



Discussion Paper 02: Aviation Connectivity and the Economy

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1. Introduction

- 1.1 As people and goods travel to more and more distant places, and with the increasing globalisation of our economy and society, aviation connectivity – which can be broadly defined as the ability and ease with which passengers and/or freight can reach a given destination by air – has taken centre stage in the debate on the UK’s future global transportation needs.
- 1.2 In this paper, we explore how the aviation connectivity of the UK may contribute to the economy of the country as a whole. As such, the paper is structured around three main themes, each of which constitutes a separate chapter.
- 1.3 **Chapter 2** explores key drivers of connectivity and provides an overview of how well connected the UK is to different regions of the world, and how it has performed in comparison to other European countries over time.
- 1.4 **Chapter 3** considers evidence for the argument that aviation connectivity supports the UK’s economic growth through facilitating the following channels: trade in goods and services, tourism, business investment and innovation, and productivity. The chapter also sheds light on what kind of connectivity seems to be most relevant for each of these channels and how it may be improved to serve each of them to a greater extent in the future.
- 1.5 **Chapter 4** discusses a range of options for measuring connectivity and assessing the importance of different routes. Developing appropriate measurements of connectivity will help inform the Commission’s assessments of the UK’s current and future requirements for aviation capacity, and the potential effects of capacity constraints on access to the most important destinations.
- 1.6 **Chapter 5** sets out a range of questions on which we would welcome evidence and views, and provides guidance on how to make submissions.
- 1.7 **Chapter 6** provides a list of references.

2. The nature of the UK's connectivity

What do we mean by connectivity?

2.1 Few people, if any, take flights for their own sake. Demand for aviation is ultimately driven by a need or desire to do other things – to win new business, to meet clients or suppliers face-to-face, to participate in conferences or other events, to see friends and families or to enjoy the benefits of a holiday abroad. At its heart, connectivity is about making these activities as easy as possible, given the geographic separation involved. A number of different factors have been highlighted that can influence this:

- Can the final destination be reached directly or is a transfer required?
- Is a flight available at the right time of day or day of the week?
- How reliable are flights and connections?
- How accessible are airports from a passenger's origin or destination?
- How much does a flight cost?

2.2 Consumers in the UK have benefitted from a long-term decline in real air fares of around 60% in the last two decades¹ and the CAA highlights that 90% of the UK population live within 2 hours of an

airport with international connections.² As such the connectivity debate in the UK has tended to focus on the issue of breadth and depth of international connections, both transport connections and communication channels that may grow in importance as technology advances, between countries, cities or airports. This is the focus of this first section of the paper.

What does the UK's international connectivity look like?

2.3 The UK has a strong aviation sector that served 219 million passengers in 2011. London in particular, with its five key airports, is one of the world's biggest single aviation markets. Together the capital's five airports serve more passengers than any other world city³ and, in Heathrow, it incorporates the most heavily used international airport in the world.⁴ A number of indicators of the nature of international connectivity from the UK are provided in Figures 2.1, 2.2 and 2.3.

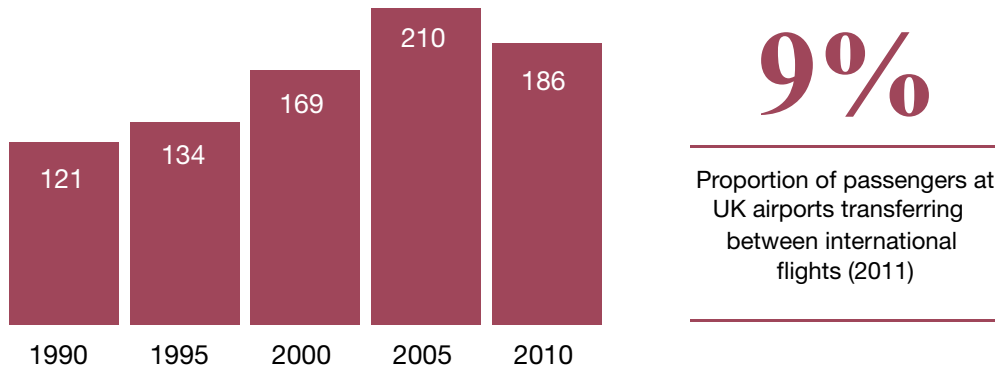
1 HMT (2011), "Reform of Air Passenger Duty: A consultation"

2 CAA (2011), "CAA Insights: Aviation Policy for the Consumer"

3 CAPA centre for aviation based on data from Airports Council International. <http://centreforaviation.com/analysis/beijing-to-overtake-london-as-worlds-largest-aviation-hub-massive-new-airport-planned-58776>

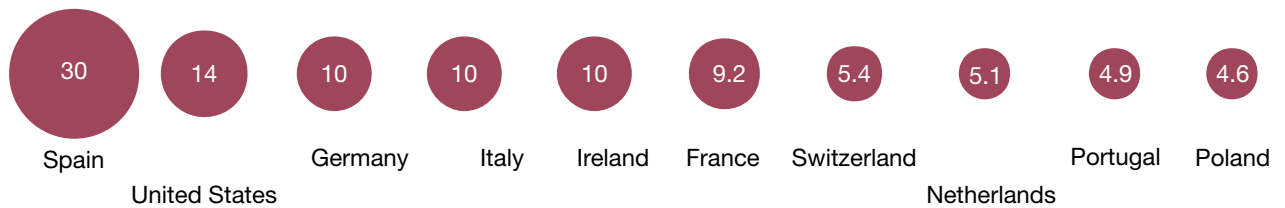
4 DfT Transport Statistics Great Britain (TSGB) 2011; DfT TSGB 2012

Figure 2.1: Total numbers of destinations served daily from UK airports



Source: Civil Aviation Authority (CAA); CAA Passenger Survey.

Figure 2.2: Top 10 destination countries served by UK airports (millions of passengers)



Source: Civil Aviation Authority (CAA); CAA Passenger Survey.⁵

Figure 2.3: Top 10 destination countries accessed via a hub outside of the UK (millions of passengers)



Source: CAA; CAA Passenger Survey.⁶

2.4 The UK's aviation market has expanded rapidly over the last two decades with an increase in the number of destinations served daily to more than 220 at its pre-recession peak in 2007.⁷ The majority of the best served destinations from the UK are short-haul with leisure appeal or provide access to key trading partners such as the USA. The number of routes served from the UK is supported by a large number of international transfer passengers, accounting for around 9% of total

terminal passengers, which allow airlines to supplement local demand in order to make a wider range of routes and destinations viable.

2.5 Indirect travel via airports in other countries may in some cases provide an alternative to travel via UK airports. Around 10% of passengers at UK airports currently choose to make their journey via airports abroad.⁸ Whilst in many cases these indirect journeys help facilitate long-haul travel to countries such as Australia and New Zealand, a number of the most frequently accessed countries, such as United States, Italy and Germany, appear in both the top 10 lists for direct

5 As the CAA survey covers different airports in different years, UK-wide estimates have been created drawing on data from a number of years. They represent the latest estimates available

6 As above

7 CAA

8 CAA Passenger Survey

Table 2.1: Frequency of services to global regions from selected airports and cities

Number of destinations by world region with at least a weekly service, 2011					
	London (5 airports)	Paris (3 airports)	Frankfurt (1 airport)	Madrid (1 airport)	Amsterdam (1 airport)
UK	17	18	9	9	24
Other Europe	228	163	130	109	121
North America	33	23	26	12	22
Asia	33	33	42	7	26
Africa	32	52	23	16	23
Latin America & Caribbean	17	16	17	25	14
Other	4	4	3	0	0
Total	364	309	250	178	230

Source: OAG, 2011 data.

and indirect travel. Airports across the UK play an important role in providing these indirect connections through linking their passengers to other international hubs: for example, Birmingham and Manchester airports together provide more than 5,000 flights per year to Amsterdam Schiphol, 4,000 to Paris Charles de Gaulle, nearly 3,500 to Frankfurt and more than 1,500 to Dubai.

2.6 Within this overall UK picture, the 5 major airports located around London account for around 60% of all passengers served. Together the capital's five major airports serve more destinations than the airports of any other European city⁹ – over 360 destinations with at least a weekly service. Heathrow also plays a unique role in supporting the UK's and London's overall connectivity. It is by far our largest airport in terms of overall passenger numbers and accounts for around 70 per cent of passengers travelling to long-haul destinations.¹⁰

2.7 Table 2.1 and Figure 2.4 provide a comparison of destinations served by the airports of London and other major cities or airports in Western Europe and the Middle East. The regions shaded in darker colours in Figures 2.4 are served with greater frequencies. The UK's relative strength in serving transatlantic routes is reiterated with more than 35,000 flights per year to the USA from London airports compared to around 13,000 per year from Paris' airports. London airports also have relatively good direct services to India compared to other European airports with nearly 5,000 services per year compared to 2,700 from the two Frankfurt airports and Munich combined.

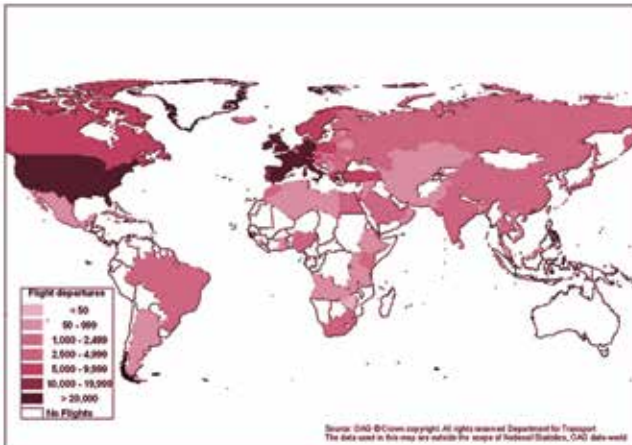
2.8 However, other cities and airports are relatively stronger at serving other regions of the world. Paris has weekly services to 52 destinations in Africa compared to 32 from London airports. There are nearly 3,000 services scheduled to China from Paris compared to under 2,000 from London airports, which can partially be explained by London passengers transferring to destinations in China through a hub in Hong Kong. Frankfurt

⁹ CAA, "CAA insights: Aviation Policy for the Consumer"

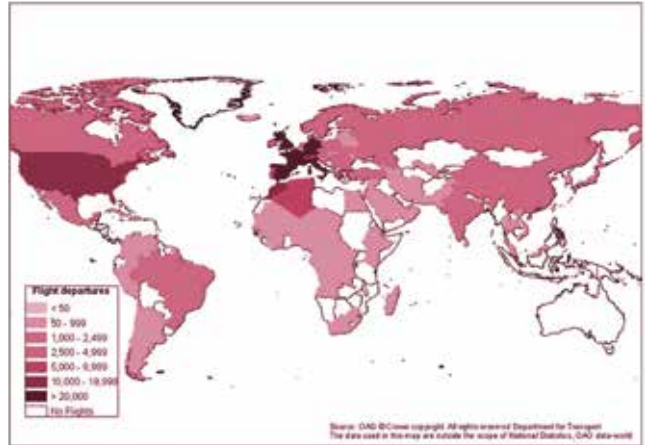
¹⁰ CAA

Figure 2.4: Frequency of services to global regions from selected airports and cities

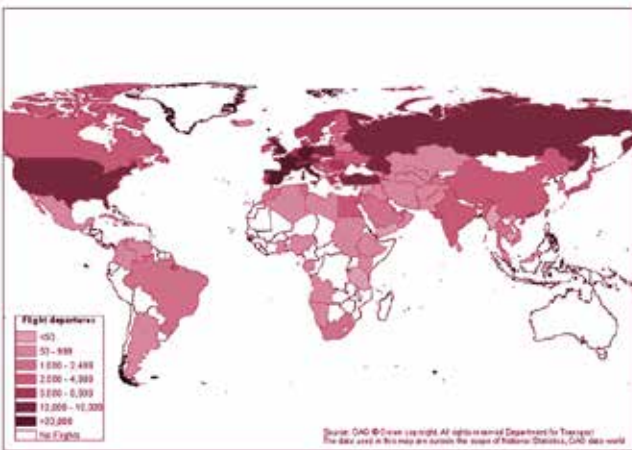
London airports



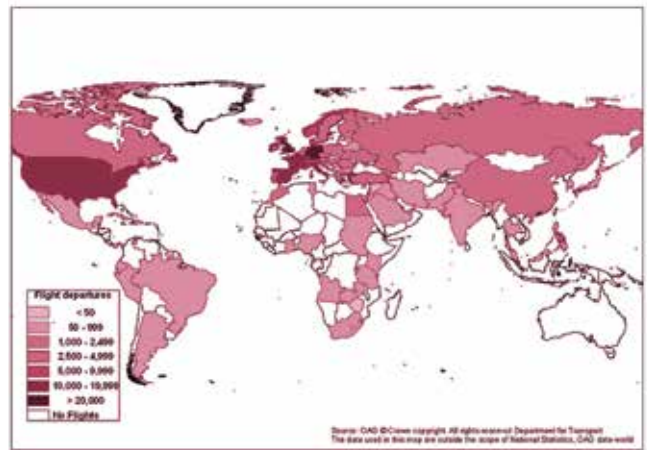
Paris airports



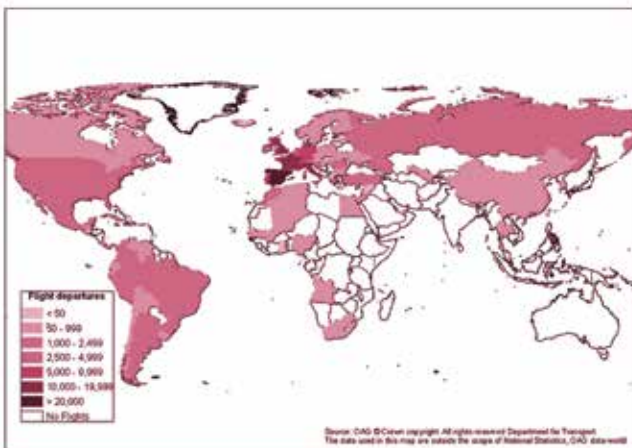
Frankfurt airports and Munich



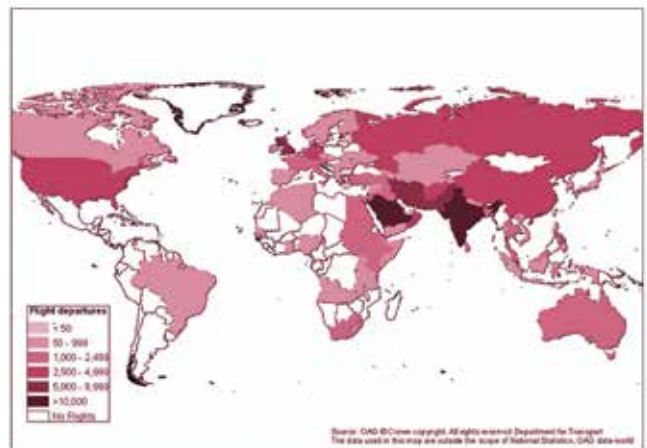
Amsterdam Schiphol airport



Madrid Barajas airport



Dubai International Airport



Source: OAG, 2011 data.

Airport serves 42 destinations in Asia on a weekly basis compared to 33 from London airports whilst the two Frankfurt Airports and Munich combined provide more than 10,000 services per year to Russia compared to around 4,000 from London airports. Madrid-Barajas airport serves 25 destinations across Latin America and the Caribbean compared to just 17 served from Heathrow. Dubai International has grown rapidly in recent years and offers more than 19,000 services to India and comparable numbers of services to China as are available at both Paris and Frankfurt.

2.9 The pattern and depth of these connections appears to be in part driven by historical and cultural ties, for example the historical connections between Spain and Latin America appear to have played a role in shaping the network of connections available from Madrid Barajas. Trade and business specialisation also influence the route network served by the UK airports, for example by providing many frequent flights to Hong Kong. Another important

driver may be geographical location of the airports relative to the origins and destinations of passengers that may wish to connect onwards. For example, Dubai's position in the Middle East gives it a natural advantage in serving European traffic wishing to travel further East.

2.10 *This raises a key question: to what extent can the UK's international aviation network adapt to changing connectivity needs?* Whilst the UK is an important transfer point for traffic between the United States and Europe, it may not be as well positioned to serve alternative, emerging aviation markets. For example, transfer traffic wishing to travel from Central Europe to Asia would be required to travel for several hours in the wrong direction in order to transfer at a UK airport.

2.11 Table 2.2 gives the ten economies that the IMF forecasts to increase the most between 2012 and 2017. This provides an indication of which economies are likely to become increasingly important trading partners going forwards and

Table 2.2: GDP growth projections versus numbers of services available from Heathrow and Gatwick for top 10 countries

	Increase in GDP 2012-2017 (international dollars, bn)	Numbers of services from Heathrow and Gatwick in 2012
1. China	7,800	1,800
2. United States	4,100	35,800
3. India	2,300	4,900
4. Russia	800	4,000
5. Brazil	800	1,200
6. Japan	700	1,700
7. Indonesia	600	0
8. South Korea	500	900
9. Germany	500	30,000
10. Mexico	500	700

Source: IMF World Economic Outlook Database (Oct 2012); OAG data

where future aviation demand could arise.

2.12 Aside from the United States, the top five includes the four emerging BRIC (Brazil, Russia, India and China) economies. Table 2.3 and Figure 2.5 compare the levels of service to the BRIC countries from major European airports. Between 1990 and 2011, Frankfurt airport saw the largest increase – from 9 to 24 – of different BRIC destinations served at least weekly. The number of daily connections to BRIC countries from Heathrow reached its peak at 15 in 2006 and, although there are still 15 destinations served at least weekly, the frequency of services has dropped on some routes due to a greater focus by airlines on North American and other destinations.¹¹ Most of the routes for which the frequency of service has been reduced are within Europe, with notable exception of Osaka (Japan) and Raleigh (USA).

2.13 However, airlines in the UK do still appear to have responded to growing demand for travel to these countries. Heathrow has actually seen a bigger increase in the number of services to BRICs than the other major European airports over the period 1990-2010, including new flights to Guangzhao and, from later this year, to Chengdu. Since Heathrow’s capacity is constrained, this increase of the number of services to BRICs to some extent comes at the expense of connectivity to regional UK airports. Gatwick Airport is also attracting increasing numbers of services to growing markets. Air China is already serving the Gatwick to Beijing route, for example, and a service to Indonesia from Gatwick will commence in autumn 2013, addressing the connectivity gap identified in Table 2.2.

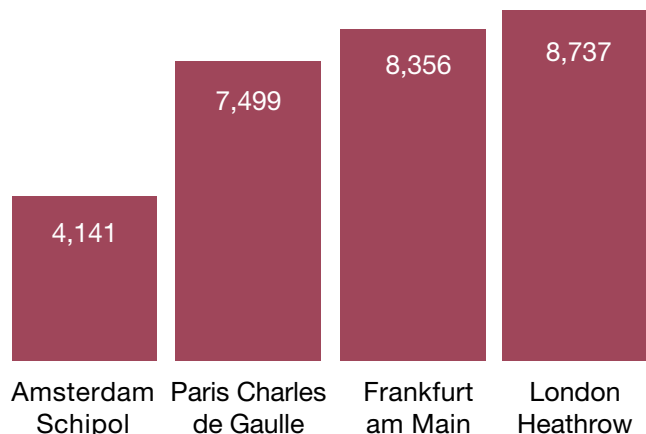
The establishment of these services at London’s second largest airport may reflect the scale of London’s origin and destination (O&D) market, which is the largest in Europe.

Table 2.3: Numbers of destinations served in BRIC countries from major European airports

Numbers of destinations served in BRIC countries (2012)	
Amsterdam Schiphol	13
Paris Charles de Gaulle	12
Frankfurt am Main	24
London Heathrow	15

Source: OAG data.

Figure 2.5: Increase in number of flights to BRIC countries between 1990 and 2010 (excluding Hong Kong)



Source: OAG data.

Conclusion

2.14 The UK aviation market appears to offer a high level of connectivity, enabling people and businesses to travel efficiently and link effectively to a wide range of markets. The majority of UK aviation serves short haul markets, with the airports serving London and the South East providing routes to more destinations than from any other European city, and with other UK

¹¹ CAA

airports also providing valuable direct connectivity in the short-haul market.

2.15 UK's strongest long-haul links in comparison to its other European nations appear to be to North America and India, which may reflect both cultural and historic factors as well as (in the case of North America) London's geographical position at the western edge of Europe. Although the majority of the UK's long haul traffic flies via Heathrow, other airports also offer valuable long haul connectivity through direct flights and by providing links to Heathrow and to other global hubs in Europe, North America and the Middle East.

2.16 The UK's high levels of connectivity are reflected in its standings in various international connectivity rankings¹² – with the UK regularly rated as one of the best world's connected nations, as shown in the tables below.

2.17 The picture for connections to areas with expected high economic growth appears to be more complicated. Whilst the depth of connections to BRIC countries, for example, appears to have

kept up with other major European economies, the numbers of cities served has not. The UK also has fewer direct links to other fast growing regions of the world, such as in Africa and Latin America, than some of its European competitors.

2.18 **Chapter 3** proposes a number of channels through which connectivity might enable and support economic activity, or in which constraints on connectivity might act as a barrier to growth.

2.19 Given the different factors affecting connectivity it is not surprising that a number of different ways of comparing and measuring connectivity have been proposed. These can vary from reviewing the number of destinations served to incorporating the frequency of service or more sophisticated approaches that, for example, try to capture the economic importance of destinations.

2.20 **Chapter 4** reviews the advantages and disadvantages of alternative approaches to measuring connectivity.

Table 2.4: Top five countries in the IATA and World Economic Forum connectivity rankings, 2012

IATA Connectivity Index
1. United States
2. China
3. Japan
4. Germany
5. United Kingdom

World Economic Forum Connectivity Index
1. United States
2. China
3. United Kingdom
4. Japan
5. Germany

Source: IATA data; World Economic Forum: *The Global Competitiveness Report 2012-2013*

¹² Methodology behind these indexes is outlined in Table 4.1 in Chapter 4

3. How may aviation connectivity contribute to the UK's economy?

Introduction

- 3.1 The aviation sector may benefit the UK's economy in several ways.
- 3.2 Airports and airport-related sectors generate output and employment in their neighbourhood, also through attracting other businesses to their vicinity. In 2011, the whole annual UK air transport sector's turnover was around £28 billion and it generated around £9.8 billion of economic output. The sector employs about 120,000 workers directly and supports many more indirectly.¹³ These figures do not include the aerospace sector, which is summarised below.
- 3.3 The UK has the second biggest aerospace industry in the world in terms of turnover and is one of only a few countries involved in the design, development, manufacture and maintenance of the full range of aircraft products. The sector has an annual turnover of about £23 billion of which 70 per cent is exported.¹⁴ It directly employs around 100,000 high-skilled workers.¹⁵
- 3.4 Apart from the direct GDP and employment benefits, the aviation sector

contributes to the economy through creation of GDP and employment within the aviation supply chain. For example, an Oxera report on the aviation sector and its economic footprint estimated the indirect contribution of the aviation supply chain to have been £9.6 billion GVA and 93,000 jobs in 2007.¹⁶

- 3.5 Employment and output are also supported by the spending of those directly or indirectly employed by the aviation sector. Aviation creates workplaces that on average are much more productive than in the rest of the economy. This higher labour productivity in turn creates positive spillovers to the economy – workers in the aviation sector spend more and pay more taxes to the Exchequer.
- 3.6 Aviation also plays a crucial role in contributing to the growth of the wider economy through facilitating the movements of goods and services, workers and tourists, investment and ideas, etc. It connects UK industry and consumers with the global market place and provides the fastest way for people and goods to travel across long distances. For people doing business in most international markets there is often no real alternative to aviation as a mode of transport. As such, good aviation links facilitate trade and investment, enhances communications and business interactions and improve efficiency

13 ONS, *Annual Business Survey 2011*, <http://www.ons.gov.uk/ons/datasets-and-tables/index.html?pageSize=50&sortBy=none&sortDirection=none&newquery=annual+business+survey&content-type=Reference+table&content-type=Dataset>

14 *UK Aerospace Industry Survey*, Aerospace, Defence, Security Trade Association (ADS), 2010 <http://www.adsgroup.org.uk/pages/07003420.asp>

15 ADS Survey, <http://www.adsgroup.org.uk/pages/07003420.asp>

16 Oxera (Nov 2009), "What is the contribution of aviation to the UK economy?"

through time savings, reduced costs and better reliability.

3.7 It is challenging to establish and value the specific contribution made by aviation in this last area, and there is limited direct evidence available, which may reflect the fact that aviation links in most cases will only be one of a number of factors influencing business decisions and patterns of investment.

3.8 Therefore, in order to explore how aviation connectivity may facilitate economic growth, we have identified five channels through which we would expect aviation to play a positive enabling role, or where connectivity constraints may act as a barrier to growth. This chapter considers the role that aviation may play in each case, and seeks to identify trends and data within the wider evidence base of relevance to that assessment. We would welcome evidence and submissions, including case studies as well as quantified data, which might support or challenge our proposals.

- **Trade in services:** For two decades, the UK has been running services surplus with the rest of the world. Aviation connectivity is very important from the point of view of many key UK services sectors due to their high dependence on face-to-face contact and on visiting clients overseas. As such, connectivity facilitates exports of UK services, enabling UK entrepreneurs to have easier and more effective access to a variety of international customers. Conversely, UK residents may benefit from a wider choice of services when overseas services suppliers get easier access to the British market.

- **Trade in goods:** In 2011, goods worth £116 billion were shipped by air freight between the UK and non-EU countries, representing about 35 per cent of the UK's extra-EU trade by value, but only a very small proportion of it in weight.¹⁷ This is due to the fact that airplanes mostly carry light or perishable goods of very high value. Air freight is a key element of the supply chain in the advanced manufacturing sector, where time is often critical.
- **Tourism:** In 2011, Britain was visited by 31 million people who spent about £18 billion. In addition outbound tourism supports UK-based jobs in the tourism sector and provides benefits to UK residents who would like to travel to faraway places.
- **Business investment and innovation:** International connectivity from passenger air services is important in attracting international business headquarters and foreign investment into the UK. London's connectivity helps sustain clusters of specialised high-value services sector in the UK such as financial, legal, IT consultancy, business management and chemical sectors which are knowledge-intensive and increasingly global in operations.
- **Productivity:** Through encouraging new ways of working and operating businesses, connectivity facilitates business to business interactions which may produce agglomeration benefits, job matching and other factors that have positive impact on productivity in the long run.

¹⁷ CHIEF Non-EU data, HMRC, 2011(provisional data), <https://www.uktradeinfo.com>

3.9 It is important to point out that all channels mentioned above can be facilitated by either *different* kinds of connectivity (not only *aviation* connectivity) such as sea transport or by focusing on other policy changes that may deliver a better value-for-money outcomes, especially when technological change is considered.

3.10 Since this paper focuses on the economic benefits of aviation connectivity, for each of the abovementioned channels, the following sections of the paper will first outline why connectivity may play an important role in facilitating them and what arguments and counter-arguments can be found to support or dispute this notion. Then they will focus on the *nature* of connectivity that seems to be most relevant in supporting these channels, in light of how connectivity

may be improved to better serve them in the future. The sections also briefly touch upon on policy alternatives to aviation connectivity improvements for each channel. How well these are served by the current state of UK's connectivity is touched upon in **Chapter 4**.

Trade in services

3.11 Trade in services makes a significant contribution to the UK economy and the country has run a significant trade surplus since 1983. Areas of particular strength for the UK include financial services, insurance and the creative industries. The City of London hosts one of the world's pre-eminent financial services clusters, and the two largest creative hubs in Europe are found in London and Manchester.

Table 3.1 Air intensity of key UK export sectors, 2010

Rank	Sector	UK Share of world exports
1	Financial services	17.9%
2	Insurance	12.3%
3	Personal, cultural and recreational services	9.2%
4	Communications	8.9%
5	Other business services	8.0%
6	Aerospace	6.0%
7	Royalties and licence fees	5.8%
8	Computer and information services	5.4%
9	Chemicals/related Industries	4.0%
10	Transport	4.0%

Rank	Sector	Share of UK aviation expenditure
1	Financial services	14.8%
2	Air transport	11.3%
3	Ancillary transportation activities	6.3%
4	Postal and courier activities	6.3%
5	Wholesale trade	6.1%
6	Insurance and reinsurance	4.8%
7	Head office and management consultancy activities	3.3%
8	Public administration and defence	2.7%
9	Motor vehicles distribution and report	2.6%
10	Travel agency and tour operators	2.3%

Source: BIS (Sept 2012), *Industrial Strategy: UK Sector Analysis*; ONS input-output tables, 2010

3.12 Many of the service sectors in which the UK competes most effectively are particularly reliant on aviation, as they comprise highly globalised firms that serve an international client base. This is reflected in the high proportion of aviation in the transport expenditure of this sector and the high expenditure per each services-sector employee. This includes financial and business services, and oil, manufacturing and engineering, construction, retail, higher education, health, and media.

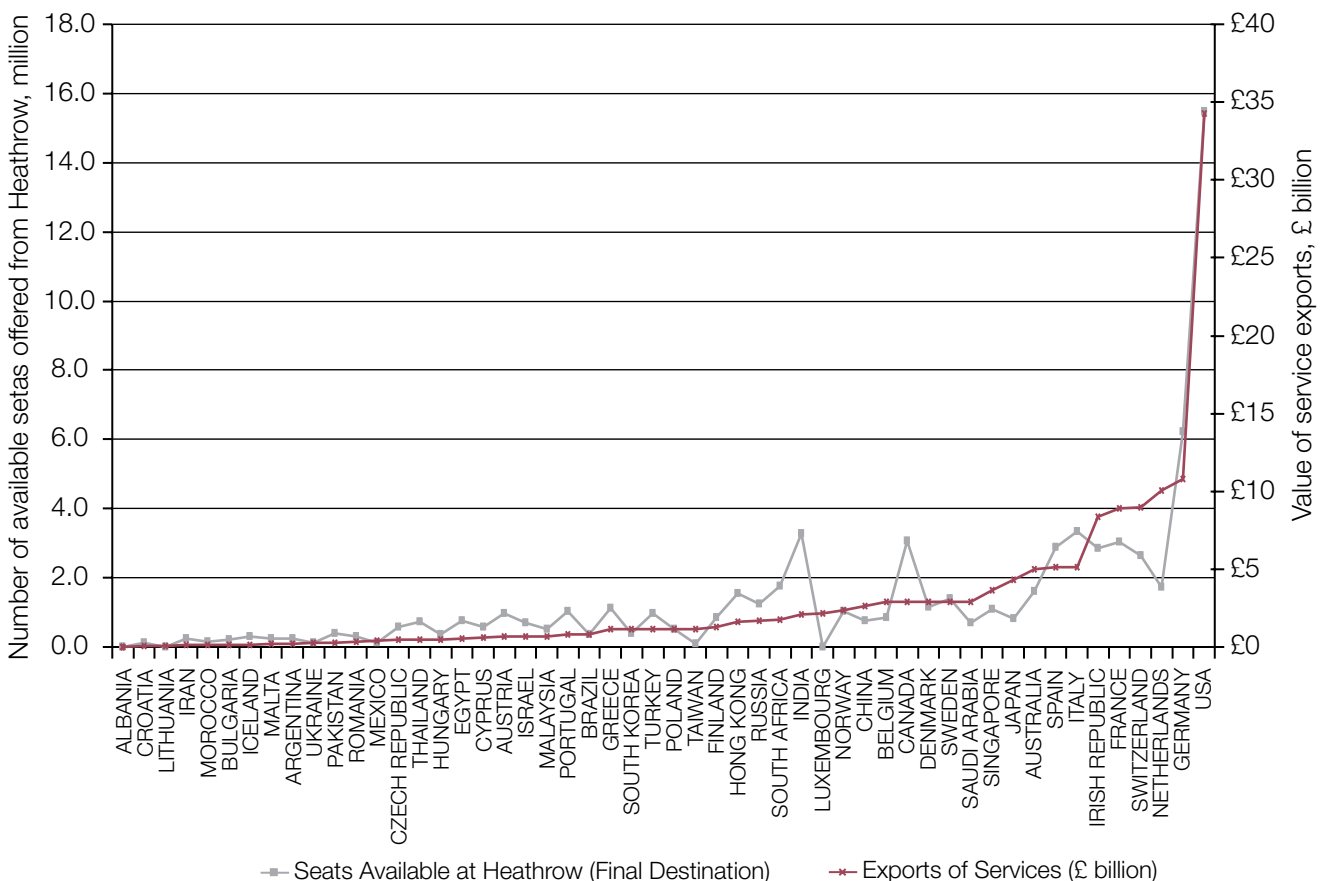
3.13 This can be seen in Table 3.1, which compares the ten top performing export sectors for the UK in terms of their share of total world exports with the UK's top ten sectors in terms of aviation expenditure. Although the two lists are not identical, many of the same sectors

appear in both – including financial services, insurance and transport.

3.14 These sectors also use high proportions of their total transport expenditure for aviation – more than seventy per cent in the case of banking and finance and more than forty per cent in the case of the insurance sector, for example. The creative industries also see very high spending on aviation relative to total transport expenditure (almost two thirds of the total in this case).

3.15 The importance of aviation connectivity for the UK's trade in services is also reflected in the apparent correlation between the level of service provided from the UK's major airport to particular countries and the value of service sector exports in each case. This is shown in Figure 3.1.

Figure 3.1: Value of UK services exported to foreign countries (£bn) and the number of seats available from Heathrow (based on final destinations), 2010



Source: DfT statistics

3.16 These associations between aviation connectivity and trade in services may reflect causal relationships in both directions. It is likely that the existence of strong trade links with particular nations will create demand for aviation to those regions and support the case for air routes to be opened up or thickened by the airline industry. But it is also possible that an enhanced level of connectivity may help to support growth in trade with the markets at the other end of the route, as it enables contacts to be made and relationships with potential clients and suppliers to be built more effectively.

3.17 While connectivity alone is insufficient to create trade (companies will not trade with partners just because there is a transport connection), it is one of the key factors that make trade flourish (companies are less likely to do business with partners located in places that are not well connected). Increasing trade with a region may increase the aviation market and hence the number of passengers to that region, further facilitating trade links – what is often called the virtuous circle of trade and connectivity. Constraints on connectivity to particular markets – for example, the fast-growing economies of newly-industrialising countries – could thus pose a risk to the UK services sector as it might increase the costs and reduce the feasibility of access to those markets for UK firms.

3.18 Research published by the CAA indicates that the fastest growth in business passengers between 1996 and 2007 was mainly in emerging markets such as China, India and the Middle East. The route to Shanghai in particular saw growth of more than 2,500 per cent in business passengers over this period, and the routes to Beijing, Mumbai, Bangalore, Chennai, Dubai, Abu Dhabi and Doha also experienced rapid

expansion.¹⁸ These increases were in most cases from low bases, and it should also be noted that this data pre-dates the recession, but recent survey data published by the Institute for Directors indicates a significant majority of their members expecting the importance of direct air access to emerging markets to increase over the coming decade.¹⁹ This is likely to include the fast-growing countries of Africa, Latin America and the Far East to which the UK currently has few direct links.

3.19 Where the establishment of new routes is dependent on high volumes of transfer traffic, the capacity constraints already evident at Heathrow could over time impact the ability of the airports sector to accommodate any long-term growth at these rates in such markets. The recent establishment of a number of long-haul routes to emerging markets from Gatwick, including the recent announcement of a new route to Jakarta,²⁰ indicates that, given the scale of London's O&D market, there is also potential for competition within the UK airports sector to support the diversification of the UK's aviation network.

3.20 Aviation connectivity will not be the only factor enabling or hindering trade with particular markets, however, and it is important to consider the wider context and other issues which may affect trade decisions in these sectors. Visa regimes and shared languages and cultures may have a role to play in establishing new trade links, as may the overall competitiveness of the UK market in each sector.

18 CAA (Nov 2011), "Flying on business: a study of the UK business air travel market", p. 34

19 IoD (Dec 2012), "Infrastructure for Business: Flying into the Future", p. 60

20 <http://www.mediacentre.gatwickairport.com/News/Garuda-chooses-London-Gatwick-to-connect-the-UK-non-stop-to-Indonesia-and-South-East-Asia-7c9.aspx>

3.21 In addition, improvements in communications technologies may provide other means of establishing and maintaining links with potential trade partners, including through telepresencing or videoconferencing. However, although the increasing quality offered by these technologies may enable them to provide a more effective substitute for aviation over time, it is equally possible that their efficiency in supporting global networks of business contacts may mean that they generate additional demand for aviation. This is reflected in the UK Climate Change Committee's report on aviation, which found that the likely effect of video conferencing on aviation demand was broadly neutral (whilst noting the scope for reductions in other scenarios).²¹

3.22 In considering the value and importance of aviation connectivity for trade in services, it is important to note that it is not only the existence of a link, but also the frequency and convenience of flights which is likely to be important. Since the services sector strongly relies on visiting clients overseas, *frequency* of flights may form a key element of connectivity to the sector as it increases flexibility with which business meetings can be arranged and with which they can be rescheduled at a short notice. To the extent to which time matters for some branches of the services sector, e.g. in

banking and finance, *directness* of flights may also be important, so that business trips in both ways are as short and as convenient as possible.

3.23 This is borne out in recent surveys of the business community – for example, the 2011 report prepared by York Aviation for the City of London, which identified both breadth (i.e. number of destinations) and depth (i.e. frequency of services) of connectivity as key priorities, as well as noting the importance of direct connections.²²

3.24 *The Commission would welcome submissions explaining how these factors affect business decisions and the wider issues which should be taken into account.*

3.25 That directness of routes is desirable, however, by no means implies that indirect routes over time may get replaced by direct ones once demand is high enough. Box 3.1 explains why indirect routes play an important role in the evolution of aviation networks and may be an important step in the establishment of direct routes to new destinations.

Box 3.1 The lifecycle of connectivity with an emerging country

When comparing a direct connection between A and B to an indirect one, the former provides consumers with greater benefits due to more time savings and a lower risk of delay. But that does not necessarily imply that indirect connections are less valuable to connectivity in all respects than the direct ones.

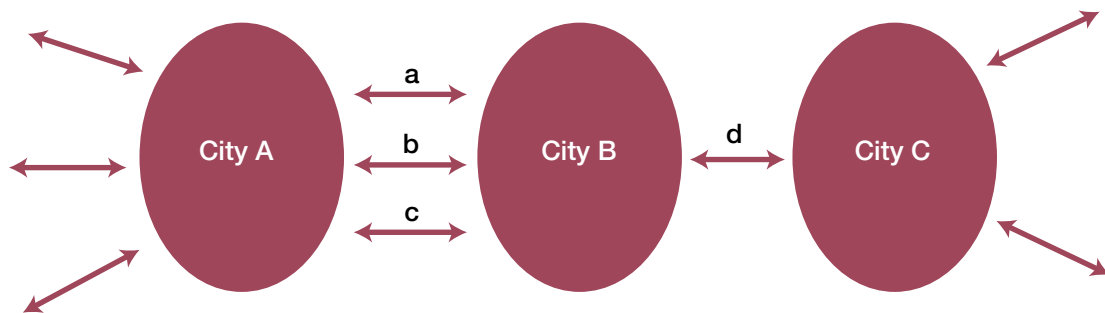
First, since indirect connections need less passenger demand to be sustained than direct routes, they may be able to serve a destination more frequently and at a lower price per ticket, offering more choice to consumers.

21 CCC (2009), "Meeting the UK aviation target – options for reducing emissions to 2050", p. 81

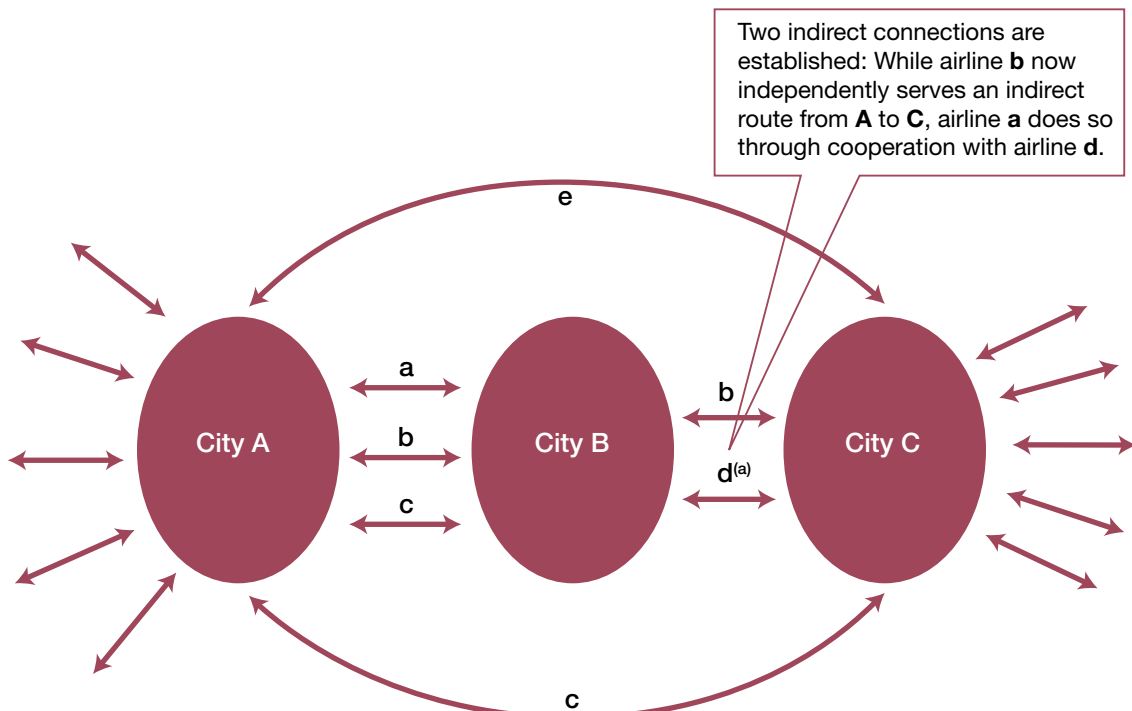
22 York aviation (Jan 2011), "Aviation Services and the City: 2011 Update", pp. 29-30

Second, indirect routes may be a first necessary step in the development of a direct service. Figures below shed more light on the role of indirect connections in the “lifecycle of connectivity” by providing a conceptual depiction of how one city may become well connected with airports in an emerging country (or region) to which it previously had no or very few connections.

Assume that there is little demand for flights from City A to City C which is in an emerging economy. Passengers who wish to travel between these cities will have to use indirect connections, often provided by different airlines or airline alliances as there are no direct flights. For example, as depicted in the figure below most passengers travelling from (or through) A will first take a flight provided by airlines a, b or c to City B as this city offers flights to City C. Airline d, at this stage is often a local or national carrier. Such indirect connections can also be found through other cities which we do not include in the figure for simplicity.



If demand for a connection between A and C starts growing as, for example, there is more appetite for trade and business links with a growing emerging market which is served by City C’s airport, at some point one or more airlines serving routes from A to B may start co-operating with airline d to serve an indirect connection between A and C. Other airlines may alternatively decide to open up a connection between B and C in order to provide their own indirect service.



If these indirect services are frequent enough to attract other types of demand – for example, business passengers who may be interested in setting up regular meetings in places where they can go frequently – demand for these connections may grow large enough for airlines to establish direct connections between A and C. Also, other airlines may be interested in opening direct connections to C from other airports in the region. This in turn will drive demand for feeder traffic – lured by the frequency of connections; some passengers will travel to A to transfer there to go to C, which in the picture is depicted by more arrows pointing into and out of City A.

Finally, direct connections between A and C may drive demand for routes from A to other destinations in the emerging country, which is depicted by arrows pointing into and out of City C.

Note that once direct connections are established, it does not necessarily imply that indirect connections between A and C will disappear – in fact, each of the network points may grow in size, fed by additional traffic. Ongoing indirect connections will still offer competition in terms of price and frequency of service for direct carriers. If any of the network points, however, is short of capacity, that may constrain the evolution of direct flights to the new destination despite growing demand for them.

Trade in goods

3.26 In 2011, goods worth £116 billion were shipped by air freight between the UK and non-EU countries. Although air freight carries a small proportion of UK trade by weight, it accounted for a third of the UK's extra-EU trade and about a fifth of all trade in 2011 by value.²³

3.27 These numbers reflect one of the most important characteristics of aviation which is that it provides quick access across long distances. Aviation thus is particularly important in supporting export-led growth in sectors where goods are light, compact, perishable and of high value. Over three-quarters of the UK's non-EU exports (by value) of optical, photographic, medical and surgical instruments and apparatus are exported by air.²⁴ Air freight is a key element of the supply chain in the advanced manufacturing sector in which the UK is looking to build competitive strength.

3.28 The importance of connectivity to UK trade in goods is reflected in the fact that Heathrow, the UK's best connected airport, is also by far the largest UK port in terms of exports by value to non-EU countries. In 2010, twice as many non-EU exports by value left the country from Heathrow compared to Southampton, the second biggest UK port on this measure. Over a quarter of all exports from the UK to BRICs and almost half of all goods exported from the UK to India go through Heathrow. On average each flight from Heathrow to BRIC countries is worth over £400,000 in goods exports and each flight to China is worth over £1 million.²⁵

3.29 *The Commission would be interested in evidence as to whether and to what extent capacity constraints at Heathrow are affecting the operation of these markets, as well as the air freight markets serving other emerging economies and major trade partners.*

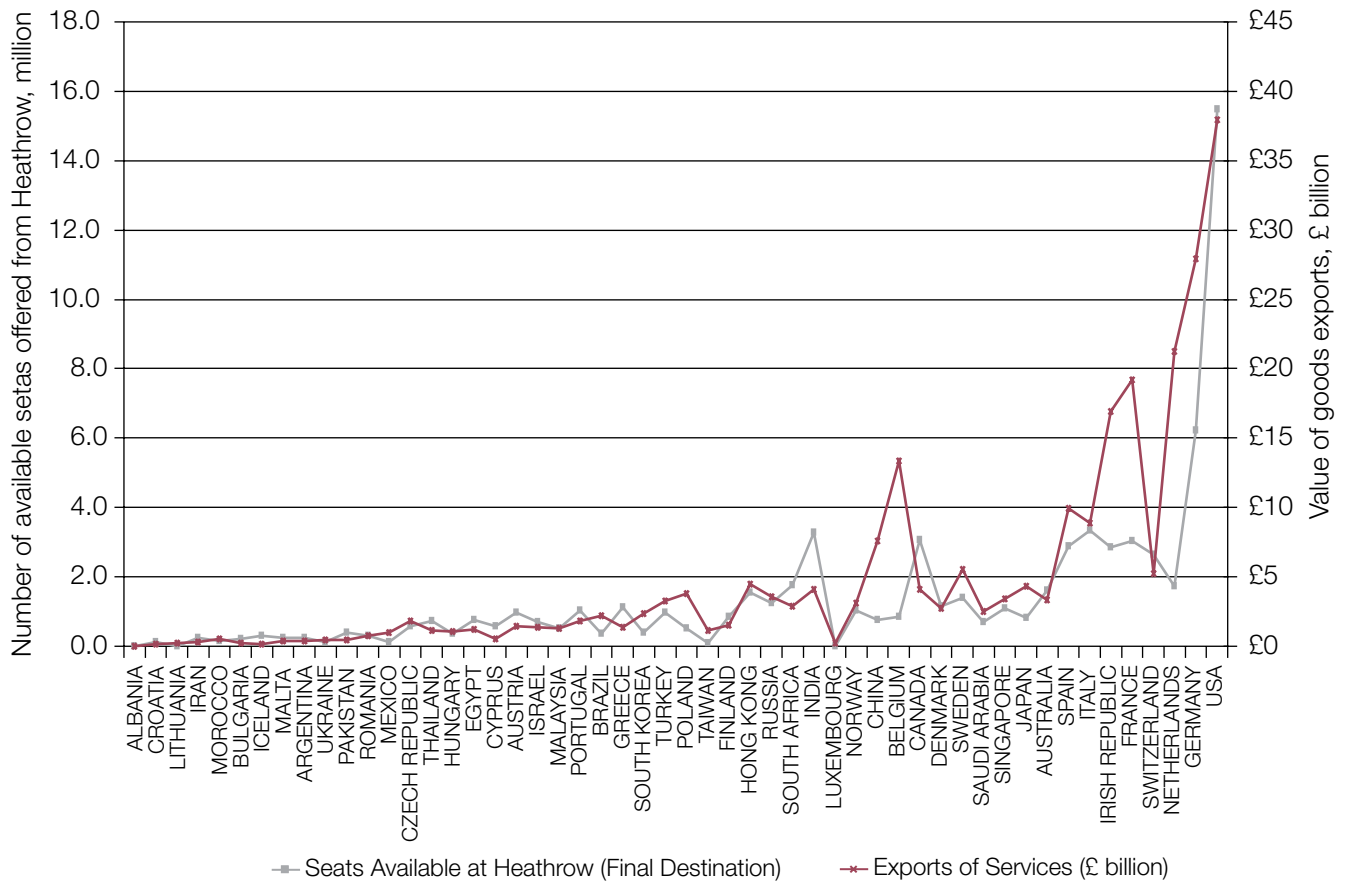
²³ HRMC Overseas Trade Statistics (CHIEF Non-EU data), HRMC, 2011 provisional

²⁴ BIS analysis of HMRC Overseas Trade Statistics

²⁵ Ibid

- 3.30 Belly-load freight (i.e. freight shipped in the belly-hold of passenger aircrafts) accounts for the majority of all air freight, while freight-only flights tend to dominate only the mail and express-parcels delivery sectors. In the UK, freight-only flights carry about 30% of all air freight by volume. Although a small number of such flights operate to Heathrow, the majority of such services operate to other airports, notably Stansted and East Midlands, where fewer operational restrictions apply (particularly in relation to night flights, reflecting the overnight nature of express delivery sector) and which are well located for access to the UK road network.
- 3.31 The fact that most of the goods sent by air are delivered as belly-hold is important for understanding what kind of potential impacts changes in aviation connectivity may have on trade in goods. If aviation connectivity for passengers declines or stagnates, this will also affect the freight market. This in turn is likely to drive up delivery prices per unit of freight and, as a consequence, the cost of exporting goods, which may have a negative effect on exports of goods from and into the UK. Belly-hold freight can be substituted with freight-only flights to the extent to which the latter can ensure both sufficient frequency of shipment and sufficient capacity to deal with shipments at a short notice.
- 3.32 Reductions or changes in aviation connectivity may therefore mostly impact those manufacturing supply chains that rely on having access to last-minute shipments of components from overseas. For example, as supply chains become more stretched (for example, through greater reliance on indirect connections) manufacturers may have to bear the cost of having to maintain higher stock levels or securing more expensive or less reliable channels of supply, which would increase the total cost of goods that they produce. Where firms aggressively compete on price of their inputs through utilising global supply chains (for example, in the high tech sector that produces such technologically advanced goods as solar panels or plasma TVs), lack of connectivity may negatively affect their competitive position.
- 3.33 *The Commission would be interested in receiving evidence in this area and case studies providing examples on where the availability of aviation links has directly influenced firms' supply chains.*
- 3.34 Figure 3.2 plots the value of UK exports by country against the number of available seats from the UK for 2010. As with trade in services, there appears to be a relatively strong correlation, although there are some near-European markets, such as Belgium, France and Germany, where the value of exports appears high. This is likely to reflect the ease of surface access for goods shippers have to these markets.
- 3.35 These data also indicate however that aviation connectivity is only likely to be one factor influencing the pattern of the UK's export trade in goods. The UK's main trading partners for the past 20 years have been the United States and Germany, and as noted above the correlation between aviation service density and exports does not hold strongly in the case of Germany.
- 3.36 It is also likely that wider factors are at play in relation to the UK's growing trade with emerging economies such as the BRIC nations. This has increased

Figure 3.2: Value of UK goods exported to foreign countries (£bn) and the number of seats available from Heathrow (based on final destinations), 2010



Source: DfT statistics.

five-fold over the past two decades, but as can be seen below, total exports to these four major markets remain lower than to Ireland or the Netherlands. This indicates the significant scope for continuing growth in trade with these markets.

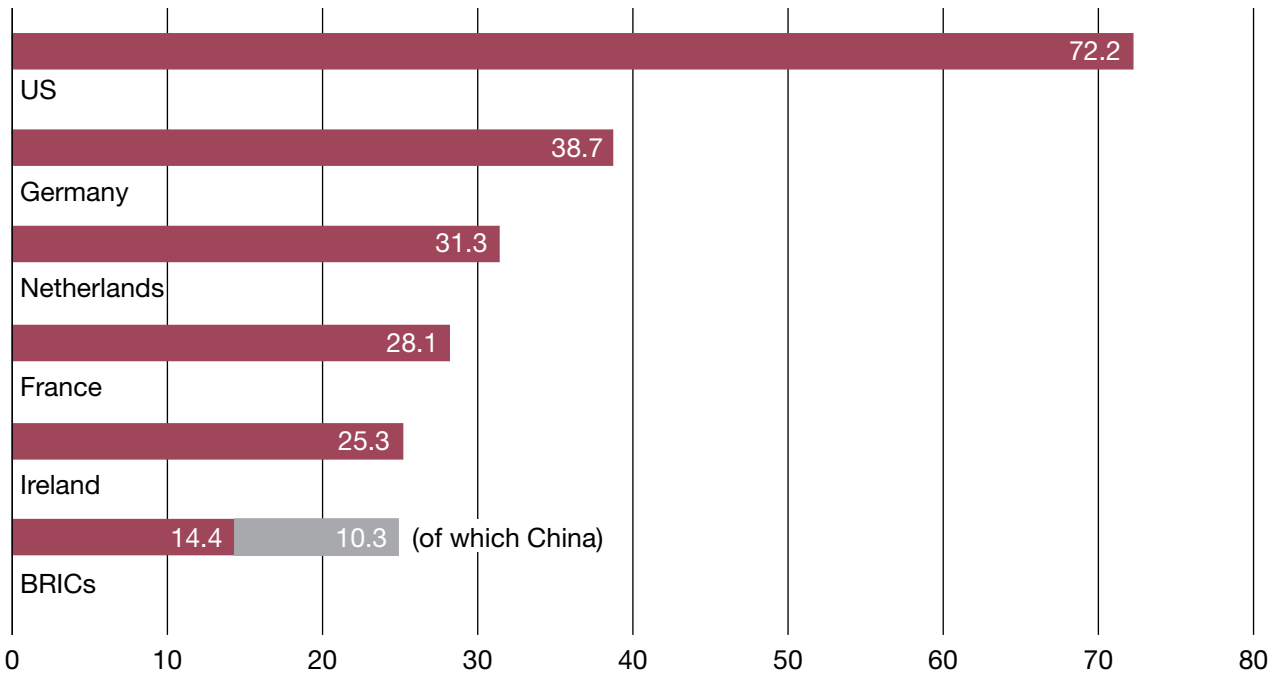
3.37 Apart from connectivity, other factors however must also be taken into account in considering how to secure more effective access for UK firms into some of these markets, for example the need for trade liberalisation. Figure 3.3 and suggests that enhancing aviation connectivity in isolation would be unlikely to drive increases in trade.

Tourism

3.38 Most overseas visitors arrive in the UK through an airport, and as Figure 3.4 demonstrates. The only UK tourism markets where non-aviation modes of transport have a significant share (France, Belgium, Germany, Ireland and the Netherlands) are from those countries where rail or sea transport provide a viable alternative to flying.

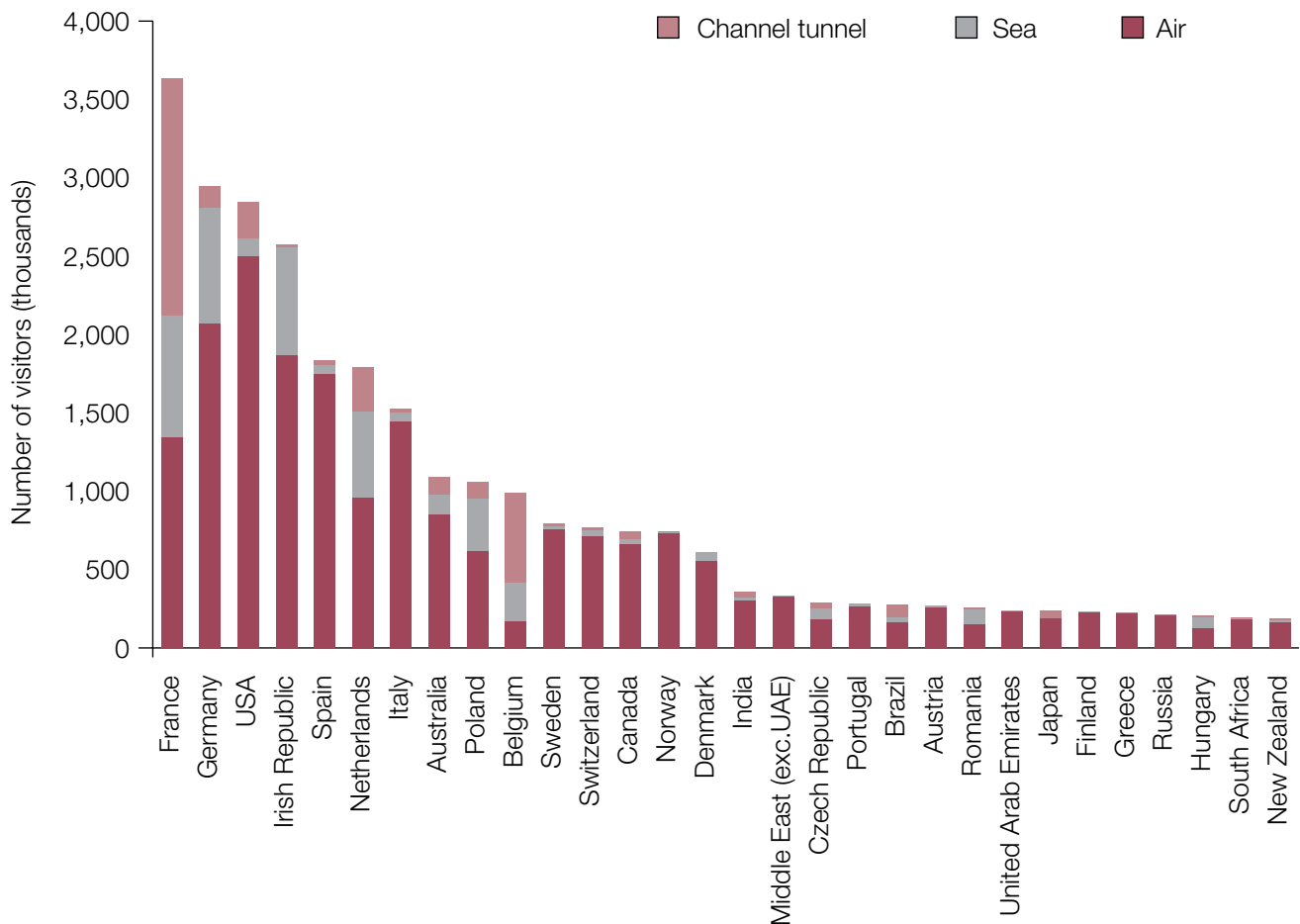
3.39 Aviation is essential in supporting both inbound and outbound tourist activity to and from Britain. In 2011, nearly three quarters of 31 million visits made to the UK by overseas residents started at an airport. Earnings from overseas visits stood at £18 billion, 84 per cent of which was spent by people who arrived by air.

Figure 3.3: UK exports to top five destinations and BRICs (£bn), 2010



Source: CBI (Dec 2011), *A vision for rebalancing the economy – A new approach to growth*

Figure 3.4: Overseas visitors to the UK by mode and country of residence (thousands), 2011



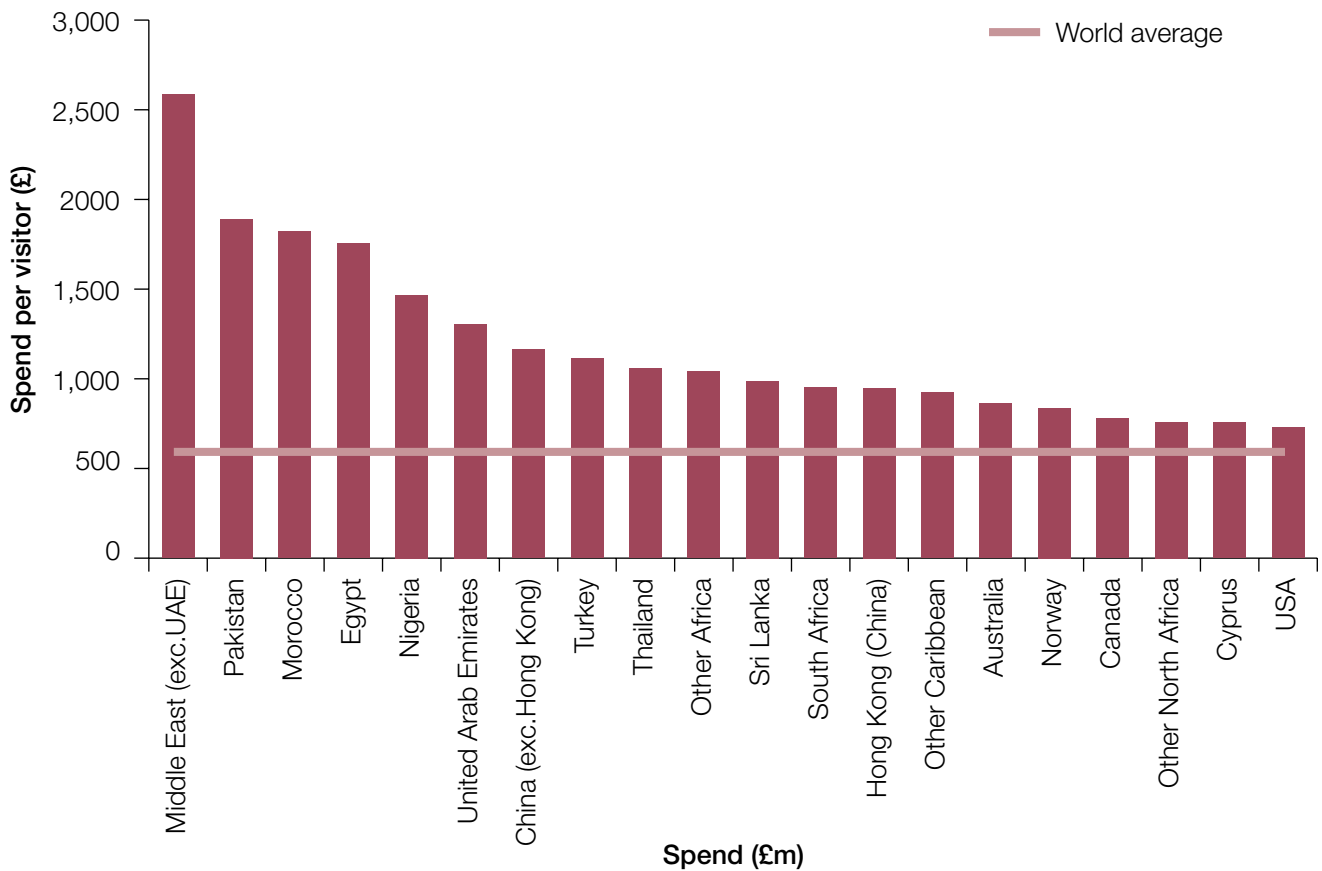
Source: ONS, IPS 2011

3.40 In the same year, UK residents made 57 million of visits abroad on which they spent £32 billion. While inbound tourism has unambiguously positive impact on UK's GDP as tourist expenditure boosts economic activity in the British Isles, there are various arguments and counter-arguments on how beneficial outbound tourism is to the UK economy. On one hand, since expenditure of UK residents abroad is higher than expenditure of overseas residents visiting the UK, tourism flows contribute to UK's negative trade balance with the rest of the world. On the other hand, outbound tourism may have positive economic impacts on the UK economy to the extent to which it supports UK-based jobs in the travel and airline industries, and boosts high street

consumer demand before trips are made – the latter has been valued at around £27 billion per year.²⁶

3.41 The *Government Tourism Policy*²⁷ promotes domestic tourism for UK residents and supports the growth of the sector's international market. One of the strategies to promote that growth is based on attracting four million extra visitors to England over the next four years, particularly from emerging economies such as China. Recent Office for National Statistics data indicate that travellers to the UK from many emerging markets although accounting for only a small proportion of visitors to the UK, tend to spend a higher than average amount per visit in the UK, as set out in the Figure 3.5.

Figure 3.5: Tourist spend per visitor in UK by country of residence (£), 2011



Source: ONS, IPS 2011.

²⁶ ONS, IPS 2011

²⁷ *Government Tourism Policy*, DCMS (March 2011), http://www.culture.gov.uk/images/publications/Government2_Tourism_Policy_2011.pdf

Table 3.2: Unconstrained demand forecast of tourist growth from key markets (thousands of passengers), 2011–2020

From	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
India	380	453	469	541	581	622	664	704	748	797
China	132	151	161	173	187	205	224	245	268	292
France	3,703	3,951	3,855	4,001	4,184	4,352	4,529	4,725	4,920	5,122
Germany	3,044	3,291	3,356	3,431	3,492	3,574	3,662	3,743	3,833	3,934
Russian Federation	172	188	190	192	190	188	186	182	180	177
Brazil	203	227	228	229	229	229	229	228	227	228
United States	2,856	3,277	3,492	3,722	3,938	4,144	4,331	4,483	4,635	4,787

Source: *Tourism Economics*, 2011

3.42 About 9 million visitors a year travel to the UK through Heathrow, on average each of them spends about £1,600 per visit, much more than an average visitor arriving in the UK who spends about £600.²⁸

3.43 VisitBritain forecasts that, in comparison with 2011, by 2020 the number of tourists from China and India would roughly double if all passenger demand to travel to the UK could be accommodated (i.e. not taking into account airport capacity constraints) and if no barriers to travelling (such as visas) were present (Table 3.2).

3.44 Since tourists often value direct connections when choosing their holiday destinations, *direct* connectivity from the UK to emerging economies is likely to attract inbound tourism from these countries in the future.

3.45 Lack of direct connectivity available to tourists who want to travel to the UK may however not be the most important barrier to travelling and the impact of

other such factors – e.g. ease of obtaining a UK tourist visa and the relative attractiveness of the UK as a tourist destination – should also be carefully considered in any assessment of the role of any constraints in aviation capacity or connectivity as a barrier to inbound tourism from emerging markets.

Business investment and innovation

3.46 Connectivity is an important factor influencing companies' decisions on where to locate. For example, according to a European Cities Monitor survey, 52% of companies consider international transport links to be an essential factor when locating businesses in Europe.²⁹ Similarly, other surveys have found that the investment decisions of firms in a wide range of countries have been significantly affected by the absence of good air transport links.³⁰ These surveys are reflected in numerous academic studies

28 ONS, IPS 2011; Visit Britain, http://www.visitbritain.org/Images/UK%20Aviation%20Policy%20and%20Future%20Inbound%20Tourism_tcm29-28614.pdf

29 Cushman & Wakefield (Oct 2007), *European Cities Monitor 2007*

30 Oxford Economics (2005), "Measuring airline network benefits"; Oxford Economics (2006), "The economic contribution of the aviation industry in the UK"

examining the determinants of the location of large firms' headquarters across a range of countries and concluding that good airport facilities are very important to firms' relocation decisions.³¹

3.47 However, these studies and surveys also point out that aviation connectivity is only one of a number of factors affecting such decisions. For example, the European Cities Monitor, which used a survey of 500 European companies to determine the relative importance of different factors in location decisions, found that transport links were the fourth most important factor, but that the availability of qualified staff, access to markets, customers or clients and the quality of telecommunications played an even greater role.

3.48 In considering this issue a number of case studies have been proposed to support the argument that aviation connectivity plays a key role in business allocation decisions. These include, for example, the recent decision by KPMG to move its European Headquarters to offices adjacent to Frankfurt Airport, and Philips' earlier 1997 decision to relocate from Eindhoven, where the company had historically been based, to Amsterdam.

3.49 Even in these cases, however, it is not always simple to isolate the impact of aviation links from other factors.

3.50 *The Commission would be interested in receiving evidence and case studies in this area – for example, providing examples on where the availability of*

aviation links has directly influenced investment decisions or, conversely, where such investment has been made despite a lack of connectivity.

3.51 Aviation connectivity may contribute to the more efficient global allocation of investment by increasing its mobility. However, it is unclear whether this facilitates increased levels of investment in the UK. Encouraging the mobility of global investment may indirectly benefit UK firms to the extent that investment is easier to obtain by those firms and through an increase in the number of opportunities for UK companies to manage foreign based assets.

3.52 Aviation connectivity may also facilitate access for UK firms to new technologies and to an international labour pool, which in turn may make British businesses more competitive by providing them with previously unavailable opportunities to grow. Aviation connectivity also provides foreign companies with an opportunity to establish their subsidiaries in the UK as well as providing UK businesses the same possibilities abroad. However, as technology, investment and innovation in a globalised world may transcend borders without necessitating transport links, the relationship between connectivity and technology, knowledge and innovation is unclear.

Long-term productivity impacts

3.53 In those circumstances where economic growth is enabled or supported by aviation connectivity, as well as the short-term effects relating to specific investment decisions or new trade opportunities, there may also be a more positive long-term impact on UK productivity.

31 Strauss-Kahn, Vanessa and Xavier Vives (Sept 2006), "Why and where do headquarters move?"; Bel, Germà and Xavier Fageda (May 2008), "Getting there fast: globalization, intercontinental flights and location of headquarters"

3.54 Better connectivity in a more globalised world, for example, may tend to accelerate trends in specialisation, which for the UK might help to enhance its competitive position in high value services and manufacturing sectors. Also, connectivity may foster global supply chains, which tend to be much more efficient than the traditional supply chains, further reducing costs and increasing long-term productivity.

3.55 Improvements in international connectivity and increasing specialisation might also support the development and growth of globally significant clusters of economic activity in key sectors. The concentration of financial services businesses in the City of London, Canary Wharf and other cities such as Leeds and Edinburgh provide example of such clusters, as do the significant concentrations of media and technology firms in East London and Soho, and the information technology and science clusters in the Thames Valley and around Cambridge.

3.56 Where related businesses locate close to each other in this way, it can facilitate business to business interactions and the sharing of ideas, which may lead to enhanced productivity by fostering innovation and competition. Such clusters of business activity can also promote labour market improvements as pools of qualified labour are attracted to the region by the opportunities it offers and job matching becomes easier. Strong international connectivity could support such productivity improvements, as they would enable employees to visit friends and family and maintain links to a wider range of destinations and hence may help to make the UK an attractive place to work

for highly skilled graduates from across the world.³²

3.57 These long-run productivity effects are harder to directly identify and value, and attributing any such benefits specifically to aviation connectivity or any other factor may not be feasible. Nonetheless, the Airports Commission would be interested in any evidence supporting or challenging the existence of such effects and the role of aviation in promoting them.

Conclusion

3.58 The sections above have discussed a range of ways in which aviation connectivity might affect the UK economy, either through facilitating valuable economic activity, or through connectivity constraints acting as a brake on growth.

3.59 It is challenging to assess the exact nature and scale of aviation's role in supporting such effects, as in every case it will only be one of a number of factors influencing business, trade and investment decisions. However, in this paper we have sought to identify how we consider such effects might operate, in the light of the broader evidence base around the UK's trade in goods and services, its tourism industry and its business investment environment.

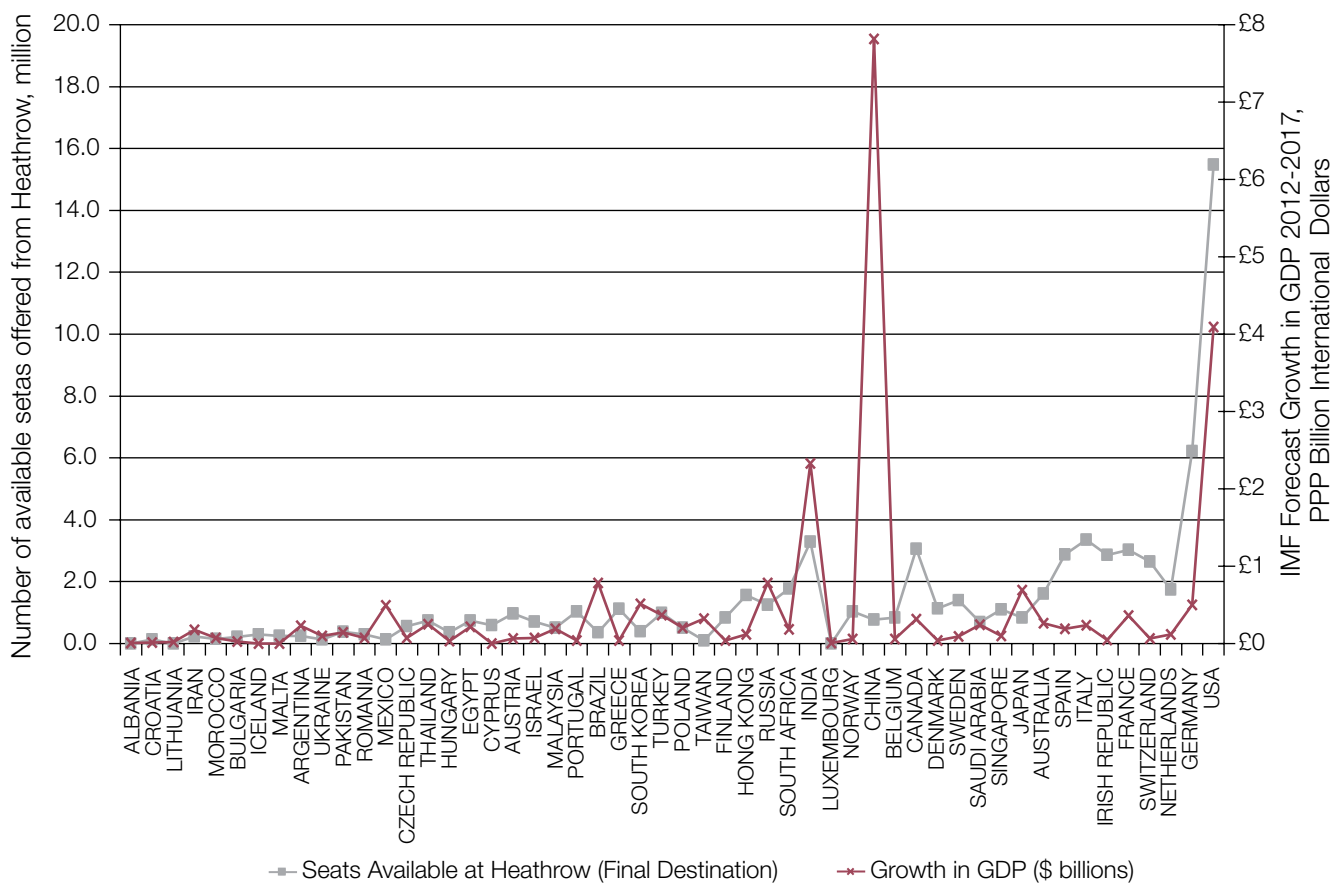
3.60 *The Commission would welcome evidence and submissions dealing with any or all of issues, and in Chapter 5 we also set out a number of specific questions on which we are seeking responses.*

32 The UK's higher education sector is one of its key strengths and a source of export earnings. It is the only European country to have institutions ranked in the top ten in the world in the TES and QS rankings, and six of the top ten European universities in the TES rankings are British.

4. Defining the UK's objectives for aviation connectivity

- 4.1 To inform our consideration of potential objectives for the UK's aviation connectivity, the Airports Commission is keen to consider the frameworks that might be used to assess the UK's aviation connectivity, and to form the basis for defining appropriate connectivity objectives.
- 4.2 UK firms value aviation connectivity because it provides them with access to foreign markets where they can sell their products, interact with other companies or secure investment. International markets also provide opportunities for UK firms to be involved in the exchange of knowledge, technology, innovation and labour.
- 4.3 Our intention therefore is that the framework should include assessments of the importance of routes to UK to businesses as well metrics relating other factor such as to the number of routes served and the frequency of services. This assessment of value to business could focus, for example, on the size of the connected markets and how they are forecast to grow in the future.
- 4.4 Similarly, we intend to consider whether a metric might be incorporated to take account of the importance of routes to UK residents. This might be based on how attractive destinations are for visiting friends and relatives, and the size and value of the outbound tourist market.
- 4.5 Assessing these measures against the number and frequency of flights to a given destination will shed light on how well the UK route network serves UK firms and residents.
- 4.6 If a big growing market, like China, is served by relatively few flights from the UK, this may indicate that the UK economy would benefit from increasing the number of flights to this particular destination. For example, relative to their future growth prospects, China, India, Mexico and Brazil currently have poorer aviation connections to the UK when compared to other countries. This is shown in Figure 4.1.
- 4.7 Constructing a set of measures assessing the economic importance of routes as part of an overall analysis of connectivity could be a valuable step in developing a robust approach to assessing possible impacts of airport capacity constraints on economy. Identifying the economic importance of those destinations that are (or will be) mostly affected by airport capacity constraints will help inform the Airports Commission on the potential economic benefits of expanding airport capacity, as well as on potential costs and risks of doing nothing.
- 4.8 *The Commission is interested in evidence or case studies on how the economic importance of routes could be assessed and in what way capacity*

Figure 4.1: Value of future economic growth (PPP bn international dollars) and the number of seats available from Heathrow (based on final destinations), 2010



Source: DfT statistics; IMF.

constraints may impede aviation connectivity for UK firms and residents.

4.9 York Aviation Business Connectivity Index³³ (BCI) provides one example of a connectivity index that captures one dimension of the economic importance of destinations. The BCI scores a destination based on its ranking within research undertaken by the Globalisation and World Cities network, which identifies a hierarchy of world cities based on a detailed analysis of the location decisions of a sample of advanced service firms. The BCI score for all five London airports fell by about 3-4% over the past decade.

4.10 Table 4.1 provides an overview of a sample of measures of connectivity that are used for reporting aviation connectivity.

4.11 The Airports Commission would welcome views on how to construct measures of connectivity that would help assess the UK's relative performance against other countries and the economic impacts of capacity constraints. In particular, the Commission is interested in such approaches to measuring connectivity that would help answer the following questions:

- To which destinations are aviation connections most important and why?

33 York Aviation (January 2011), "Aviation Services and the City"

Table 4.1: Sample of measures of connectivity

Measure	Interpretive value
Number of Destinations Served	How many different destinations are available. The frequency of the connections to these destinations (e.g. at least one flight a day).
Number of Destinations Served Multiplied by Frequency	How many available flights there are over a time period.
Seat capacity	How many passengers can travel to a given destination over a period of time.
York Aviation Business Connectivity Index ³⁴	Captures the economic importance of destinations. Measures value of connectivity to businesses.
Netscan Connectivity Index ³⁵	Captures seat capacity. Accounts for both direct and indirect connections, and for transfer time and potential delay time when connecting.
IATA Connectivity Index ³⁶	Captures the importance of destinations based on the size of the final destination airport.
World Bank Air Connectivity Index ³⁷	Weighs value of a route based on the number of onward connections available so reflects benefits of hubs. Declining value of routes as distance to destination increases may make it difficult to interpret.
World Economic Forum Connectivity Index ³⁸	Presents data on scheduled available seat kilometres per week in 2012 for a sample of 144 countries. Does not weight routes on the basis of frequency, or the economic importance of destinations.

Source: DfT analysis.

- What is the impact of providing indirect flights (i.e. flights involving a transfer) rather than direct ones on connectivity of the consumer/freight? Which consumers are most affected?
- How should connectivity for leisure passengers be valued?
- How does providing flights at the right time of day and day of the week impact connectivity? Which consumers are most affected? What about freight?
- What is the impact of airport congestion on consumer connectivity? Should reliability be taken into account?
- What is the impact of ticket costs to the consumer? How price-sensitive are business and leisure travellers? How can this be captured in measuring of connectivity?

34 York Aviation (January 2011), "Aviation Services and the City"

35 Burghouwt, Guillaume & Renato Redondi (January 2013), "Connectivity in Air Transport Networks: An Assessment of Models and Applications"

36 IATA (December 2006), "Measuring the Economic Rate of Return on Investment in Aviation"

37 World Bank (June 2011), "The Air Connectivity Index: Measuring Integration in the Global Air Transport Network"

38 World Economic Forum (2012), "The Global Competitiveness Report 2012-2013"

5. Conclusion

- 5.1 This paper discusses the nature of aviation connectivity in the UK in light of how it currently serves UK businesses and residents and how it compares to other European countries. The paper presents arguments and counter-arguments on how aviation connectivity may facilitate trade in goods and services, tourism, business investment and innovation, and productivity. It also sheds light on various approaches to measuring connectivity and how to assess the economic value of different routes and destinations.
- 5.2 We have set out in the document a number of particular areas in which we would value evidence, case studies and other submissions. To inform those preparing submissions on valuing the benefits of aviation connectivity, we set out below a number of further specific questions of interest. Note that this list is by no means exclusive and we would welcome submissions covering any other topics or issues relevant to Airports Commission's work on understanding the value of aviation connectivity to the UK, and whether and how this might be affected by capacity constraints at UK airports.
- 5.3 Submitted evidence will support Commission's efforts to deliver an assessment of the nature, scale and time of the UK's need for airport capacity as part of its interim report at the end of 2013.
- 5.4 Questions relating to the nature of connectivity in the UK and its drivers:
- Do you agree with the definition of connectivity presented in the paper? What other factors, if any, should we take into account and how do they impact connectivity?
 - Do you agree with the assessment we have made of the UK's current aviation connectivity?
 - What factors do you think contribute to the fact that the UK is directly better connected to some regions of the world than others?
 - Given connectivity trends in the UK versus other European countries, how much scope is there for route network available to UK residents to radically change over the coming years?
 - To what extent do you consider indirect connectivity to be an important part of presenting an accurate picture of the UK's nature of connectivity?
- 5.5 Questions relating to the assessment of how aviation connectivity supports (1) trade in goods, (2) trade in services, (3) tourism, (4) business investment and innovation, and (5) productivity:
- To what extent do you agree with evidence that aviation connectivity supports the UK's economic growth through facilitating each of (1)-(5)?

- Are there other channels through which aviation connectivity might facilitate economic growth? What are they, and what evidence is there to support this?
- How effective do you consider that the aviation connectivity of the UK may facilitate economic growth now and in the future? What risks and opportunities does it present?
- How important do you consider connectivity for each of (1)-(5)?
- Are there other relevant policy issues which should be taken into account?
- To what degree can causality between connectivity and (1)-(5) be established? Are there any particular research methods that we should be looking at and why?

5.6 Questions relating to what the UK's objectives for the future aviation should be:

- What is the best approach to measuring the UK's aviation connectivity?
- Connectivity depends on many factors, such as number and frequency of flights and time and cost of travelling to passengers. Do you consider any of these factors to be of particular relevance to facilitating any of (1)-(5)?
- We have outlined a few different measures of connectivity in the paper. What alternative measuring approaches that we have not mentioned should we take into account?

- What kinds of impact do you consider capacity constraints to have on the frequency and number of destinations served by the UK? And, if any, are any particular kinds of routes or destinations likely to be more affected than others?
- To what extent do you consider that the need for additional connectivity may support the argument that additional capacity may be required?

5.7 Submissions of evidence should be no more than 15 pages long and should be emailed to connectivity.paper@airports.gsi.gov.uk clearly marked as a response to the 'Aviation Connectivity and the Economy' paper. Evidence will be reviewed thereafter by the Commission. If further information or clarification on your submission is required, the Airports Commission Secretariat will be in touch.

5.8 We are therefore inviting submissions and evidence by **19 April 2013** to inform the development of our framework for the assessment of need for new airport capacity.

5.9 In exceptional circumstances we will accept submissions in hard copy. If you need to submit them in hard copy form, please provide 2 copies to the Commission Secretariat at the following address:

Airports Commission
6th Floor
Sanctuary Buildings
20 Great Smith Street
London SW1P 3BT

5.10 We regret that we are not able to receive faxed documents.

5.11 We are also expecting to hold public evidence sessions later this year to help us form our assessment of the need for additional capacity. These sessions are expected to be based on both this paper and the other thematic papers the Commission will be publishing for example on the arguments surrounding the concept of a hub airport, and on environmental issues, including noise and climate change. More information on the structure and scope of these sessions will be published on our website: <https://www.gov.uk/airports-commission>.

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