passengers can also pay a fee to pre-book a higher level of GatwickConnects service, which, as well as the above, offers queue jump for security and also 'protects' the passenger's onward connection—i.e. if their first flight is delayed then they will be booked onto the next available flight at no extra cost to themselves.

- GatwickConnects now offers its own booking engine, launched in September 2015, that allows passengers to purchase protected connections through Gatwick via the GatwickConnects website, as well as a number of online flight comparison tools—including Skyscanner (17 markets) and Kayak (five markets)—and the websites of selected partner airlines. Gatwick is continuing to expand the number of channels through which the Connects service can be booked: in September 2017, easyJet, Norwegian and Westjet announced that they would begin selling tickets on their websites for flights connecting between the three airlines using GatwickConnects.

Source: Information provided by Gatwick.

Programmes such as these make it feasible to use LCCs as feeder flights even in the absence of an official partnership programme, therefore presenting passengers with an alternative to travelling on alliance airlines and transferring flights at traditional hubs. At airports that already serve a large number of destinations, such schemes potentially unlock a large number of connection possibilities: for instance, Gatwick and Milan Airports serve over 200 and 130 routes, respectively.[68] In this light, we estimate that GatwickConnects—in combination with its participating airlines—could facilitate up to around 5,300 connection possibilities using the same criteria as applied in section 5.1, while ViaMilano may allow around 5,700. These figures can be placed in context by noting that they are higher than those of Rome Fiumicino and similar to those of Madrid (as shown in Figure 5.1). However these developments are relatively small in the context of the European aviation market.

This analysis demonstrates how airports making it easier to connect between flights offered by different airlines may therefore allow secondary airports to increasingly compete with hub airports for connecting passengers in a way that was not previously feasible or efficient. While at this stage only a small number of airports have launched such schemes, these do appear to have a large degree of potential to increase competitive pressure on hub airports. For instance, of the 3,800 connections identified in section 5.1 as being possible via Rome in 2016, over 1,000 of these connections would now be possible as a guaranteed connection via Milan.

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[68] Based on Oxera analysis of OAG data in 2016, considering only routes that are served by at least 50 flights per year.

5.5 Conclusion on competition for connecting passengers

Airports face a market in which connecting passengers can use any viable route to travel between their origin and ultimate destination. Such passengers are an important component of the business models of many of the largest European airports. Since 2010, there have been a number of significant changes in the extent of competition for these passengers:

- the continued growth in connections to the Middle East, giving passengers more options on how to fly long-haul from Europe;

- the increased use of airline groups to adopt a split-hub strategy, increasing the ease with which aircraft can be moved between those hubs;

- the growth in point-to-point operations that bypass hubs entirely, which broadens the options available to passengers who would have previously needed to use a connecting service.

- the emergence (albeit still nascent) of connection via LCCs, self-connection and airport-assisted connection opening up more options for connecting passengers via European airports with less of a traditional focus on connecting passengers.

In total, these developments combine to suggest that the extent of competition between hub airports for connecting passengers has increased substantially since 2010.

6 Competition for passengers in the local area

There has been a material increase in the proportion of traffic at large and very large airports where passengers have a nearby alternative, suggesting an increasingly competitive landscape for such airports. This section considers the extent to which airports face competition for passengers in their local areas—a traditional approach that has been adopted to assess airport market power.

In this section, we analyse the extent to which airports face competition for passengers in their local area, and how this has evolved over time. In its simplest form, this sort of competition can be demonstrated by considering a potential passenger who lives between two airports and wishes to fly to a certain destination. If both airports offer a flight to that destination, the passenger will have the choice of which airport to use.

The main development in the aviation industry that is relevant to this form of competition is the general growth in the industry, which has led to a broader range of flights being available from a greater number of airports.

6.1 Proportion of competed routes

To determine whether an alternative airport can credibly compete for passengers within the catchment area of a given airport requires detailed analysis of factors such as the origins of passengers and local transport networks, in order to determine the catchment area for individual airports. In this analysis, we have adopted the 100km catchment area suggested by the European Commission's State Aid guidance.[69] The implication of adopting the 100km catchment area is that airports are considered as competitors when they are located within 100km of one another.

In addition, we consider the extent to which airports might be 'strong' alternatives to one another. For instance, if a given destination is served daily by one airport, but only on a weekly basis by a nearby airport, then the alternative airport may be considerably less attractive to passengers, and thus may only pose a weak constraint.

Overall, the extent to which passengers are likely to have a viable alternative within their local area stayed roughly stable between 2010 and 2016. Alternatives are considered to be routes at Airport A that have a frequency of at least 50% of the focus route at Airport B. On this basis, the total number of (capacity-weighted) routes with at least one competitor within 100km of the departure airport increased from 21% to 23% in this time period, as shown in Figure 6.1 below.

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[69] European Commission (2014), 'Guidelines on State aid to airports and airlines', para. 25(12).

Figure 6.1   Proportion of seats on routes with competitors, 2010–16
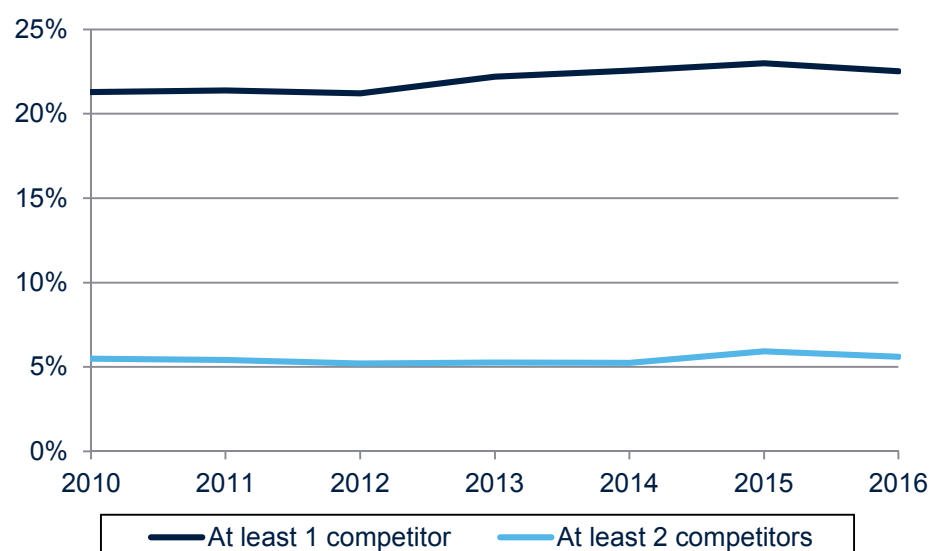
Notes: Alternatives are required to have a frequency equivalent to at least 50% of that of the reference route. Based on traffic departing countries with at least one member of ACI EUROPE. Distances are based on straight line measurement.

Source: Oxera analysis of OAG data.

However, this aggregate-level analysis does not provide information on how this type of competition has developed among different sizes of airport. Figure 6.2 shows the proportion of capacity that was competed at different airports in 2010 and 2016, broken down by size of airport (as measured by mppa in 2016). This analysis shows that while the proportion of competed capacity at small and medium airports (below 25mppa) has tended to decline slightly (although remaining at a high level), the proportion of competed capacity at large and very large airports (25mppa and above) has increased significantly.

Figure 6.2   Proportion of seats on routes with competitors by airport size, 2010 vs 2016
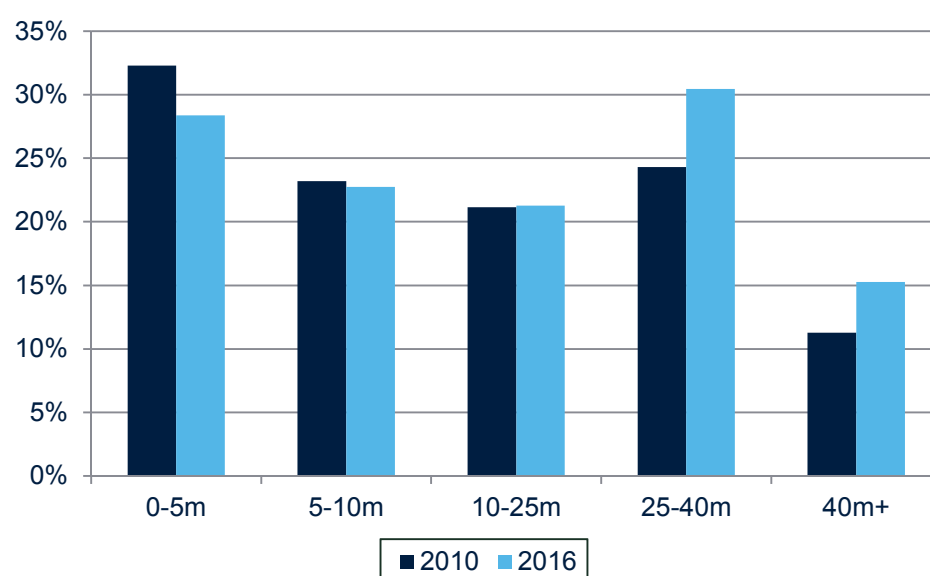
Notes: Alternatives are required to be within 100km and to have a frequency equivalent to at least 50% of that of the reference route. Based on traffic departing countries with at least one

member of ACI EUROPE. Distances are based on straight line measurement. Airport size categories are based on millions of passengers in 2016 (or 2015 where 2016 data not available).

Source: Oxera analysis of OAG data.

The implication of these results—which Appendix 0 demonstrates are robust across a range of thresholds for distance and frequency—is that the competitive constraint faced by larger airports for competition for local passengers is likely to have increased between 2010 and 2016.

6.2   Improvements in surface access

Airports can increase the catchment area that they attract passengers from by improving surface access to the airport. At a local level, improving surface access to a given airport can intensify competition between airports by both enabling a larger volume of potential passengers to reach that airport within a reasonable journey time, and making the existing journey more convenient for passengers already within the airport's catchment area.

Recent examples of such improvements in surface transport that directly affect airport competition are as follows.

- The more effective use by airlines and surface transport operators of existing infrastructure.[70] For example, passengers flying into Germany can use Rail&Fly deals, offered by several international airlines to and from 15 airports in Germany—including Frankfurt, Munich and Berlin—that allow them to use the country's rail network instead of domestic airports.

- The UK has recently seen examples of partnerships between rail operators and airlines, allowing passengers to use multiple modes of transport on the same journey, all under one ticket that is cheaper than the combined price of the individual tickets. Singapore Airlines' partnership with Great Western Railway and Heathrow Express allows customers to save up to £150 while using the same ticket to travel from Bristol to Singapore and beyond.[71]

- A new rail link to Luton Airport, to replace the existing shuttle bus service from Luton Airport Parkway, has been approved.[72] This direct route aims to reduce the travel time from Central London to under 30 minutes and will mean that Luton joins London's other major airports (Heathrow, Gatwick and Stansted) in having a direct rail connection from Central London. The airport's Chief Executive said that the link would help the airport to expand capacity by making the commute easier for passengers, particularly from Central London.[73]

- Porto Airport has developed a relationship with a bus company, Autna, to enlarge the area from which it was drawing passengers. The airport contributed financial support to start the operation and also marketed the service. In the arrivals area of the airport, a dedicated waiting room was created for passengers from Galicia, Spain to use while waiting for transportation. A telephone line exclusively for these passengers to communicate with the airport was also set up. Initiated nearly ten years ago, Porto Airport's relationship with Autna is now consolidated, with information

[70] Access Rail (2017), 'DB Rail & Fly'.
[71] Heathrow Express (2014), 'UK's first 'rail-fly' deal'.
[72] BBC News (2017), 'New Railway connection to London Luton Airport approved'.
[73] City A.M. (2017), 'Forget Heathrow, it's time to take Luton Airport seriously'.

about the service and Autna ticket sales currently available at the airport information desk.[74]

As both airports and airlines continue to push for greater connectivity to airports, consumers will increasingly have a feasible option to fly out of more than one or two airports. While it is difficult to generalise or quantify the extent of such developments across Europe, this section has illustrated that there are examples of increased surface access to airports and noted how these might intensify competition for local passengers.

6.3   Conclusion on competition for passengers in local area

Historically, competition for passengers between airports has been considered on the basis of passengers in local catchment areas. This section has shown that although the proportion of routes that are competed has decreased slightly at airports with less than 10mppa, this has been more than offset by a significant increase in the share of traffic that is competed to/from large and very large, meaning that passengers at these airports (and more passengers overall) have more choice available to them.

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[74] Information provided to Oxera by ANA.

7 Market outcomes

This section examines how market outcomes (charges, service quality and capacity) have changed over time, and whether these outcomes are consistent with the extent of competition between airports as described in the previous sections. We find that:

- or airport charges, there is an approximately equal split between airports that have raised charges and those that have lowered them;

- airports have increased average levels of service quality, particularly larger airports, and many of these larger airports have invested in additional capacity.

These findings are consistent with the assessment of competition presented in previous sections, with the growing importance of LCCs at all airports resulting in an increase in buyer power, placing additional pressure on airports not to raise charges. Increases in service quality are consistent with the notion that airports are likely to face greater competition for passengers. That larger airports (above 25mppa) have invested in substantial additional capacity is also consistent with airports investing in capacity to enable them to compete with each other.

Sections 4 to 6 of this report examined how industry developments have influenced competition between airports in Europe. In this section, we look at how these developments (and others in the aviation industry) have influenced the outcomes in the airports sector in Europe. This is important because while the previous sections examine indicators of the extent of competition, they do not provide evidence on how this competition is changing outcomes in the market.

In particular we consider:

- charges at airports (section 7.1);

- how service quality has changed at airports since 2010 (section 7.2).

- how capacity has changed for large airports over time (section 7.3).

7.1 Charges

Using data from the ACI on aeronautical revenue per passenger between 2010 and 2015, we have examined how airports of different size categories have increased charges in real terms. The data provided covers 66 of 75 airports within the EU, EEA and Switzerland with passenger levels exceeding 5mppa. The results of this analysis are shown in Figure 7.1 below.

Figure 7.1   Number of airports obtaining real changes in aeronautical revenue per passenger by size category, 2009 versus 15
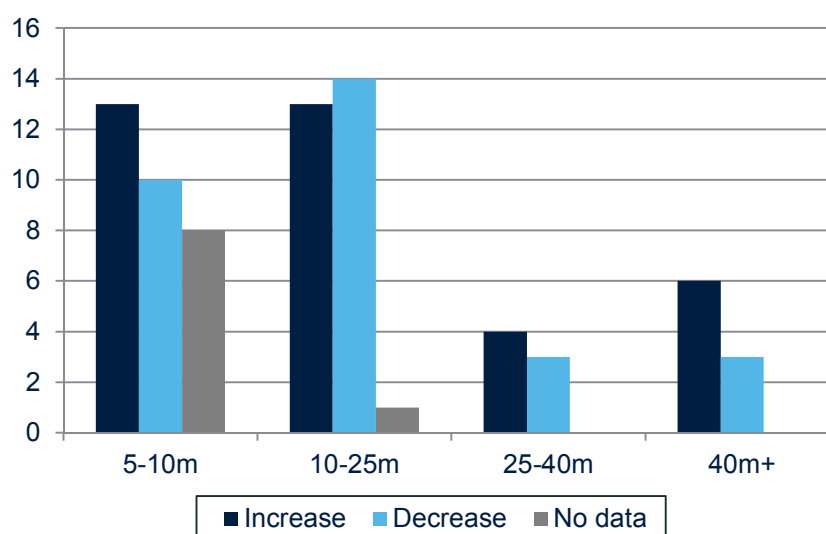
Note: Data for 2016 is not available. For selected airports in Paris, the Netherlands, Sweden, Italy and Romania, disaggregated figures for airports within an overall owning group were not available; for these groups, it has been assumed that the overall group-level change applied across all airports owned by that group. This assumption has been applied for a total of eight airports.

Source: Oxera analysis of ACI data.

Overall, average aeronautical revenue per passenger has increased at 36 airports, and fallen at 30 airports. This shows that airports across the different size categories have not been able to systematically raise charges, which is consistent with the existence of significant competitive pressures.[75]

Airport charges may increase over time for a number of reasons, including to reflect increases in costs outside of airports' control (such as security, compliance with safety regulations and environmental obligations); the costs that airports are charged by their suppliers (which may also be largely outside the control of the airport); and the costs of investment in the airport facilities—for example, to improve service quality and/or increase capacity. It is therefore instructive to examine the changes in service quality and investment as well.

7.2   Service quality

Price is only one component of airports' product offering to airlines and passengers: service quality is another important element. We have assessed service quality performance at airports using data from the ACI on Airport Service Quality,[76] as illustrated in the figure below.

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[75] This picture will also have been distorted by the operation of regulation in some countries permitting increases in charges in this period after several years of preventing them.
[76] Consistent and comprehensive data on the quality of service offered to airlines is not available, so in this report we have focused on service quality from a passenger perspective.

Figure 7.2   Change in overall satisfaction score by airport size category, 2010–15
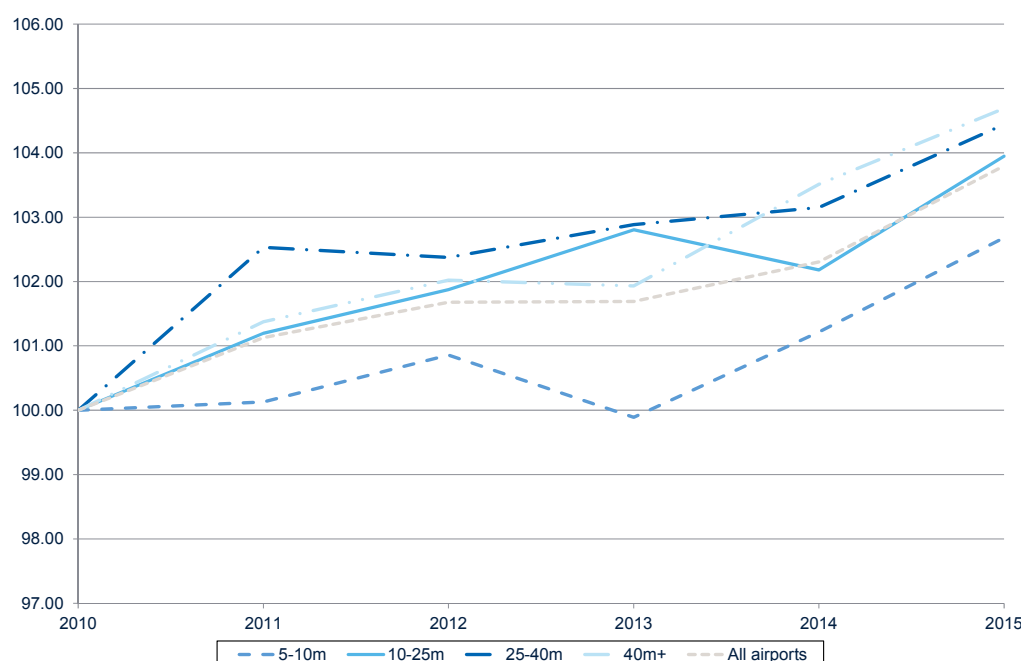
Note: Data for the smallest airports (<5mppa) is not available, and so this category is not included. The data for 2016 is missing a large number of airports, and so is not included.

Source: Oxera analysis of ACI data.

Figure 7.2 shows the increase from a 2010 benchmark (given a score of 100) for each airport size. It shows that, since 2010, service quality (as measured by passenger satisfaction) has increased across all airports. The rate of increase has been fastest at airports with over 40mppa, followed by those with between 25mppa and 40mppa, drawing attention to the importance of this form of non-price competition for larger airports. The average level of satisfaction in 2016 was almost identical to 2015 across all size categories for which data is available.

The increase in service quality at Europe's largest airports points towards increasing competitive pressures among these airports to attract and retain airlines and passengers.

7.3   Capacity enhancements

In addition to improving quality of service, which may require investment, airports may also invest in increases in capacity to accommodate more passengers. Consistent data on capacity is not available, but data from ACI EUROPE shows that there were substantial increases in capacity at the largest airports in Europe in the ten years to 2015, with two-thirds of the airports for which data is available expanding terminal capacity over this period. The table below provides some examples of the level of capacity expansion at these airports.

Table 7.1   Airport capacity expansion (mppa)

	2005 capacity	2015 capacity
BCN	23	55
MAD	35	70
FRA	58	64
VIE	20	30
DUB	20	30

Note: More recent data is not available.

Source: ACI EUROPE.

This is consistent with the expected patterns of competition outlined in section 2—i.e. of airports investing in additional capacity to attract more passengers.

7.4   Conclusions on market outcomes

This section has reviewed the developments of key market outcomes in the aviation market, including airport charges, service quality and capacity increases. It shows a mixed picture in terms of airports being able to raise charges (as measured by aeronautical revenue per passenger). This suggests that there is no systematic ability for airports to raise charges, which is consistent with the other findings in this study on the way competition has developed between airports in Europe. Rather, the ability of a given airport to raise charges is likely to depend on its particular circumstances.

Additionally, airports have increased average levels of service quality, with this trend being particularly pronounced at larger airports. Finally, many of these larger airports have also invested in substantial additional new capacity. This highlights the importance of non-price elements of competition, both in general and at these particular airports.

8   Future developments

This section considers the extent to which the developments outlined in section 3 and analysed in sections 4–6 are likely to continue. We show that growth in the aviation market in Europe and further afield is likely to continue, with that growth largely being served by LCCs and non-European carriers. In turn, these developments are likely to continue to increase the competition between airports in Europe. However, where capacity constraints increase this may have a dampening effect on the competitive constraints affecting those airports. The extent to which this arises will depend on the legal, regulatory and policy environment around expansion of individual airports.

Boeing, Airbus and Eurocontrol all forecast substantial growth in demand for aviation in Europe in the period up to 2035.

Two of the notable features discussed in section 3 are the growth in LCCs and the increase in services to the Middle East and Turkey. At least in the short term, there are some large fleet orders from LCCs for aircraft that can cover all distances, suggesting that the strong growth from those airlines is likely to continue. Middle Eastern airlines have similar outstanding fleet orders, signalling that the increase in competition for flights to the Middle East is likely to continue to develop in future years.

This section considers future developments in the aviation industry, including the extent to which the increase in demand for air travel is likely to continue and the role of different types of airlines in any growth (section 8.1). We then consider the potential increases in capacity constraints generated by this growth (section 8.2), and future airline business models (section 8.3).

Since any predictions about the future are inherently uncertain, where possible, a range of scenarios should be considered. In particular, five key factors are likely to shape the passenger aviation market in the future:[77]

- economics;

- technology;

- consumer experience;

- environmental concerns;

- government policy and regulation.

We do not consider all of these factors in detail here. However, we review the projections available from the literature on the key factors affecting airport competition.

8.1   Prospects for industry growth

Both Boeing and Airbus predict strong growth in the global aviation market over the next 20 years. Boeing expects annual growth of 4.7% in global traffic and

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[77] Oxera and PA Consulting (2014), 'Could trains overtake planes? Exploring the future of the passenger aviation industry', p. 17.

3.5% in global fleet size between 2017 and 2036,[78] with Airbus expecting the global aircraft fleet to more than double in size over the same time period.[79]

The breakdown of this growth is explored in more detail below, but these forecasts expect continued growth in the European market of between 3.3% for Airbus[80] and 3.7% for Boeing.[81] This continued growth will contribute to giving airlines the opportunity to allocate services, and airports the opportunity to compete for those services, across Europe.

The next question that arises is how this growth will be divided between different types of airline and services within Europe and to/from Europe to the rest of the world.

8.1.1   Growth of LCCs

As shown in section 3, the growth in European flights since 2010 has largely been driven by LCCs. Based on aircraft orders, there are signs that this is likely to continue, with Ryanair ordering over 100 of Boeing's short-haul aircraft at a price of $11bn.[82] While International Airlines Group has firm orders and options on up to 220 Airbus A320 aircraft, 120 of those are for its low-cost subsidiary, Vueling.[83] This suggests a continuation of an established trend of growth in LCCs and of large airline groups growing through their low-cost brands.

In addition to LCCs continuing to drive growth in short-haul traffic, they are also expanding into long-haul operations. For example, Norwegian Air Shuttle has a total order for 30 Dreamliners.[84]

These existing aircraft orders suggest that there will be continued growth of LCCs on routes of all lengths in the future.

8.1.2   Growth of non-European markets

The figure below illustrates how growth in traffic is split across the world based on Boeing's analysis.

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[78] Boeing (2017), 'Global Market Overview', accessed 17 August 2017.
[79] Airbus (2017), 'Global Market Forecast: Growing Horizons 2017/2036', p. 8.
[80] Ibid. p. 56.
[81] Boeing (2017), 'Global Market Overview', accessed 17 August 2017.
[82] Ryanair website, 'Ryanair fleet', accessed 15 August 2017.
[83] International Airlines Group (2013), 'Shorthaul fleet order', accessed 17 August 2017.
[84] Norwegian website, 'Year by year', accessed 17 August 2017.

Figure 8.1   Total number of planes operating in each region of the world, 2016–36
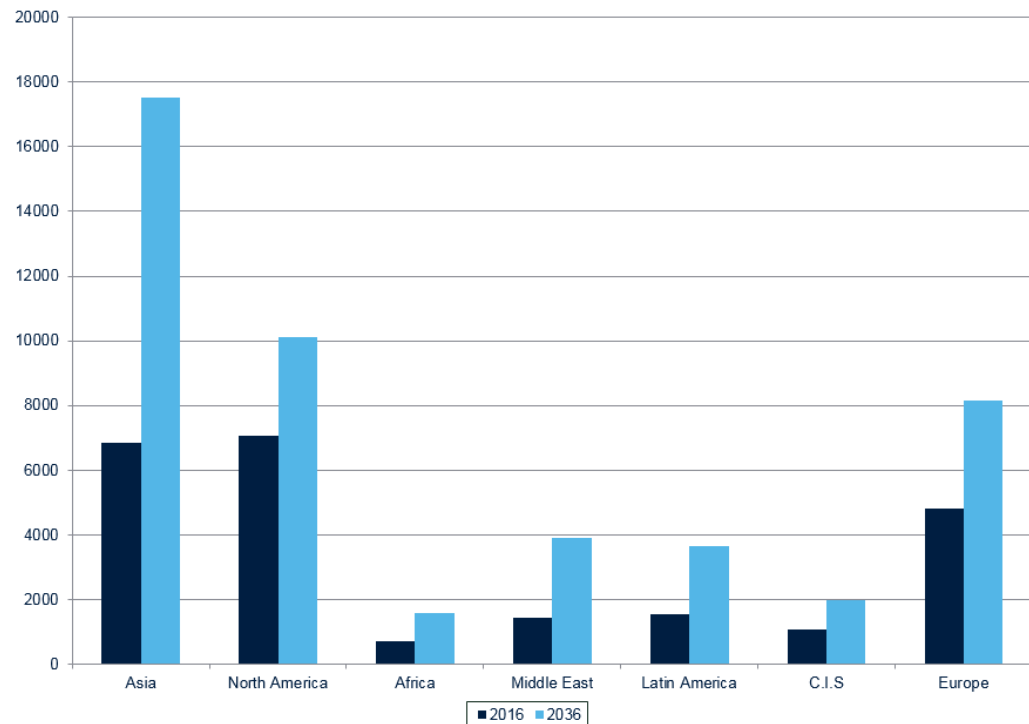
Source: Boeing (2017), 'Global Market Overview'.

This figure indicates significant growth in every world region, although it is especially pronounced in Asia, where, owing to an emerging middle class and rapid economic growth, affordable air travel is forecast to become increasingly popular. A sign of this is China Eastern Airlines' target to increase its fleet size from 702 aircraft in 2016 to 862 by 2019.[85] Asia is forecast to account for 40% of global passenger traffic by 2036. LCC provision of airline travel is expanding by 22% annually, which means that Asia provides the largest number of seats in the global LCC market. [86]

Another expected source of growth is the continued expansion of the Middle East market. For example, Qatar Airways has outstanding orders for an additional 362 aircraft on a fleet of 200.[87] Similarly, Emirates currently has 259 aircraft, with an additional 219 on firm order.[88] The increase in competition that European airports face from Middle Eastern airports, as outlined in section 5, is therefore likely to continue as Middle Eastern and Turkish airlines continue to expand.

The growth in non-European markets is far more pronounced than the growth in the European market: this suggests that competition between European airports for services to these fast-growing regions is likely to continue.

8.2   Growth in capacity constraints

One of the challenges of the growth in demand for aviation is the extent to which airport capacity is available to accommodate this demand. Potential growth of capacity constraints can be important because, as outlined in section 2, airports

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[85] China Southern Airlines (2017), 'Annual report 2016', p. 29.
[86] Boeing (2017), 'Global Market Overview'.
[87] Qatar Airways (2017) 'Qatar airways fact sheet'.
[88] Emirates Group (2017) "The Emirates group annual report 2016-2017'.

that are operating at capacity may have reduced incentives to compete with each other, meaning that some of the benefits to passengers which might otherwise arise from this competition would be lost.

As outlined in section 3.4, there are continuing constraints on airport capacity expansion and, according to Eurocontrol, between 2% and 20% of unconstrained demand in Europe is forecast to be unsatisfied in 2035 because of airport capacity constraints.[89] However, the EU's Aviation Strategy has recognised the need to deal with this developing picture, airports have shown themselves able through more innovative operations to increase throughput beyond previously recognised capacity limits and decisions on capacity have not all been of a constraining nature with the UK at least deciding to expand Heathrow.

As shown in section 7.3, and demonstrated by high profile examples,[90] airports can actively work to gain the rights to expand and build runways, showing that this constraint can be mitigated.

8.3 Changes in airline business models

The development of airline business models is very uncertain. Long-haul low-cost travel is currently relatively small but is an area with a large number of aircraft on order. As outlined above, Norwegian Air Shuttle has orders for a number of long-distance aircraft. While there have been examples of previous attempts at low-cost long-haul, Norwegian's Chief Executive, Bjørn Kjos, plans to significantly reduce the static time spent between landing and the next journey, aiming to increase the utilisation of aircraft to 17–18 hours flying time per day.[91]

Similarly, Malaysia's AirAsia X has continued to focus on long-haul low-cost travel. It has placed orders for an additional 66 A330 neo aircraft in the coming years, based on a capacity of under 30 aircraft today.[92] If successful, low-cost long-haul may result in considerable expansion of hub bypass and/or in the presence of LCCs at large airports with the associated buyer power of these airlines.

In addition to these potential developments in LCC business models, there is potential for considerable consolidation in the European aviation industry if the large airline groups continue to acquire smaller airlines.[93] The continued emergence of a relatively small number of large airline groups would continue the trend in enabling these groups to deploy aircraft on a pan-European basis and would engender competition between airports for those aircraft.

8.4 Conclusions on future developments

Boeing, Airbus and Eurocontrol are all forecasting substantial growth in demand for aviation in Europe and key markets further afield. This growth may increase capacity constraints at some airports, which would affect the extent to which these airports are incentivised to compete with each other.

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[89] Eurocontrol (2013), 'Challenges of growth 2013–Task 4: European Air Traffic in 2035', June, p. 22.
[90] Illustrative examples include Vienna and Munich, which have appealed their runway plans through multiple administrative courts, and the contest new runway capacity in the south east of the UK.
[91] Taylor, I. (2015), 'Big Interview: Norwegian sets out strategy to make low-cost long-haul work'.
[92] AirAsia X (2017), 'Realising Dreams: Annual Report 2016'.
[93] For example, in 2015 International Airlines Group acquired Aer Lingus. In 2017, Lufthansa is reported to be interested in buying Air Berlin. See Bryan, V. (2017), 'Lufthansa gets backing from Economy Minister in Air Berlin carve-up', 21 August.

However, the developments generally suggest a continuation of trends that have generated competition across the airport market. Fleet orders suggest that the growth in LCCs is likely to continue, with some LCCs placing large fleet orders for aircraft that can cover all distances. Similarly, the strong growth in the aviation market in the Middle East and Asia is likely to continue, with large aircraft orders placed there also. This growth will provide considerable opportunity for airlines to choose where to locate themselves within Europe in order to maximise profits and for airports to compete for those services. The continuing growth of hubs in the Middle East and Turkey will also continue to increase the competitive constraint on Europe's largest airports.

While the future development of airline business models is necessarily uncertain, there are a large number of aircraft on order from low-cost long-haul airlines. If successful, these airlines may considerably increase the competitive constraints on large airports by increasing the extent to which passengers can travel directly (building on the hub bypass that now operates for short haul routes) and/or increasing the prevalence of LCCs at these airports with a commensurate increase in airline negotiating power.

Overall, the trends in the aviation market outlined in section 3 seem likely to continue, and with them the implications for greater airport competition.

9   Conclusions

This report has identified a number of key trends that have continued to develop from the last time ACI EUROPE assessed the European aviation market in 2012:

- the aviation market as a whole has continued to grow, largely driven by LCCs and a growing leisure market. In particular, LCCs have grown strongly at larger airports across Europe where previously they had often been absent, exposing different airports to the negotiating strategies used by these airlines and increasing switching behaviour at those airports;

- hubs and airlines in the Middle East and Turkey have continued to develop strongly, both increasing the number of connections available for European passengers to use for long-haul travel and providing airports across Europe with the potential to compete for those connections;

- airline business models have continued to evolve, with the continued development of pan-European LCC networks, the launch of long-haul low-cost routes, an increase in the use of multi-hub strategies, and a degree of convergence in LCC and short-haul FSC business models.

Airports' commercial success is determined by the marginal decisions on the part of airlines and airports. This means that the commercial behaviour of some airlines, seeking to maximise fleet profitability across their pan-European networks, drives the behaviour of the affected airports, to the benefit of all airlines operating at those airports. The dynamics of the aviation market therefore significantly constrain the ability of many airports to set charges.

This study has set out a clear framework for assessing the extent of competition between airports in Europe. Competition between airports is multi-faceted, and our framework centres on three main aspects:

- competition for airline services on a pan-European basis (new and existing routes);

- competition for connecting passengers;

- competition for passengers in the local area.

In reality, the world is not as clear-cut as this framework, with the different facets of competition interacting with each other to create an overall competitive position for airports in Europe. For example, the growth of Middle Eastern hubs and airlines has had an important impact on competition for connecting passengers—i.e. the number of airports that passengers travelling from Europe to Asia/Australia can connect through has increased. In addition, this growth has resulted in competition for airline services to create the spokes to those new hubs from European airports.

9.1   Conclusions for the three main aspects of airport competition

9.1.1   Airline services (new and existing routes)

The economic framework sets out how airlines seek to maximise profits by allocating their fleets to routes that provide the greatest profit. Each route choice presents an opportunity cost to the airline, which it keeps under review. Much of the growth in the European aviation market since 2010 has come from LCCs, which have greater ability to switch between airports, and therefore greater buyer power than FSCs have traditionally had. Thus, the greater market share

for LCCs has resulted in more intense airport competition for routes than was historically the case, and this growth in competition is now happening to a greater extent at larger airports. This increase in the potential for competition is especially evident in the increase in the level of route churn at airports with between 10mppa and 25mppa but is also present at larger airports.

In addition to the growth of LCCs, there has been substantial growth in connections to Middle Eastern hubs. The Middle Eastern carriers are able to connect to airports across Europe, generating pan-European competition for these connections.

In summary, the extent of pan-European competition for airline services has increased materially since the 2012 study.

9.1.2   Connecting passengers

Connecting passengers can travel by any substitutable route, and airports compete for airlines to deliver those passengers. Since 2010, there has been an increase in the number of competing options for these passengers, particularly with the rapid growth of Middle Eastern and Turkish hubs. This will have increased competition between European hubs for those passengers.

The emergence of hub bypass, with more airports gaining direct services that were previously only available through hubs, adds to this increase in airport competition. In addition, the emergence (albeit still on a small scale) of low-cost long-haul and self-connection at airports, further increases the number of travel options by bypassing hubs directly and, in effect, creating new hubs.

In summary, the extent to which large airports have to compete for connecting passengers has also increased significantly since the 2012 study.

9.1.3   Passengers in the local area

Since 2010, the number of city pairs with a competing airport offering similar services has increased for larger airports. This increase in the number of cases where there are alternative travel options will increase the extent of competition between airlines on those routes. Such an increase in airline competition will have been passed through to airports through pressure in the airport–airline negotiations.

The extent of competition for passengers in the local area has increased since the 2012 study, but to a lesser extent than competition for airline services and connecting passengers.

9.2   Conclusions for each airport size

Within each airport size category there are various situations, and the conclusions set out here can only be indicative across the size categories. However, the analysis in this study enables us to draw some overall conclusions on how the extent and types of competition vary across airport sizes.

As in the 2012 study, our analysis has found that competition remains high for small airports (with less than 10mppa) because of the significant presence of LCCs, the associated extent of switching by airlines and the strength of the competition for airlines' services on new and existing routes.

For airports with more than 10mppa and less than 25mppa, there is considerable evidence that these airports are now competing more with other airports than was the case historically, largely driven by airlines' ability to allocate new routes

across Europe. Given the growth in LCCs since 2010, the extent of switching seen at these airports has increased, which is consistent with the existence of airline buyer power in this market.

For airports with more than 25mppa but less than 40mppa, there is also evidence that the competitive constraints on those airports have increased. This is due to increases in the extent of both route churn and competition for passengers in local areas across this group. While some airports in this group have raised charges (as measured by aeronautical revenues per passenger) since 2010, others have lowered such charges, and this group has been associated with an increase in service quality and capacity. Competition between airports in this group might have focused on quality and capacity rather than price (as seems to be the case at smaller airports).

For airports with more than 40mppa, there is also evidence that competition for passengers and airlines has increased across the range of ways in which these airports compete, with the combination of an increase in the extent of route churn, an increase in the proportion of routes competed from a local catchment, and significant developments in the connecting passenger market. Moreover, these airports have increased their service quality and capacity since 2010. We conclude that competition between large airports might have focused on other aspects such as service quality. The extent of competitive pressures on these airports is less than that for smaller airports, but is increasing significantly.

These findings are summarised below.

Table 9.1   Summary of findings: changes in airport competition

Airport size (mppa)	New/existing routes	Connecting passengers	Local catchment
0–5	↔	n/a	↓
5–10	↔	n/a	↔
10–25	↑↑	n/a	↔
25–40	↑	n/a	↑↑
40+	↑	↑	↑↑

Source: Oxera.

9.3   Closing remarks

The figure below provides an illustration of these conclusions, depicting how the different facets of competition between airports and the recent developments in the aviation industry combine to create the current picture of competition between airports in Europe.

Figure 9.1   Summary of conclusions
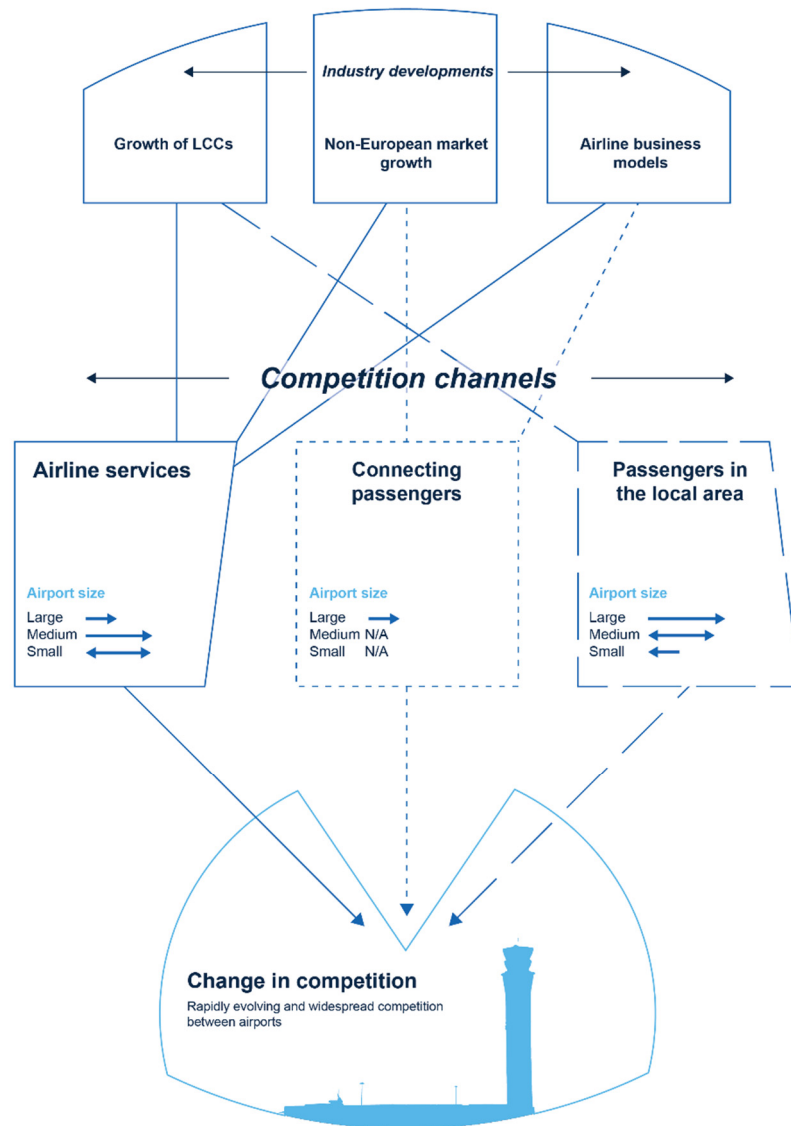
Source: Oxera.

Many of the trends explored in this report are well established and are driving an evolution in the extent of competition in the European airport market. There is evidence from a wide range of sources that the aviation market is likely to continue to grow, and this growth is likely to continue to come from LCCs and connections to non-European markets. Therefore, the competitive pressure on airports of all sizes across Europe from these developments is highly likely to continue. However, this growth may come at a price for some airports if they cannot expand their capacity, as this could dampen some of the competition that would otherwise arise.

It is less clear to what extent the emerging changes in airline business models such as the development of connections to long-haul traffic and low-cost long-haul will continue. However, what is clear is that the competitive landscape of the European aviation market is evolving rapidly, and competition between airports is both widespread and increasing. In an industry with largely fixed costs and long design periods, this means that airports, their customers, regulators and government stakeholders will need to address this 'new normal'.

A1 The 2012 study

In 2012, ACI EUROPE published a study that examined the extent to which airports in Europe competed.[94] This appendix summarises the results and conclusions from that study.

This study assessed the nature of competitive constraints faced by European airports and identified key developments in passenger, airline and airport behaviour from 2002 to 2011 that influenced the competitive environment in which airports operated.[95] Overall, it found that over this period, there was a step change in the extent to which airports competed, although this competition was stronger for small airports than for larger ones.

The following sub-sections provide more details on the analysis and findings of this study, split by passengers, airlines and airports to reflect the structure of the 2012 study.

A1.1 Passengers

The report found that changes in passenger behaviour between 2002 and 2011 led to increased passenger choice of airports, thereby reducing the extent of any commercial advantage that airports could derive from passengers. In particular, the report noted that:

- increased incomes and lower fares had resulted in more discretionary trips and more price-sensitive, time-insensitive travellers;

- Internet aggregation and booking services had reduced switching costs;

- growth in tourism had increased the number of inbound passengers, with a choice of airports and of destinations.

The study quantified the magnitudes of these trends, noting that 63% of European citizens were within two hours' drive of an alternative airport. In addition, 50% of local departing passengers had a 'reasonably attractive' alternative route, with local departure choice increasing at all the airports in the study with more than 25mppa.

A1.2 Airlines

The report identified trends in the business models of airlines between 2002 and 2011, and considered how these trends had increased airlines' propensity to switch between airports. The report noted that:

- intercontinental and intra-European markets had continued to be liberalised;

- developments in aviation technology had increased airline flexibility;

- airlines' business models had evolved, with the market share of LCCs increasing,[96] more point-to-point traffic, the emergence of new pan-European airlines and of network airlines with multiple hubs as a result of mergers and alliances.

The study presented evidence of increased competitive pressure on airports. It noted that an additional 500 routes were opened and closed in 2011 relative to

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[94] Copenhagen Economics (2012), 'Airport Competition in Europe', June.
[95] As the report was published in June 2012, most analysis focused on the period up to and including 2011, i.e. the last complete year prior to the report being published.
[96] There was a 41% market share on intra-European routes in 2010, compared with 27% in 2002.

2002, demonstrating an increase in airlines' willingness and ability to switch. Moreover, the number of hub airports hosting multi-hub airlines (with the ability to switch capacity between hubs), and the share of single-carrier routes (where airlines can switch the routes they operate more easily and therefore have additional bargaining power), had both increased since 2002.

A1.3   Airports

The study discussed the entry of new airports and expanded capacity at existing airports (including Middle Eastern hubs), noting that this had increased choice for both airlines and passengers, thereby further increasing the extent of competition between airports. In response to this increase in competitive pressure, the study discussed how airports were increasing marketing activities, competing on quality, and engaging in price competition.

A1.4   Conclusions from the 2012 study

The 2012 study concluded by demonstrating that the number of airports of all sizes facing competitive constraints—from either passengers or airlines—increased between 2002 and 2011. It recommended that policymakers review whether the economic regulation of airports is necessary given these competitive constraints and, where it is, that the form of this regulation should be developed to account for the competitive constraints that now exist.

A2   Critical loss analysis

This appendix outlines the calculations that underpin the critical loss analysis presented in section 3. In essence, a critical loss analysis assesses the loss in passenger/aircraft volumes that would result in a price rise being unprofitable. It does this by calculating the reduction (increase) in passengers that would balance the increase in profitability from a higher (lower) price being charged to those passengers who would remain. As outlined in section 3, the logic works in the opposite direction, and can be applied to consider the extent to which a price reduction could be profitable from increasing passenger/aircraft volumes.

This analysis proceeds in two steps:

- calculate the change in passenger volumes required for an unchanged level of profit based on assumed aeronautical and non-aeronautical revenue per passenger and cost per passenger;

- calculate the equivalent change in aircraft using assumptions on aircraft load factors.

We have carried out this analysis for the following scenarios:

1.   5% and 10% price rise;

2.   with and without an assumed cost impact;

3.   based on aircraft data for LCCs and FSCs.[97]

This analysis is for a stylised airport but is based on work undertaken by Oxera for European airports. The tables below summarise our assumptions.

Table A2.1   Critical loss assumptions: airport

Passengers (m)	25
Aeronautical revenue (€m)	250
Non-aeronautical revenue (€m)	200
Total revenue (€m)	450
Operating costs (€m)	340
Operating profit (€m)	110

Source: Oxera.

Table A2.2   Critical loss assumptions: aircraft

Assumption	LCC	FSC
Based 'standard' aircraft	B737-800	A321
Aircraft capacity	189	174
Average occupancy rate (%)	86	79
Assumed movements per day	6	4.6

Source: Airport data provided by ACI. LCC data is based on publicly available data on Ryanair's website, 'Our fleet'. FSC data is from Oxera's industry experience.

Table A2.3 below summarises our findings.

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[97] We assume that the LCC is using B737-800 aircraft and the FSC A321 aircraft.

Table A2.3 Critical loss

Price increase	No change in variable costs		Change in variable cost[1]	
	5%	**10%**	**5%**	**10%**
Passenger loss	2.7%	5.3%	2.9%	5.7%
equivalent to:				
Aircraft loss				
LCC	4	6	4	7
FSC	5	10	6	11

Note/source: [1] We have assumed that a 10% change in passenger volume leads to a 1% change in operating costs based on Commission for Aviation Regulation (2014), 'Maximum level of airport charges at Dublin Airport', paragraph 4.8. All data is based on changes to total revenues.

As can be seen from this table, if there is a reduction in costs from the reduction in passenger volumes then more passengers need to leave in response to a price rise than if there were no reduction in costs.

A3 Countries considered part of each region (Europe/Asia-Pacific)

Our analysis relies on a number of geographic definitions. Where EU countries are referred to, this means the 28 members of the European Union as at 1 August 2017. The 'European' and 'Asia Pacific' regions are defined based on the countries with airports that are members of ACI EUROPE and ACI Asia-Pacific respectively. These lists, along with any variations to them, are detailed below.

A3.1 European countries

ACI EUROPE has member airports in 45 countries as at 10 August 2017, as detailed in Table A3.1.[98] All 45 countries as classified by ACI EUROPE are captured as part of the definition of Europe adopted by Oxera in this report.

Table A3.1 Countries with members of ACI EUROPE

Country	Country
Albania	Lithuania
Austria	Luxembourg
Belarus	Macedonia, Former Yugoslav Republic of
Belgium	Malta
Bosnia and Herzegovina	Moldova, Republic of
Bulgaria	Monaco[2]
Croatia	Montenegro
Cyprus	Netherlands
Czech Republic	Norway
Denmark	Poland
Estonia	Portugal
Finland	Romania
France	Russian Federation
Georgia	Serbia
Germany	Slovakia
Greece	Slovenia
Hungary	Spain
Iceland	Sweden
Ireland, Republic of	Switzerland
Israel	Turkey
Italy	Ukraine
Kosovo[1]	United Kingdom
Latvia	

Note: [1] Airports in Kosovo are recorded in OAG's data as being in Serbia. [2] Monaco does not have an airport; the only ACI member is a heliport.

Source: ACI EUROPE (2017), 'ACI EUROPE members list', 10 August; Oxera.

A3.2 Asia-Pacific countries

ACI Asia-Pacific has member airports in 48 countries as at 27 March 2017 (see Table A3.2 below).[99] All 48 countries as classified by ACI Asia-Pacific are captured as part of the definition of Asia Pacific adopted by Oxera in this report, with the exception of the USA, which has certain airports in Hawaii and Guam

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[98] ACI Europe (2017), 'ACI Europe members list', 10 August.
[99] ACI Asia-Pacific (2017), 'ACI Asia-Pacific Members List', 27 March.

that are members of ACI Asia-Pacific. As these airports do not have direct flights to or from Europe or the Middle Eastern hubs considered in this report, this does not affect our analysis.

Table A3.2   Countries with members of ACI Asia-Pacific

Country	Country
American Samoa	Marshall Islands
Australia	Micronesia
Bahrain	Mongolia
Bangladesh	Myanmar
Bhutan	Nepal
Brunei	New Caledonia
Cambodia	New Zealand
China	Northern Marianas
Chinese Taipei	Oman
Cook Islands	Pakistan
Fiji	Papua New Guinea
French Polynesia	Philippines
Hong Kong	Qatar
India	Samoa
Indonesia	Saudi Arabia
Iran	Singapore
Iraq	Sri Lanka
Japan	Thailand
Jordan	Tonga
Korea	UAE
Kuwait	USA[1]
Macau	Vanuatu
Malaysia	Vietnam
Maldives	Yemen

Note: [1] Included due to Hawaii and Guam; however, there are no flights of relevance to the analysis in this report to/from Europe from these airports.

Source: ACI Asia-Pacific (2017), 'ACI Asia-Pacific Members List', 27 March; Oxera.

A4   The construction of the connecting flights analysis

The connecting flights analysis presented in this report has been constructed based on the OAG data used throughout this study. This appendix details how this data has been used and the assumptions made to produce this particular analysis.

A4.1   Sample selection

In effect, to construct our dataset we combined all of the arrivals at a given airport with all of the departures that then followed from that airport, in order to identify the possible connections that passengers might make.

Such a process requires significant amounts of computational power. Therefore, to conduct this analysis within a reasonable timeframe, we used selected time periods—specifically, 4 x 1-week windows from each year (the 7th, 20th, 33rd and 46th weeks), in order to use one week from each quarter. Where we have reported annual results, these are the average of these figures, in order to smooth out any results driven by seasonality.

A4.2   Connections and their timings

We considered only 'one-stop' connections in this analysis—i.e. journeys involving two legs. To determine the feasibility of a connection, we have assumed that the second flight of a journey must depart:

- no earlier than 90 minutes after the first flight has landed, in order to allow the passenger sufficient time to connect flights; and

- no later than 360 minutes after the first flight has landed, in order to ensure a tolerable 'layover' period for the passenger.

These assumptions represent our central case, presented in section 5. Sensitivities around these cut-off periods are presented in Appendix A5.

A4.3   Alliance status

For a journey to be possible, we have assumed that both legs must be made by airlines that are members of the same airline alliance. For instance, if a journey from A to C (via Airport B) is possible only on a OneWorld alliance flight from A to B and a SkyTeam alliance flight from B to C, this would not be counted as a possible connection through Airport B. However, if both legs were possible using a OneWorld flight, the journey would be counted as being possible through Airport B.

A4.4   Likelihood of a connecting flight

We have also considered only cases where a connecting flight might not be seen as a likely or practical option. In particular, we have not counted connections where:

- there is a direct flight between the origin and destination point, with a frequency more than three times that offered by indirect services, as it seems likely that connecting flights are of relatively less significance on such routes;

- the distance between the origin airport and connecting airport, and between the connecting airport and destination airport, sums to more than twice the direct distance between the origin and destination.

A5   Connecting flights analysis sensitivities

As set out in section 5 and Appendix A4, the construction of our connecting flights analysis assumed a connection period between a first flight arriving and a second flight departing of between 90 minutes and 360 minutes. The results of this analysis (set out in Table A5.1) led us to conclude that the non-traditional hubs in the Middle East and Istanbul posed an increasing competitive constraint on traditional European hubs.

Table A5.1   Proportion of connecting routes where selected European airports face competition, 90- to 360-minute connection period, 2010 vs 2016

	Facing at least one competitor (all competitors)		Facing at least one competitor (Middle Eastern and Istanbul airports only)	
	2010	**2016**	**2010**	**2016**
LHR	82%	80%	26%	35%
FRA	66%	70%	17%	29%
CDG	59%	64%	13%	25%
AMS	63%	65%	15%	24%
FCO	63%	60%	14%	26%
MAD	32%	35%	3%	7%
MUC	76%	76%	16%	27%

Notes: The first panel treats 'all competitors' as those airports listed in the left-hand column, as well as Istanbul, Dubai, Abu Dhabi and Doha airports. The second panel treats 'Middle Eastern' competitors as Dubai, Abu Dhabi and Doha airports, and includes Istanbul Airport.

In the tables below, we set out the following sensitivities around these connection period windows:

- 60 to 180 minutes (Table A5.2);

- 60 to 240 minutes (Table A5.3);

- 90 to 240 minutes (Notes: See Table A5.1.

- Table A5.4).

In all of these sensitivities, the results are as expected: longer connection periods result in a greater degree of competition from other airports (owing to the increased likelihood of a connecting flight being possible through a particular airport for a given origin–destination pair). However, in all cases there is a significant increase in the proportion of connections via traditional airports that can now also be made via the emerging hubs in Dubai, Abu Dhabi, Doha and Istanbul.

Table A5.2   **Proportion of connecting routes where selected European airports face competition, 60- to 180-minute connection period, 2010 vs 2016**

	Facing at least one competitor (all competitors)		Facing at least one competitor (Middle Eastern and Istanbul airports only)	
	2010	**2016**	**2010**	**2016**
LHR	78%	78%	19%	28%
FRA	65%	66%	13%	20%
CDG	58%	63%	9%	18%
AMS	62%	61%	11%	16%
FCO	58%	55%	10%	20%
MAD	30%	32%	2%	5%
MUC	73%	73%	11%	18%

Notes: See Table A5.1.

Table A5.3   **Proportion of connecting routes where selected European airports face competition, 60- to 240-minute connection period, 2010 vs 2016**

	Facing at least one competitor (all competitors)		Facing at least one competitor (Middle Eastern and Istanbul airports only)	
	2010	**2016**	**2010**	**2016**
LHR	80%	79%	23%	33%
FRA	66%	69%	15%	26%
CDG	60%	64%	11%	23%
AMS	63%	63%	14%	21%
FCO	62%	59%	12%	25%
MAD	31%	34%	2%	6%
MUC	75%	74%	14%	24%

Notes: See Table A5.1.

Table A5.4   **Proportion of connecting routes where selected European airports face competition, 90- to 240-minute connection period, 2010 vs 2016**

	Facing at least one competitor (all competitors)		Facing at least one competitor (Middle Eastern and Istanbul airports only)	
	2010	**2016**	**2010**	**2016**
LHR	78%	77%	21%	31%
FRA	64%	66%	14%	25%
CDG	59%	62%	10%	21%
AMS	62%	62%	12%	19%
FCO	58%	54%	11%	22%
MAD	29%	31%	2%	5%
MUC	74%	72%	13%	23%

Notes: See Table A5.1.

A6 Geographic competition analysis sensitivities

In section 6 of this report, we found that large and very large airports, with passenger levels over 25mppa, had seen an increase in the proportion of routes on which they faced competition from a nearby alternative airport, as depicted in Figure A6.1. This analysis was based on a 100km catchment area and a requirement that competitors to a reference route must have a frequency equivalent to at least 50% of that reference route.

Figure A6.1 Proportion of seats on routes with competitors by airport size, 100km catchment area and 50% frequency threshold, 2010 vs 2016
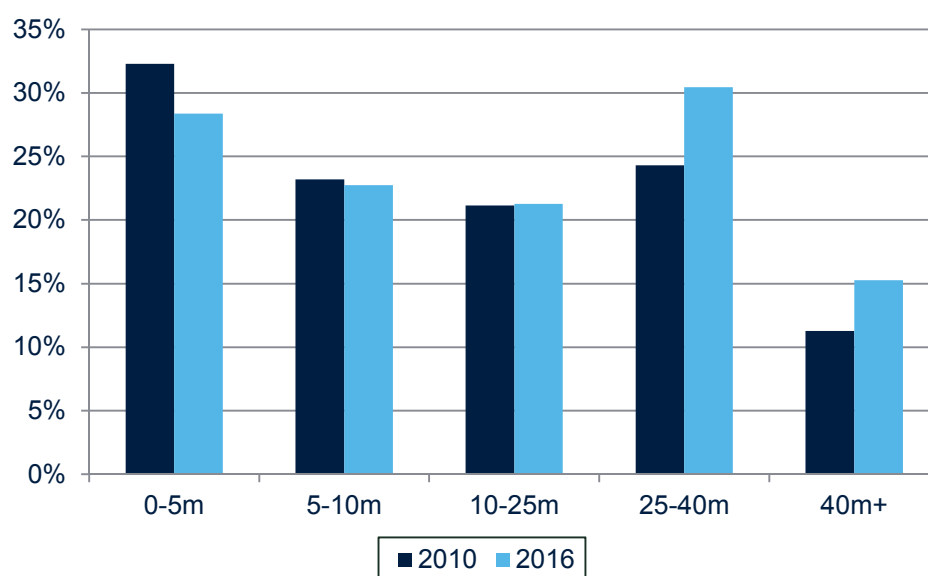

Notes: Based on traffic departing countries with at least one member of ACI EUROPE. Distances are based on straight-line measurement. Airport size categories are based on millions of passengers in 2016 (2015 where 2016 data not available).
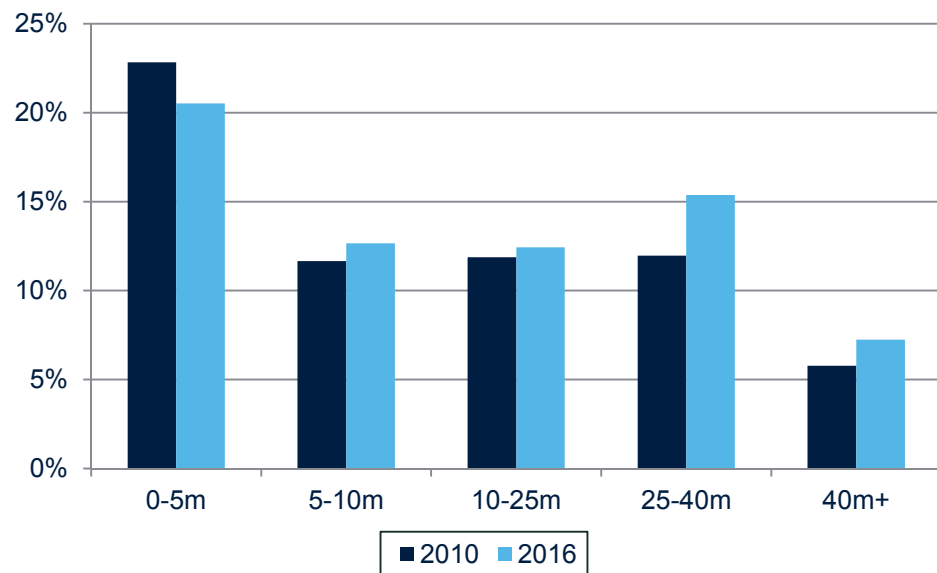
Source: Oxera analysis of OAG data.

Figure A6.2 and Figure A6.3 below test the robustness of this analysis to variations in the frequency threshold imposed, while Figure A6.4 and Figure A6.5 vary the catchment area used. All of our analysis is based on traffic departing from countries that are members of ACI EUROPE, with airport size categories based on millions of passengers at airports in 2016. The analysis demonstrates similar trends to those found in the main body of this report, with the degree of competition at larger airports increasing under this metric. Results also vary in the direction that we would expect, with the extent of competition increasing as thresholds are relaxed by lowering frequency requirements or increasing catchment areas, and decreasing as they are tightened by doing the opposite. On this basis, we consider that these results are robust to a wide range of sensitivities.

Figure A6.2   Proportion of seats on routes with competitors by airport size, 100km catchment area and 33% frequency threshold, 2010 vs 2016
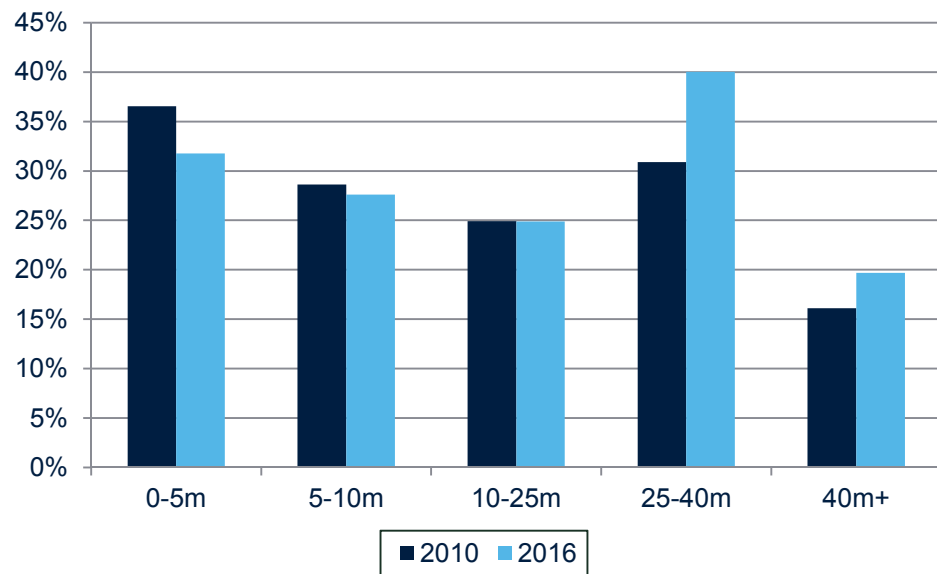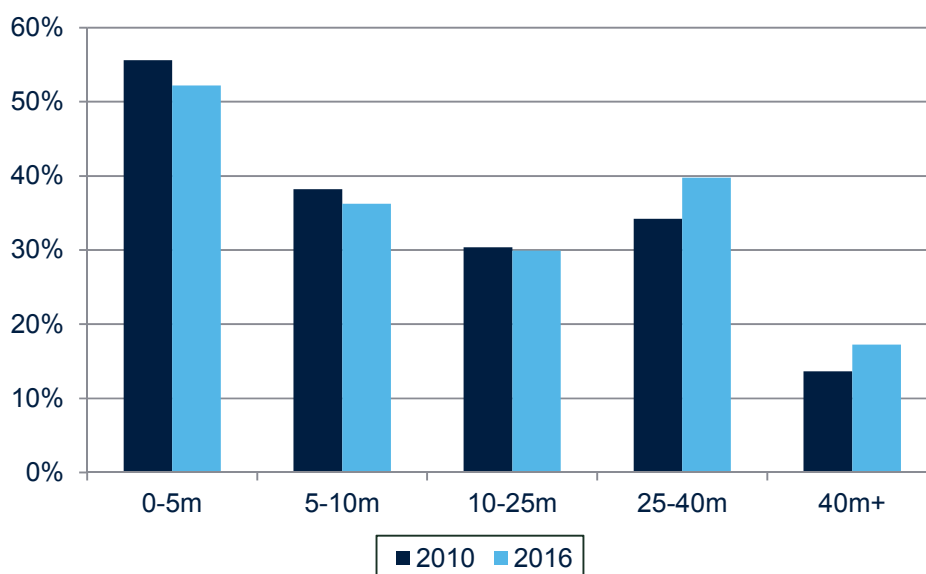

Source: Oxera analysis of OAG data.

Figure A6.3   Proportion of seats on routes with competitors by airport size, 100km catchment area and 100% frequency threshold, 2010 vs 2016
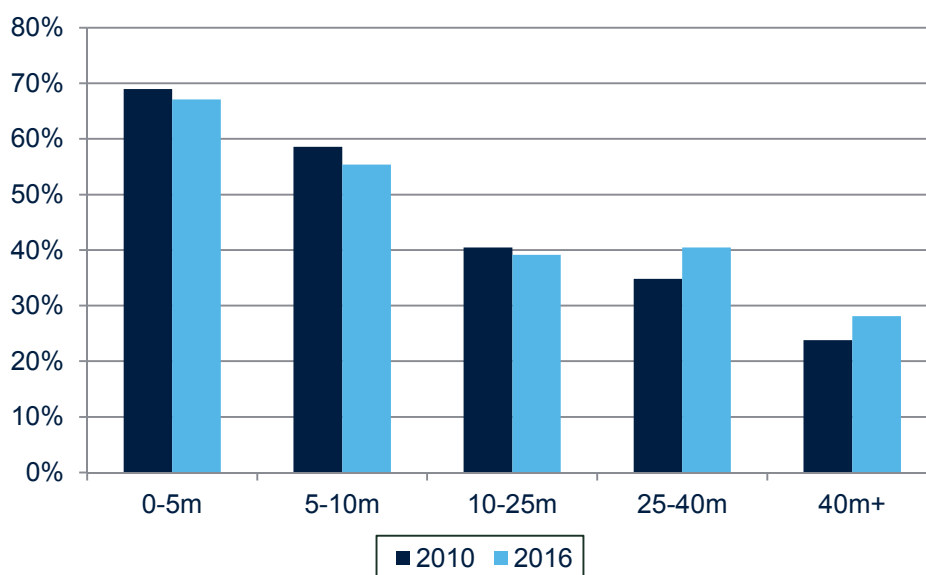

Source: Oxera analysis of OAG data.

Figure A6.4   Proportion of seats on routes with competitors by airport size, 150km catchment area and 50% frequency threshold, 2010 vs 2016

Source: Oxera analysis of OAG data.

Figure A6.5   Proportion of seats on routes with competitors by airport size, 200km catchment area and 50% frequency threshold, 2010 vs 2016

Source: Oxera analysis of OAG data.