



Development and Assessment of Airport Capacity Options

ECONOMIC IMPACTS OF CLOSURE OF HEATHROW AIRPORT

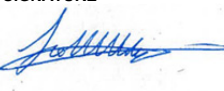
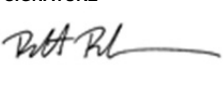
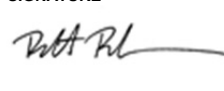

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1 SUMMARY

- The key source of economic benefits from airport development is providing new capacity to realise consumer benefits, and the direct and indirect employment effects of growing the aviation sector and its supply chain to meet this. New capacity is critical to realising this.
- The construction of a new airport to replace an existing one is likely to only generate substantial additional economic benefits if it generates the additional capacity needed to realise those consumer benefits. As such, there is little economic point in closing an existing airport and replacing it with an identical one of similar capacity, if the existing airport was severely capacity constrained (as is the case with Heathrow).
- If Heathrow were to close and be replaced by a new airport, that new airport should at least have the equivalent capacity to Heathrow plus a third runway.
- Airports generate four types of employment/local economic impact: direct activity at the airport itself; indirect activity arising from supporting the supply chain of the direct activity; induced economic activity, as in businesses locating near the airport to take advantage of the connectivity the airport offers; and catalytic activity, being businesses attracted by the general economic activity generated by the direct and indirect activity.
- The two main local economic impacts of an airport are: the requirement of labour, goods and services to maintain the airport, and the connectivity offered by the airport.
- Approximately 76,000 people are employed at the Heathrow airport site, with another 7,700 off site. Approximately 29,000 are also considered to have local employment due to the indirect and induced employment impacts of the airport.
- Most of the direct and indirect employment can be expected to relocate or be replicated at the site of a new airport. However, induced and catalytic employment is less predictable, as it is not entirely dependent on the operations at the airport.
- In Hounslow, Spelthorne, Hillingdon and Slough, between 8 and 10% of employment in those boroughs is directly and indirectly associated with Heathrow.
- Whilst the presence of Heathrow is important for some firms locating in the M4 corridor, it is unlikely to be the single decisive factor for many of them. Access to a major international airport is only one of several considerations important to employers.
- Clearly closing Heathrow is likely to reduce the attractiveness of the M4 corridor area for businesses with a high propensity to fly, and over time this may see some relocating of businesses closer to the new hub.
- Closure of Heathrow will have minor implications for surface transport networks, primarily because it is unlikely that major redevelopment of the site will occur until there is redesign of the transport services and infrastructure, both public and private.

- No other country has closed and relocated an airport at a new site with the scale and intensity of the operations of Heathrow. Those that have relocated, have typically had mixed experiences in doing so.
- The largest one, in terms of ATMs and passengers handled, was Hong Kong, but it experienced significant teething troubles. The fundamental problem with such a relocation is the need by airlines to relocate at once, to maintain connections and interline transfers. Whilst it is theoretically possible to stagger such a relocation over days, it becomes difficult and unwieldy to maintain two airports in parallel for longer periods. Therefore, the high risks involved in opening a new airport and successfully transferring all necessary operations are difficult to avoid.
- Employment transitions can be arranged well in advance, as there would be at least a decade between legal commitments to build the airport and the time when employment would have to relocate. In that timeframe, many existing employees will have retired or moved onto other jobs elsewhere, and so new employees can be employed on condition they accept the relocation at a future date. There may need to be some assistance for long standing employees on lower incomes who may face either high relocation costs or punitive commutes. However, it has not been common practice in other cases for such assistance to be provided (the long notice period of the need to relocate or make alternative commuting arrangements being seen as sufficient).
- Redevelopment of the Heathrow site is likely to take some years, given the need for planning approval and to address any local concerns. Local interest in what happens to the site is unlikely to be well focused until the airport is actually closed.
- The immediate impact of Heathrow's closure is likely to be to reduce the commercial and industrial property values adjacent to it, but increase residential property values.
- The stages of development after planning approval may be demolition/clearance, development of utility infrastructure, development of open space, first stage major retail development, social infrastructure associated with residential development.
- However, it is likely to take over 20 years before the full value of the land would be realised in a redevelopment. Yet the value of that development is unlikely to come close to the RAB value of the airport at closure.

2 INTRODUCTION

Several options to provide long-term airport capacity for the UK include the replacement of London Heathrow Airport (“Heathrow”) with a new hub airport at another location. To enable the commercial viability of such an airport probably requires Heathrow to be closed, which may also deliver environmental benefits by transferring the exposure of noise and emissions to a less populated location.

Heathrow Airport has important benefits for the economies of west London and the neighbouring counties. It is a major source of employment and commerce, and its presence, in enabling connectivity to a wide range of destinations, is one reason why businesses locate within convenient access to it.

As a result, closing and relocating the airport to a site distant from Heathrow would have a consequentially higher impact.

The key economic benefit from developing airport capacity is to allow consumer benefits to be realised by airlines providing additional services, enhancing connectivity for passengers and cargo. This enables the aviation sector and its supply chain to grow. Increasing capacity may be delivered by expanding Heathrow, expanding other airports, or by developing a new hub airport to replace Heathrow. Many of the economic benefits are dependent on enabling services to meet demand through greater capacity. The building of a new airport and closing others, without providing such a capacity increase is highly unlikely to be worthwhile in economic terms. It is clear that in any scenario involving Heathrow being closed and replaced with another airport, that most of the economic benefits come from the new airport including a substantial increase in capacity compared to what currently exists at Heathrow.¹

The purpose of this paper is to provide a high-level assessment of the effect of closing Heathrow on employment and businesses in the vicinity of the airport, and assess the high-level issues, risks and broad opportunities around redevelopment of the Heathrow site. It draws upon the experiences of the handful of cities that have relocated their major airports since the 1980s, taking general observations and lessons learned from those examples, to identify the short and long term issues around such a major transformation of urban land usage.

To understand the general economic impacts that airports can bring, it is useful to distinguish the ways that businesses interact with airports or are affected by them. From this it becomes easier to consider how airport expansion, closure or relocation might affect those businesses, as to whether they are directly dependent upon the airport for trade (e.g. as a supplier of goods and services) or use the airport as infrastructure for connectivity for goods, employees or customers. The positive impact of the presence of a major airport comes from the value of the airport in enabling connectivity for businesses, and the value for businesses supplying the airport and its customers. Arising from that are the benefits arising from employment, and the businesses that serve the needs of those working at the airport. Whether it be expansion of the airport or closure and relocation of the airport (with a larger airport on another site), it is important to understand that economic impacts are not simply a matter of greater or lesser economic activity in an area.

New economic activity (“additionalities”) should be clearly distinguished from displacement, the former being activities that would not have occurred were it not for the factor that induces them. Displacement occurs when an activity merely relocates, rather than commencing in its own right. Of course, additionalities may also parallel some displacement (i.e. a new airport to replace Heathrow will primarily involve displacement of activity from Heathrow to the new site, but will also generate additionalities assuming the new airport has higher capacity).

¹ This means at least one additional runway compared to that at Heathrow. This should also include any capacity lost if, for operational reasons, another airport must be closed (e.g. proposals for a hub airport at Stansted are incompatible with retaining the existing airport at Luton).

This paper does not assess the wider impacts of the environmental changes arising from the closure of Heathrow, nor does it attempt to assess the potential value of the land used by Heathrow if it were put to other uses. This is because the underlying value is entirely dependent on prevailing market demand for different types of property use and because the presence of Heathrow has both a negative and positive effect on the values of adjoining land. These factors make it challenging to assess the response of different property markets to the removal of Heathrow as a source of employment, commerce and connectivity, and as a source of noise and pollution. The former has a significant effect on commercial and industrial properties values, but also some effect on residential property demand (as some will want to locate close to work), whereas the latter's primary impact is on residential property, although this is likely to be tempered by the very high underlying demand in London for such property.

The structure of this paper is as follows:

Section 3 summarises the effects of airports on local economies and assesses the economic impacts that Heathrow Airport has on local boroughs, and what effect Heathrow Airport has on decisions as to the location of businesses. The possible effects of closing Heathrow Airport on business location are considered, as are the effects on surface transport access to the Heathrow site.

Section 4 summarises recent examples of international airports that have been relocated to other sites, with the original airports closed, citing some key issues that have arisen with such relocations.

Section 5 considers the possible process and steps involved in closing and relocating Heathrow Airport's activities, and highlights important elements and factors around the redevelopment of the site, and the issues and timescales involved in such a redevelopment.

Section 6 briefly summarises our conclusions.

3 IMPACT OF HEATHROW AIRPORT ON LOCAL AND REGIONAL ECONOMIES

3.1 Employment impacts of airports

There are three types of employment that the opening or closing of an airport could impact:

- **Direct:** Economic activity at the airport itself, both by the airport owner and by companies operating at the airport, such as airlines, caterers, retailers and security. Airport closure and relocation will see all of this economic activity, and hence employment, relocate to the new site.
- **Indirect:** Economic activity arising from supporting the supply chain of the companies located at the airport, or the customers of the airport offsite (e.g. hotels). Airport closure and relocation will necessarily see much of this economic activity, and hence employment, relocate to the new site. The proportion that relocates will vary, depending upon the extent to which it depends upon the airport, the extent to which it can continue servicing airport custom remotely, and the extent to which it is servicing non-airport clients. For example, some hotel businesses are likely to remain in the area servicing the general demands of the local community and business travellers, although it is clear that the excess which exists to service airport business will relocate.
- **Induced:** Economic activity from businesses that regard location convenient to the airport to be an advantage. These are businesses that regard access to the connectivity (for people or cargo) provided by the airport to be a factor influencing their location decisions. These businesses are less likely to relocate in the short term, especially if there remain other countervailing factors (access to skilled labour, other transport access benefits, property prices) to offset less convenient airport access.
- **Catalytic:** Economic activity from businesses attracted to the location of the airport because of the economic activity created by the airport's (and its customers') supply chains and supporting infrastructure.

It is widely acknowledged that agglomeration factors can be a key factor in promoting economic development in developed economies. The agglomeration factors, which encourage businesses to co-locate, are primarily access to skilled labour markets, and the benefits of co-location, including access to services that support their businesses, as well as appropriate infrastructure.²

There can be a reasonable degree of confidence in estimates for the direct and indirect employment generation of airports, because they are so closely related to the underlying demand to use the airport from airline end customers and so the airlines themselves, and the businesses that support those customers. However, estimating the induced and catalytic employment that comes from the presence of an airport is more difficult. Businesses that locate conveniently to the airport may also choose that location for other factors, such as the presence of good surface access links (which invariably are located near airports), property rentals and access to employees. It is not just the presence of the airport that is important, but the presence of airline services at that airport to relevant destinations also matters. This is one factor that may support assertions that Heathrow's presence is more important to particular businesses readily accessible to it, than is the presence of other airports on employment. Heathrow's strength in facilitating connectivity is the high number of destinations that are served from it, often by multiple airlines. Other airports in the UK do not typically offer such a wide range of destinations, with the exception being those that are bases for large low cost carriers, as these can offer many short-haul destinations. No other airports in the UK have airline services with the number of long haul destinations available at Heathrow.

² WebTag Unit 3.5.14 describes how DfT seeks to assess agglomeration effects of transport.

3.2 Economic impacts of airports

The two primary reasons airports have a major economic impact on the areas where they are located are:

- the significant utilisation of labour, and consumption of goods and services required to maintain and service the airport, the aircraft using it, the staff and passengers; and
- the connectivity the airport offers, by allowing airlines to connect the area served with different cities and countries, for business and leisure travel, cargo and to attract tourists.

As the third busiest airport in the world measured by passenger traffic,³ and with approximately 76,000 people employed on site,⁴ Heathrow's impact on the neighbouring boroughs is considerable. A range of studies and reports on the impact of Heathrow on the local economies have been produced by various firms, typically commissioned by business groups, lobbyists and local authorities. Although such studies should be approached with caution (given both the motive and the methodologies that might be used), studies elsewhere on the impacts of airports on local economic development indicate that they can be considerable, primarily because they provide a source of employment, much of which is relatively low-skilled, low-income and so can have a high impact on communities that have a surplus of such labour.

A variety of studies of the local impact of aviation development in specific locations is summarised in the Table 1 below, which is reproduced from the report *The Economic Impact of Air Service Liberalization*, InterVISTAS-ga², 2006.⁵ There is the business of the airport and its supply chain, which grow with the airport. This direct, on-site activity provides footfall encouraging businesses to set up to serve the passing trade. The presence of the improved transport services may not only reduce a business's direct input costs, for example shipping costs, it can also reduce its costs of doing business in other ways, for example costs involved in negotiating contracts with suppliers, since transport costs both in money and time occupied in travelling contribute to business costs. When one has lower costs, one can invest more in finding business opportunities and thus not only reduce cost but also increase opportunity. Thus even businesses which are not transport-intensive may decide to locate where they can take advantage of the infrastructure to reduce the costs of finding business opportunities. The surface transport infrastructure to serve the airport customers can also be appropriated by others to reduce their surface transport costs, which is purely incidental to the airport. The cluster that may results seeking these reductions has agglomeration benefits, which attracts further co-location increasing the agglomeration benefits.

³ 70.0 million passengers in 2012, behind Hartsfield-Jackson Atlanta (95.5 million) and Beijing Capital (81.9 million). Source: *Passenger Traffic 2012, Preliminary*, ACI.

⁴ See Table 2 below.

⁵ The report was funded by a number of sectoral business interests, including IATA, ACI, ATAG, Boeing, among others.

Table 1: A cross-section of local economic impact studies

	Passengers	Employment	Output	Source
Des Moines, 1998	1.7 million	2,352	\$182 million U.S.	Des Moines International Airport
Newcastle, NSW 2005	.76 million	3,336	\$540 million AU	Newcastle Airport Limited
Cincinnati, 2004	22 million	89,536	\$5 billion U.S.	University of Cincinnati
Reykjavik, 1998	1.8 million (2006)	1,156	11.4 Billion IKr	University of Iceland Institute of Economic Studies
Geneva, 1999	7 million	24,000	9.0 Billion SFr	Aéroports Internationale Geneva
World Aviation, 2005	2 billion	29 million	\$2.96 trillion U.S., 8% of world GDP	Air Transport Action Group
U.K. Airports, 2004	229 million	580,000	£22.2 billion gross value added	Airport Operators Association, 2005
Toronto, 2001	28 million	138,000	\$14 billion CD	Greater Toronto Airports Auth.
Auckland, 2001	8.5 million	235,780	\$14.2 billion NZ	Auckland International Airport
All United States, 2005	746 million	12.3 million	\$1.37 trillion U.S.	Air Transport Association
Inverness Airport, 2005	.5 million	2,297	£ 120 million	Inverness and Nairn Enterprise, Highlands and Islands Enterprise and Highlands and Islands Airports Limited
U.K. Air Freight Industry, 2000	2,526,266 tonnes	80,000-100,000	£ 4.99 billion	U.K. Air Freight Study Report, U.K. Department of Transport

Source: Table ES-3, *The Economic Impact of Air Service Liberalization*, InterVISTAS-ga², 2006.

It can be hard to distinguish between what is additional activity from what is displaced. Some activity has merely been attracted from elsewhere, for example if business and employment relocates from Heathrow to a new airport site, this amounts to displacement rather than additionality, but airports can also displace activity from other sites that would have provided a different group of benefits to those businesses.

Many of these agglomeration benefits could have been obtained from other investments or interventions that attract businesses to a particular area by reducing their direct input costs, or reducing their costs of finding business opportunities. Therefore, there is a risk of over-counting the wider economic benefits of air transport activity.

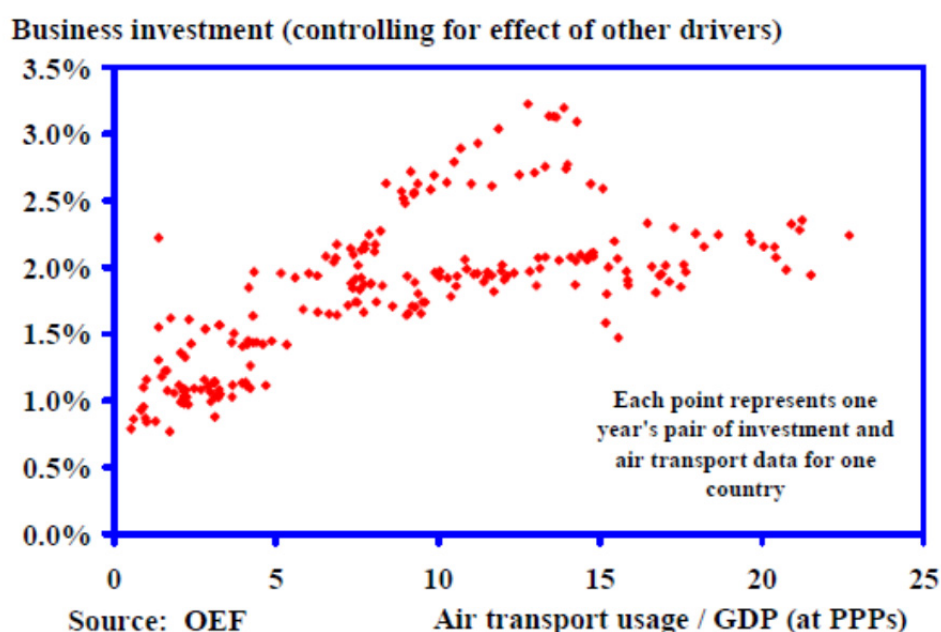
Major commercially run airports are generally sufficiently large investments that investors will carry out their research with sufficient care to ensure that they restrict their investments to locations where they will attract more passenger and cargo (and hence more flights and airlines). Many smaller airports fail to cover their full costs, or even their short-run operating costs, but are often supported by local authorities, for reasons not entirely dissimilar to that used to support other forms of public transport infrastructure.

Local authorities justify that support in the same way they would generally justify supporting other transport infrastructure costs: namely, reducing a mobility deficit (in the case of airports by supporting connectivity to other cities or even countries) in access which has a perceived value that cannot be fully

captured from all users of the service to make the project financially feasible. However, the effect is not universal: one cannot simply build airports and obtain economic benefits for them without a properly analysed business plan, including analysis of future demand. The most egregious case internationally is perhaps Montreal's Mirabel Airport, which was sized to become the main passenger airport for Montreal, but never attracted more than 200,000 passengers a year and today provides only air cargo services. More recently, in Europe, Ciudad Real Central Airport, was completed in 2009 and closed in 2012.

However, airports can also promote catalytic employment, as they make their locations attractive in their own right for businesses with a high propensity to fly. A much-cited report on the catalytic effect of aviation is *The Economic Catalytic Effects of Air Transport in Europe*, Oxford Economic Forecasting (2002),⁶ (OEF) which finds that aviation catalyses tourism, trade, productivity growth, and investment. This report analyses the effect of aviation more widely, but clearly sufficient airport capacity to supply the aviation demand is a key factor in delivering that aviation, and clearly the effects that it finds are at least local in some way to the aviation destinations. Some key results from OEF's report are summarised in the following two charts. OEF attempts to demonstrate a catalytic effect of aviation by showing a positive relationship between air transport usage and business investment, and between air transport usage and productivity.

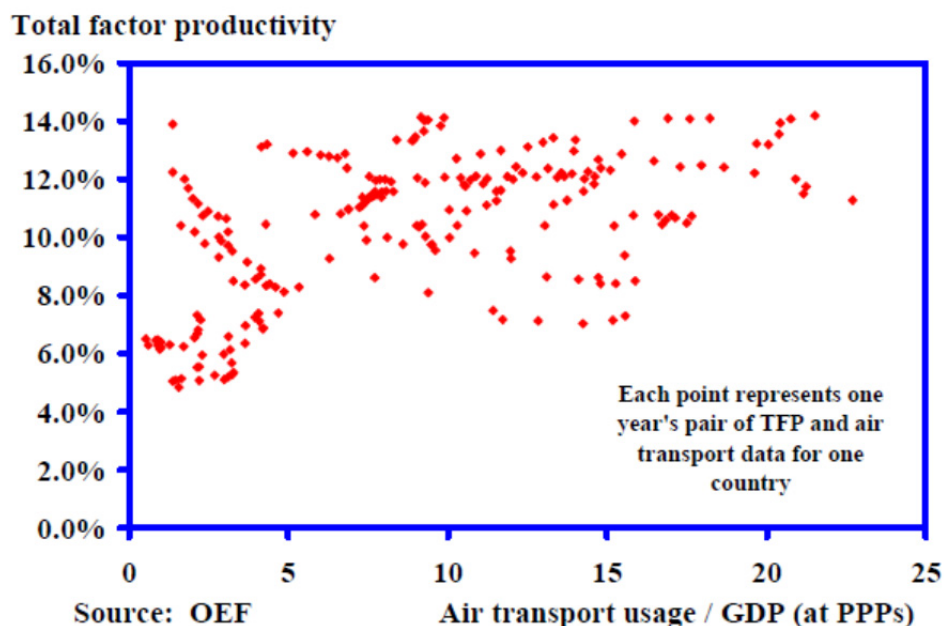
Figure 1: Relationship between air transport usage and business investment



Source: Chart 6-1, *The Economic Catalytic Effects of Air Transport in Europe*, Oxford Economic Forecasting, 2002

⁶ The report was funded and later published by Eurocontrol, which gives a publication date of 2005 although the report itself is dated 2002. Similar results are reported in another paper from the same group, *The Economic Contribution of the Aviation Industry in the UK*, Oxford Economic Forecasting, 2006, a report that was co-funded by the UK Department for Transport and a number of aviation and business interests.

Figure 2: Relationship between air transport usage and total factor productivity

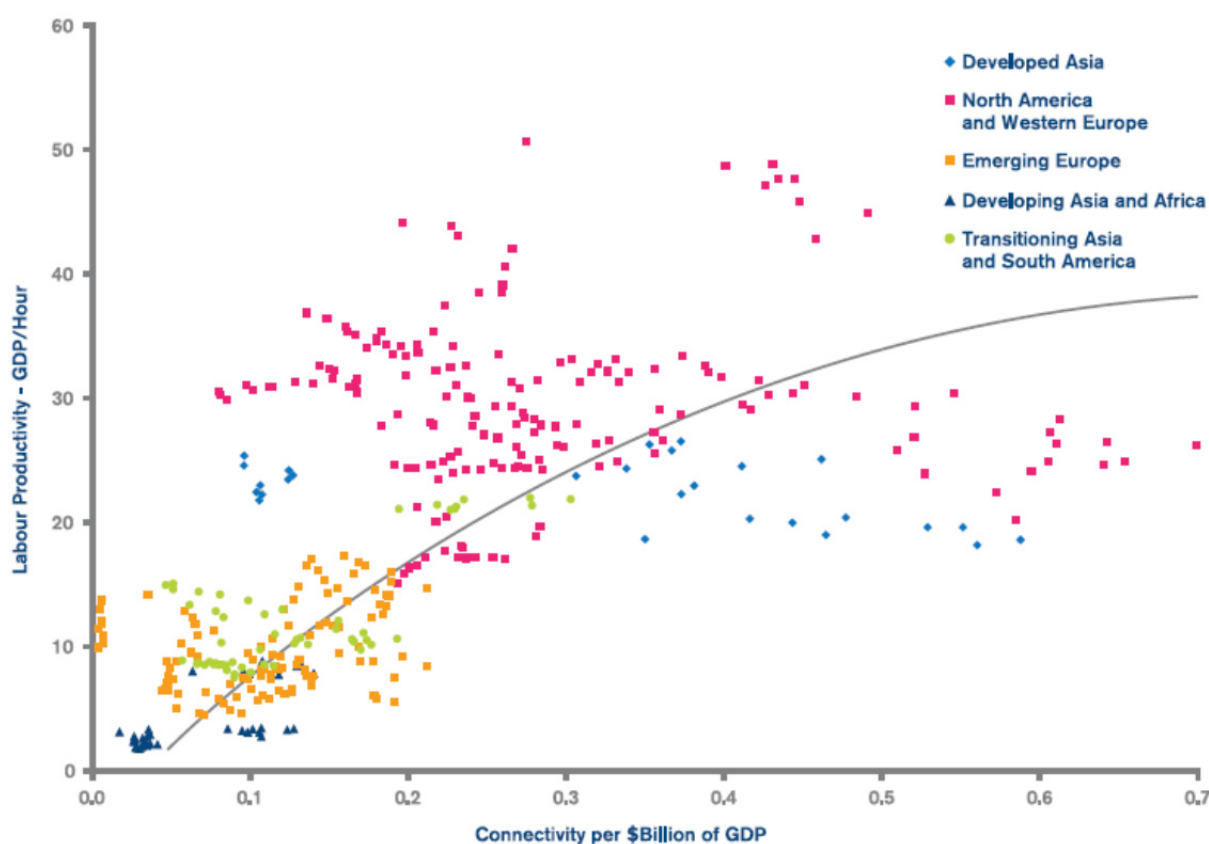


Source: Chart 6-3, *The Economic Catalytic Effects of Air Transport in Europe*, Oxford Economic Forecasting, 2002

The relationship between air transport connectivity and economy has most notably been studied twice by IATA in two reports by the same authors coming close to one another, *Airline Network Benefits*, M Smyth and B Pearce, IATA (2006), and *Aviation's Economic Benefits*, M Smyth and B Pearce, IATA (2007). The first of these suggested, rather implausibly, that a 10% increase in connectivity (as they measured it) could increase GDP in the longer run by 1.2%. This study had some issues with the methodology which were addressed to get to a lower estimate, suggesting that the increase would only be 0.07%. This is generally the result quoted.

In this second paper, the key result is summarised in the following chart, which finds a positive association between labour productivity and air transport connectivity per unit of GDP. The authors have measured connectivity by constructing an index which weights the seat capacities on the routes from a given airport by the volumes of traffic at the destination airports the route connects to.

Figure 3: Relationship between labour productivity and air transport connectivity per unit of GDP



Source: Chart 6, *Aviation's Economic Benefits*, M Smyth and B Pearce, IATA (2007)

An observation in all of these cases is that the effect on productivity appears to be diminishing as the level of aviation connectivity or development of the economy increases. In other words, it appears that the effects could be greatest in places most in need of economic development.

One common criticism of this kind of analysis is that the relationships are found to be rather “noisy”. Aviation is not the only effect on productivity, and other important factors will also vary from place to place. However, statistical analysis can attempt to isolate the effect of one factor on something, when other things are also relevant. Those other things may be “noise”, but do not invalidate the effect which has been isolated, but defining the parameters to isolate it may be difficult, particularly with analysis over time where “noise” may emerge from multiple sources.

A more serious criticism could be that correlation is not causation. Greater connectivity is associated with increased productivity (IATA, 2007). However, the chain of causation may run in the other direction: greater productivity may be associated with increased connectivity. A more productive, developed economy, with higher investment, trade and tourism, simply promotes higher demand for aviation.

The possibility that causation might be mainly in the other direction has been studied in *Air transportation and regional growth: which way does the causality run?*, K Mikkala and H Tervo, 2012, ERSA Congress Bratislava 2012. In the absence of being able to discern mechanisms of causation directly, the Granger causality test increases one’s confidence as to the direction of causation, although misleading cases can be constructed. In particular, if causation is not found (evidenced by the Granger

causality test), one should be sceptical of claims for causation. In this case, Makkala and Tervo (2012), studying a panel of major and regional airports, found good evidence for “Granger causation” in the case of airports in peripheral regions, but no clear evidence in the case of “core” airports. This might be explained because mobility deficits tend to be greater for peripheral regions, and natural agglomeration tends to be weaker there. Thus facilitating air services provides greater relief of these brakes on economic growth than for core regions, which tend already to have natural agglomeration and lower mobility deficits requiring relief.

3.3 Economic impacts of Heathrow on local boroughs

Over 300 companies⁷ operate on Heathrow’s site today, whether they be airlines, companies servicing airlines, companies servicing customers’ requirements, or part of the wider supply chain to enable the efficient and secure operation of the airport. They employ over 76,000 people within the boundaries of the airport, and around 37,000 via direct off-airport, indirect and induced jobs.⁸

Table 2: Direct, indirect and induced employment from Heathrow (2010)

	Employment (nearest 100)			GVA (£bn)		
	Local ¹	All London ²	All UK	Local	All London ¹	All UK
Direct On-Airport³	76,600	76,600	76,600	3.276	3.276	3.276
Direct Off-Airport	7,700	7,700	7,700	0.328	0.328	0.328
Indirect	11,100	20,800	44,400	0.656	1.358	2.462
Induced	18,600	31,500	77,200	1.065	2.059	3.616
Total	114,000	136,600	205,900	5.304⁴	7.021	9.680⁴

Notes:

1 Hounslow, Hillingdon, Ealing, Slough and Spelthorne

2 Appears to be London plus Slough and Spelthorne

3 2009 data

4 Totals reproduced from original source: there is inconsistency in these totals, this could be explained by rounding adjustments for All UK, but there must be a transcription error in the Local column where the items sum to 5.325.

Source: Reproduced from “Heathrow Related Employment”, Optimal Economics, 2011

Further survey work and analysis done in 2010 by Optimal Economics for Heathrow airport, and published as “Heathrow Related Employment” in 2011 (key results reported in Table 2) found that in addition to 76,600 workers on-site, a further 7,700 workers were directly employed off-site. In addition, they assessed that 44,400 workers were employed indirectly related to the airport, of which 20,800 are based in London more widely, and 11,100 were locally employed. Thus the off-site supply chain comprises of 52,100 nationally (7,700 off-site direct plus 44,400 indirect) by their assessment. Further “induced” employment amounts to 77,200 workers, of whom 18,600 are locally based. “Local” here refers to the location of the employment, not the domicile of the workers.

It is difficult to find information on the residency of local direct and indirect workers, so we propose to assume that their domiciles are similarly distributed to those of on-site workers. Based upon that assumption, off-site direct and indirect employment amounts to a 24.5% uplift on on-site Heathrow workers, to assess the total direct and indirect employment impact of Heathrow on local boroughs. Whilst “indirect” employment is more clearly associated with the airport’s supply chain, and that of the customer of the airport and so forth, the induced employment is a less direct connection with a specifically located airport, and therefore more likely to survive airport relocation, or may indeed be able

⁷ Optimal Economics (2011) mentions 320 companies operating on the Heathrow site at the time of their survey in 2008/9.

⁸ See Table 2 below for detailed data.

to associate itself with other airports. We therefore consider this connection less certain, and show only the direct and indirect which is more closely associated with the airport's supply chain.

To assess the impact of Heathrow Airport on the local economies, a review was undertaken of the local authorities' economic development strategies. Although most local authorities neighbouring Heathrow have concerns about noise and other negative externalities coming from the airport, they also acknowledge the critical role the airport has in providing employment for their communities.⁹

We have estimated the current employment impact on surrounding boroughs based upon Heathrow's *On-Airport Employment Survey* (2008/9), which is the same data source used by the boroughs in making their own estimates of the impact. According to that, approximately half of the employment on the airport site itself came from the six surrounding boroughs of Hillingdon, Hounslow, Ealing, Spelthorne, Slough and Windsor & Maidenhead, and we consider the effect on those boroughs.

Given that the direct and indirect employment at Heathrow is dependent on being part of the supply-chain for the airport and its customers, it is a reasonable assumption that if Heathrow were closed and its operations relocated to a new site, that most of this employment would relocate to the new site. It is more difficult to assume that this would happen with the induced employment. At present, there is insufficient information to conclude the extent to which such businesses would remain or relocate, increase or decrease economic activity (particularly given the long timeframes involved).

Local employment directly and indirectly associated with Heathrow is highest in Hounslow (10%), Spelthorne (10%), Hillingdon (9%) and Slough (8%), presented in Table 3 below. Thereafter it falls off rapidly with Ealing (4%) and Windsor & Maidenhead (3%). These are the jobs which are most at risk following the closure of Heathrow.¹⁰ However, these figures are based upon 2008/9 data, and although some boroughs have seen some remarkably rapid growth in working population since that time, and it seems unlikely that Heathrow has absorbed most of that growth, as the growth in working population is similar or higher than the total number of workers at the Heathrow site residing in those boroughs. As can be deduced from Table 3, working population growth from the date of that survey, 2008/9, to 2012/13 has been particularly marked in Hillingdon (13%), Hounslow (9%) and Slough (8%).

⁹ See Table 3 for data on the proportion of employed people working at the Heathrow site per borough.

¹⁰ Businesses that see a critical risk in accessing their labour pool at the time of the airport's relocation, may facilitate the relocation of key workers with them when they relocate. This will be entirely dependent on commercial conditions for those businesses.

Table 3: Employment impact of Heathrow on surrounding boroughs

	Hillingdon	Hounslow	Spelthorne	Slough	Ealing Windsor & M	
Working Population (2012/13) ¹	149,000	134,100	51,400	71,100	173,400	78,800
Working Population (2008/09) ¹	132,000	123,200	49,800	66,000	166,400	77,700
Unemployed (2012/13) ¹	12,600	9,600	2,500	5,900	17,600	3,500
Unemployed % (2012/13) ¹	8.7%	7.2%	4.8%	8.3%	10.4%	4.4%
Average full time wage (2012/13) ¹	31.1	29.3	31.6	26.8	29.4	37.7
Workers on Heathrow Site (2008/9) ²	8,960	10,755	3,916	4,092	5,760	2,077
% of working population (2008/09)	6.8%	8.7%	7.9%	6.2%	3.5%	2.7%
Other direct and indirect Heathrow workers (pro-rated) (2008/9) ³	2,199	2,640	961	1,004	1,414	510
% of working population associated with Heathrow (2008/9)	8.5%	10.9%	9.8%	7.7%	4.3%	3.3%

Sources:

- 1 Nomisweb
- 2 Heathrow Airport Employment Survey (2008/9)
- 3 24.5% uplift based on "Heathrow Related Employment", Optimal Economics, 2011

An issue that arises in relation to the boroughs' ability to supply labour mobility lies in the tenure of the housing stock. Due to the difficulties obtaining allocation of social housing stock, workers in this tenure tend to be more immobile than those in privately rented and owner-occupied housing stock. As shown in Table 4, Hounslow (22%), Slough (21%) and Ealing (18%) have relatively high proportions of the population in social housing stock. These proportions are high in comparison to the broader South East region (14%), though perhaps low in comparison to some other parts of London. Heathrow directly employs a large number of people with relatively low-skills, and it is likely that a significant proportion of those people are on low incomes and would find relocation of homes or significant changes in commuting distances/times to another airport site challenging.

Table 4: Housing Tenure in Boroughs with Many Heathrow-related Workers

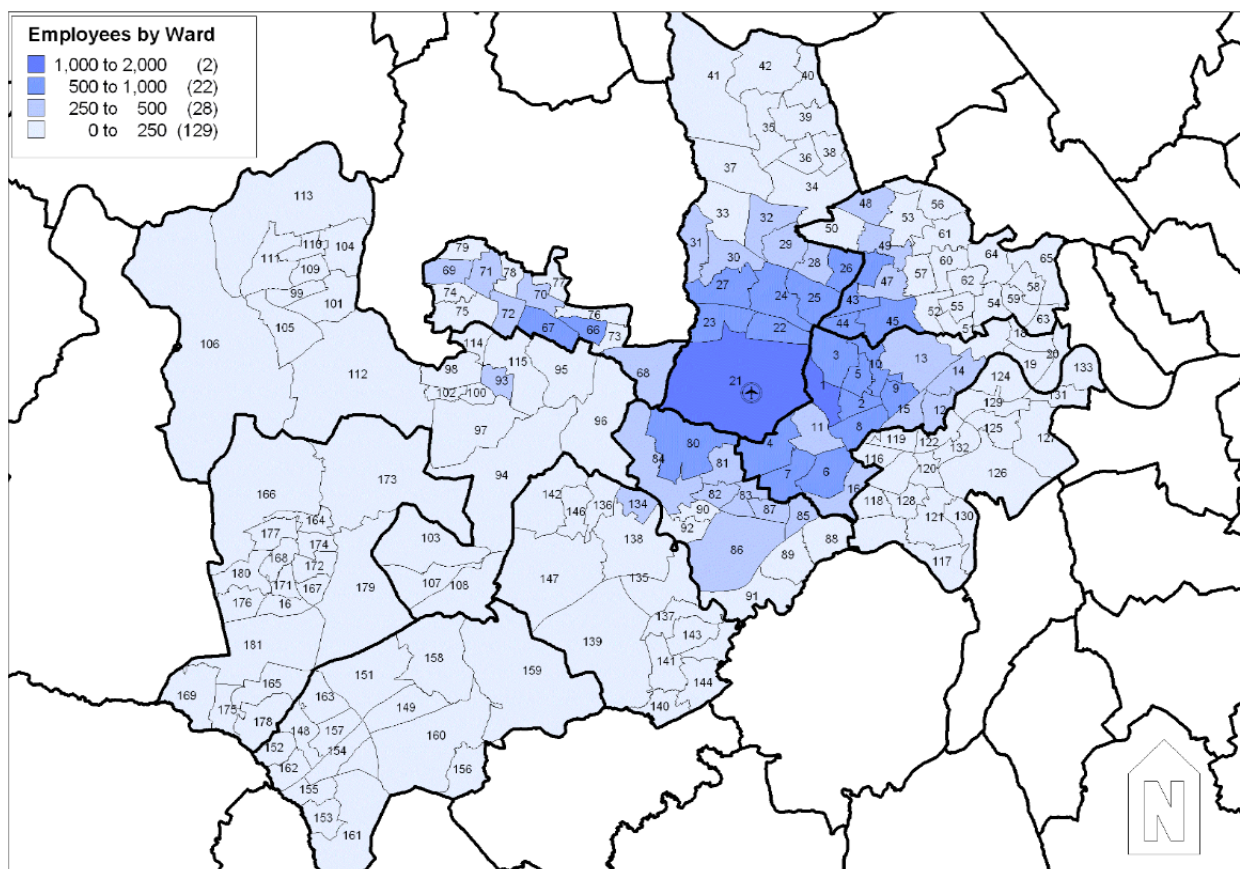
	Hillingdon	Hounslow	Spelthorne	Slough	Ealing Windsor & M	
Social ¹	16%	22%	14%	21%	18%	14%
Other Rented ²	13%	20%	9%	12%	18%	n/a

Sources:

- 1 ONS from census data (2011)
- 2 Individual LA Local Plans and supporting materials, based on surveys of varying date. LA-level data on private rented tenure outside registered social housing is not to our knowledge reported by ONS or DCLG.

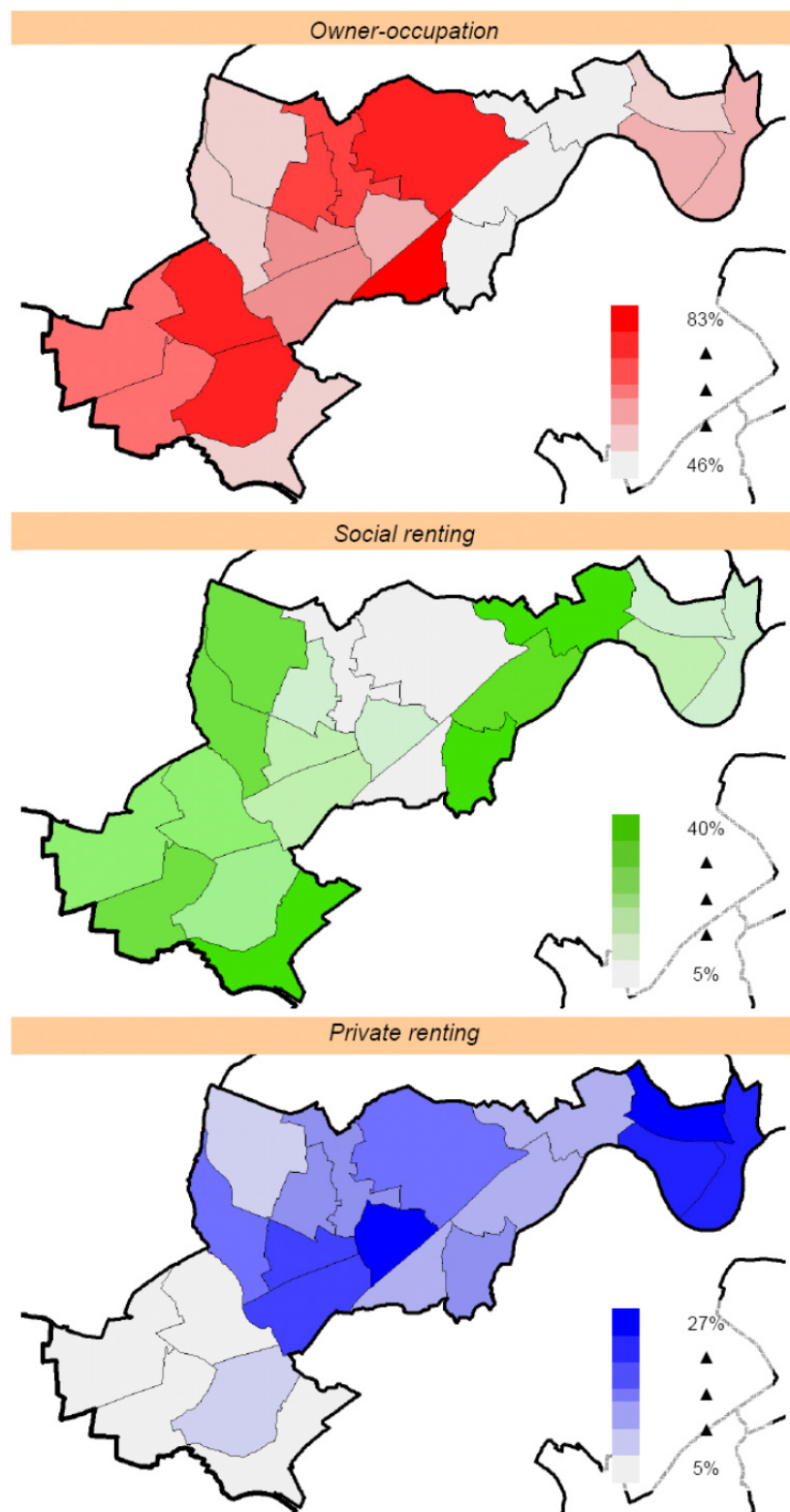
To further test this plausible hypothesis, we reproduce at Figure 4 a chart from the Heathrow On-Airport Employment Survey (2008/9) which shows the distribution of employment at Heathrow by ward, albeit in fairly coarse bands. We can compare this with, for example, a chart of housing tenure by ward from Hounslow, reproduced at Figure 5. This shows some considerable correlation between Heathrow employment and rented tenure in general, private and social taken together, however there is relatively little employment from the east of the borough which is one of the areas with a high proportion of social housing. Unfortunately we have been unable to find similar maps of housing tenure for other relevant local authorities.

Figure 4: Heathrow Airport Employees by Ward of Residency (2009)



Source: Reproduced from "Heathrow On-Airport Employment Survey", 2008/9

Figure 5: Hounslow: Housing Tenure by Ward (2001)



Source: Reproduced from Housing Strategy 2010-2014, London Borough of Hounslow

It is sometimes argued that a high proportion of employment of no clear connection to the airport is nevertheless strongly induced to locate in the M4 corridor and West London because of location of the airport, and is thus at risk if the airport relocates. For example, Slough Borough Council claimed that:

“According to a study, 75% of existing Thames Valley businesses cite Heathrow as the primary reason for their location in the area,¹¹ while a separate study found that 46% of respondents across 19 European regions said that proximity to a major airport was a critical factor in their decision making.¹² This indicates that for those who locate closest to Heathrow, their location is more important than to those who locate near to other major airports.”¹³

Recent survey work is reported in *The Economic Contribution of Aviation Industry in the UK*, OEF (2006). The results of four survey questions are reproduced below. They show that around 26% of UK businesses find access to airports an important factor in the location of their business (third chart in Figure 6). Yet the UK is well supplied for airports with frequent scheduled services, so other places can provide such access to those businesses. We are unsurprised to find that a mere 8% of businesses found lack of good access to airports a problem for their proposed investment in the UK, (first chart in Figure 6) because the UK is well served for airports, and suitable airports can be found close to many good investment locations. Of that 8% that did not find good airport links in their potential investment locations, 65% went ahead and made the investment anyway, (second chart in figure 6) presumably because other factors in the chosen location outweighed the additional costs of poorer airport access. It is also unsurprising that as many as 45% of the businesses around Heathrow say that the airport is important to them, since they have chosen to locate close to the UK's main airport, a factor which typically results in some premium in rent or other costs the business has to accept.

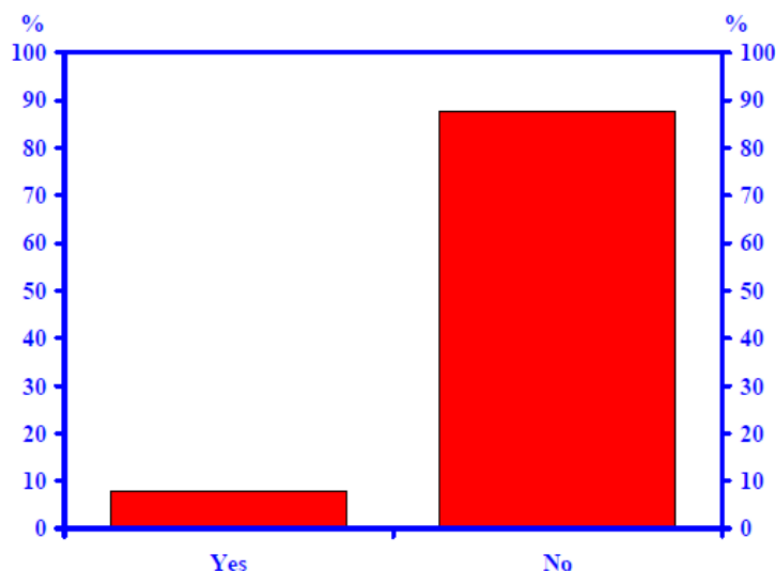
¹¹ “*Western Sunrise*; University of Reading” (footnote quoted from original source)

¹² “*New Location Factors for Mobile Investment in Europe*; Nederlands Economisch Instituut, Ernst & Young, Commission of the European Communities. Directorate-General for Regional Policy” (footnote quoted from original source)

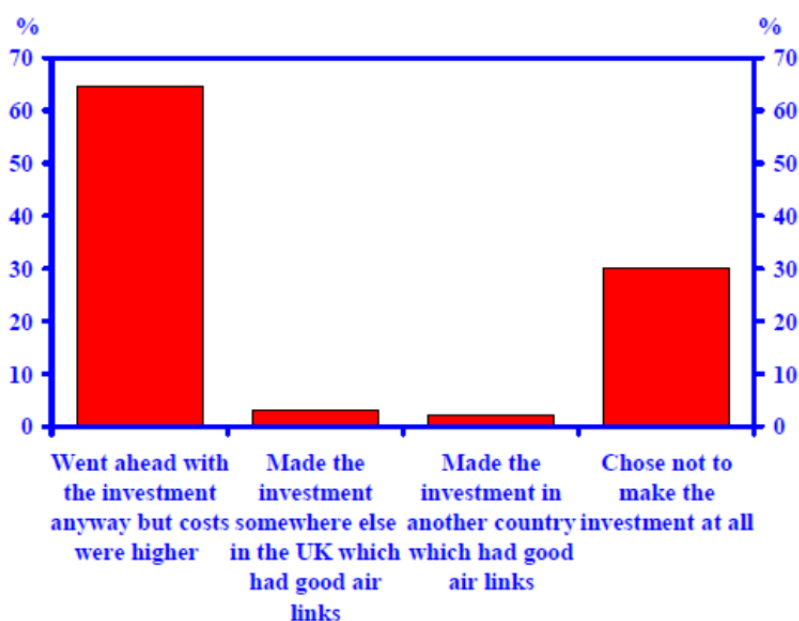
¹³ Response to Aviation Connectivity and the Economy Discussion Paper 02, Ruth Bagley, Ch Exec Slough Borough Council, 19 April 2013

Figure 6: Survey information on importance of access to airports for businesses in UK and around Heathrow

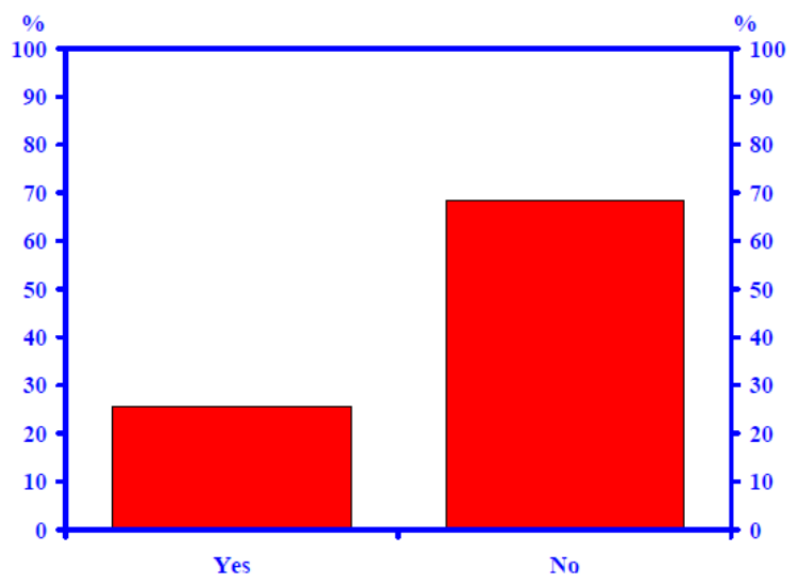
Has the absence of good air transport links ever affected your organisations's decisions to invest in the UK?



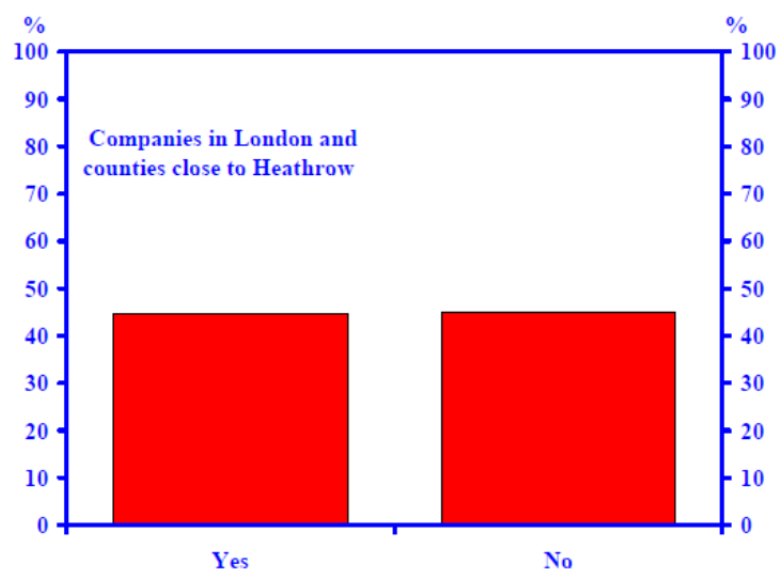
Effect of absence of good air transport links in the UK by those affected



Is access to air services an important factor in influencing where your company locates its operations in the UK?



Is access to air services an important factor in influencing where your company locates its operations in the UK?



Source: Reproduced from "The Economic Contribution of Aviation Industry in the UK, OEF (2006).

The relevance of this for determining what may happen following the relocation of the UK's main hub airport is that, such is the cost of relocating a business, the removal of the airport is unlikely to cause most businesses to consider relocation before the airport's closure. Once the airport is closed, there is likely to be a sharp reduction in local economic activity and businesses as those directly servicing the airport exit the vicinity, or at least significantly scale down their operations (including numbers of employees) in the local area.

For others for whom location near the airport provide advantages but is not critical to their business, the cost of relocation may well outweigh any immediate benefit of getting closer to a hub airport again. It does however seem reasonable to suppose that the absence of an airport will on balance reduce the attractiveness of the area for new businesses choosing to locate into the area, and will also reduce the

ability of the region to retain that kind of employer when finally it becomes appropriate for them to relocate for whatever reason. The Heathrow area will nevertheless remain exceedingly well-connected by surface transport, and this is also an attractor for businesses, albeit not necessarily precisely the kind of business that is currently located there. The 1993 EU paper quoted above reports that office-based activities on average find good surface transport just as critical as proximity of an airport. The M4 corridor agglomeration will still be there and an attractor, albeit it may be somewhat weakened over time.

So the Heathrow area will likely remain relatively advantaged as an attractor to employment because it will remain an area of relatively good surface infrastructure and with a populous hinterland and part of an employment agglomeration. However the loss of the airport is likely to reduce its ability to attract and retain the same range of employment activities longer term.

3.4 Effect of Heathrow on business location decisions

Once the airport and the companies directly servicing the airport and its users have been relocated, the closure of the airport is likely to have an influence on the decisions of companies to locate in the vicinity of it.

The Thames Valley/M4 corridor and the vicinity of Heathrow more generally include several company headquarters located in part because of proximity to Heathrow.

There are many examples of what appears to be clusters of businesses in various sectors. In the technology/telecommunications sector, O2 and LG are at Slough, Vodafone (UK) at Newbury, UK headquarters of Microsoft, Huawei, Cisco and Oracle at Reading, Ericsson (UK) at Guildford, Hutchinson 3G at Maidenhead. In Reading are Prudential and ING, whilst Guildford has a range of companies such as Colgate-Palmolive, Philips and Allianz. In Brentford are GlaxoSmithKline, BSkyB, Datapoint and Kraft Food's European headquarters. Whilst the presence of Heathrow Airport is no doubt a positive for many of those businesses, it is unclear how many would relocate if a new hub airport were to be opened in the Thames Estuary or Stansted, for example.

It is important to not over-emphasise the importance of Heathrow Airport in facilitating growth and business location along this corridor and in these towns.¹⁴ Factors which are of equal or greater importance to many businesses will include access to skilled staff, property rental prices, availability of suitable properties and access to business services (e.g. financial institutions). Technologically and innovation led firms may seek proximity to key universities and research bodies.

Airports can promote the perceived accessibility of an area, but transport costs are typically a small proportion of total costs for most businesses. Changes in transport costs are likely to have to be high to justify relocations.¹⁵

Given the long lead time involved in relocating the airport, it is likely that those firms that particularly value airport connectivity will follow the airport (or at least locations with convenient access to the airport), but that most firms that regard the airport as one of many factors to determine location, are more likely to react more slowly to the airport's location, given factors such as business conditions, property rental costs, behaviour of competitors and other costs. They may choose to relocate only if they can be guaranteed adequate access to the skilled labour market they need competitive property

¹⁴ For example, Google, whilst far from being a typical business given dynamic nature and global scale of its activities, is relocating its UK headquarter near Kings Cross, in part because of the availability of a large enough site to consolidate its Victoria and Holborn offices, and in part because of the good connectivity across London.

¹⁵ "The Importance of Transport in Business' Location Decisions", Transport Research Institute and Employment Research Institute, Napier University, Edinburgh. McQuaid, Ronald W, Greig, Malcolm, Smith, Austin and Cooper, James, 2003.

prices and good access to London and other locations that are important. Given closure of Heathrow will result in some businesses relocating with the airport, this will mean reduced demand for commercial property in the local area which may lower commercial property there. Such a reduction in property prices (and availability of properties) could mean those locations attracting new businesses, albeit with lower GVA (and potentially lower propensity to fly).

3.5 Impacts of Heathrow closure on surface access

The decision to close and relocate the operations at Heathrow Airport will have a major impact on the strategic future of some key surface transport infrastructure and services, such as impacts on highways, the railway branch, the Piccadilly line and other public transport services. In general there will be a localised impact of significantly reduced demand on the immediate network serving the Heathrow site, depending on its alternative use, and a network impact of the reduced demand freeing up capacity for other rail and road users.

3.5.1 Heathrow railway branch

The closure of Heathrow airport would likely see a significant scaling down, if not complete termination of services on the Heathrow railway branch given the limitations of accessing the stations for those not using the (then) ex-terminal buildings without significant redesign. The Heathrow Express service would end, and Crossrail services would likely focus on the Maidenhead terminus. This effectively releases capacity on the Great Western Main Line (GWML) and Crossrail east towards London for other users. However, this does not significantly weaken the business case for Crossrail, as many of its benefits are based on relieving existing lines and services (e.g. Central Line).

However, it is likely that any major redevelopment of the site, particularly for residential purposes, will be predicated on a return of high frequency rail services into central London. Therefore, any curtailment of services would have to be temporary, as property development will be, in part, dependent on sustaining high quality transport links.

It is less likely that this would include services on the westwards spur line on the GWML. It is more difficult to envisage services from what may be simply a new residential suburb to Reading, Bristol and Wales, being viable. Similarly, if in the meantime approval is given for a new HS2 loop line to be built to Heathrow, to enable London-Heathrow-Birmingham etc services, it is difficult to envisage it remaining viable to offer such services if Heathrow is simply a residential suburb.

In all cases, it is likely that services on the Heathrow branch will be reduced and that additional capacity would be available for services elsewhere on the GWML. However, if the Heathrow site is to attract significant residential housing development, there will need to be commitments about a minimum level of service to make the site attractive for investors (and home-owners and tenants).

3.5.2 Piccadilly line

As with the railway, Transport for London would have to make strategic decisions as to whether there was a continued role for any Piccadilly line services to the Heathrow site after the airport is closed, and before any major redevelopment of the site.

This will depend upon activities at the site after the airport is closed, such as whether there is a role for the line during demolition and construction periods in providing transport for employees of contractors undertaking those activities. However, the key point is that the line and stations would have to be assessed for their utility given any plans on how to proceed with developing the site. It may be that the existing loop and branch layout may be changed, and that a redesign of infrastructure across the three Heathrow stations (and likely Hatton Cross which serves the Heathrow site as well) will be required.

Meanwhile, the closure of Heathrow will release capacity on services on the line, which may allow more patronage from stations in west London, and a more intensive level of service on the Uxbridge branch or to intermediate stations. However, as with the rail branch, it may be that at a future date, demand for services at the Heathrow stations may increase again, and that redevelopment of the site may partially be dependent upon ensuring a minimum level of service. It is likely that service levels may not necessarily be as intense as they are at present, but it is too premature to predict the types of service patterns that would be provided.

3.5.3 Highways

For highways, the closure of Heathrow is likely to have a modest impact in reducing traffic volumes on the M25 and M4 in the vicinity of the airport. Given both motorways have significant strategic arterial functions in their own right closure of Heathrow would release some capacity for such traffic. Of course some traffic currently accessing Heathrow may still use part (or in the case of the M25) much of those routes to access the replacement airport. The net effect on these routes in the vicinity of Heathrow, at least until there has been redevelopment of the site on a scale to generate new traffic, will be to reduce congestion and delays, and on the routes they feed (e.g. A4 towards west London).

4 CASE STUDIES OF AIRPORT RELOCATIONS

4.1 Limitations of case studies

There has not been a case of an airport being closed that had the scale and intensity of operations that are seen at Heathrow today, and its replacement with a new airport on a distant site with a significant increase in capacity.¹⁶ Whilst new airports open fairly regularly, in most cases pre-existing airports have been retained for a lower level of operations, with the new airport seen as adding capacity to the system, not enabling closure of existing capacity.

Whilst Japan has a reputation for building new airports to relieve congested airports, in no cases has the construction of major new airports resulted in the original airports being closed to scheduled airline services. Indeed, the two biggest cases (Tokyo Narita and Osaka Kansai) saw the pre-existing airports retained with considerable services, as the new airports were built to provide new capacity for the cities concerned focused on international flights. The existing airports were seen as sustainable because of Japan's intensive level of domestic services, and the relatively low priority given to international interlining traffic.

In Europe, there are three recent cases of airport relocation; Munich in 1992, Oslo in 1998 and Athens in 2001. In the United States, the most recent relevant example is Denver in 1995, whilst Hong Kong in 1998 was perhaps the largest recent example of a new airport that resulted in another airport closing completely. In all of the cases outlined below the airports closed were closer to the city centre than Heathrow is from central London (at 14 miles).

Summary tables for each case study below are presented as:

Name of Airport	Heathrow
Annual ATMs	c. 475,000
Annual passengers on closure	70 million
Size of site	1,200 ha
Distance from city centre	14 miles
Airport runway capacity	2 runways of 3,660 and 3,900m

4.2 Case studies

4.2.1 Hong Kong

Name of Airport Closed:	Hong Kong – Kai Tak
Annual ATMs on closure	221,000
Annual passengers on closure	29.5 million
Year of closure	1998
Size of site	333 ha
Distance from city centre of old airport	4.7 miles
Distance from city centre of new airport	21 miles
Old airport runway capacity	1 runway of 3,390m
New airport runway capacity	2 independent runways of 3,800m

¹⁶ Significant capacity meaning the equivalent of a new runway for full jetliner service.

The case of closing Kai Tak Airport is well known, given the extremely constrained site at Kai Tak, with single runway operation in an intensely populated urban location. Options to expand Kai Tak were unsafe and unacceptable given the geography of the site. The closure and relocation to Chek Lap Kok was seen to be essential to enable expansion of services for the territory, including the ability of Cathay Pacific to be a competitive network hub airline in Asia.

The relocation took place overnight and involved a 23 mile relocation of equipment and aircraft. All employees were expected to find their own way to the new site, given the provision of adequate bus and rail access. However, all did not go smoothly. A Commission of Inquiry¹⁷ was held into the wide range of teething problems when it opened, including baggage handling, cargo handling and flight information systems at the new airport failing to function. There were extensive delays, including misplaced baggage and confusion for both passengers and airlines as the reality of full scale operations of the new airport did not match the simulations and trials before it was opened.

Whilst most of this can be attributed to programme management, testing and training issues at the new site, it highlights the inherent complexities and difficulties of such a mammoth logistical exercise. Clearly, there was commercial sense in all operations shifting overnight, given the hub status of the airport, and inherent confusion for users in maintaining two airport operations for a set period. However, given risk of human error when very large scale operations are relocated, there is always a high risk of some difficulties. These are likely to be exacerbated by the larger the scale of relocation and scale of operation. A significant amount of spare capacity in both systems and staff may be needed to handle confusion and errors.

Whilst all direct and many indirect employers relocated overnight in Hong Kong, 57.5% of freight forwarders did not relocate their activities in time for the airport shift, largely so they could determine what impact the new airport would have on their own operations, but also because they had not established suitable warehousing sites for new operations and because many did not see an advantage to relocating when many of their competitors had not done so. Some were also bound by rental leases that extended beyond the airport opening. It is unclear how long it took for all of them to relocate, but it would appear that it took over a year for many to shift operations, and this had no noticeable impact on the airports operations as they simply serviced the site remotely.

For the redevelopment of the existing site, initial plans for Kai Tak airport were to reclaim surrounding land, and use it for a major commercial and residential property development. However, this was extensively opposed by local landowners, resulting in a revised plan being issued in 1999, which was also rejected and revised again in 2002. Key concerns appeared to be imposing height limits on new developments, and a desire by local landowners to retain the waterway between the closed runway and the parallel coastline. Of course, there may also have been interest in not supporting development that may affect land prices. A legal challenge saw the 2002 scheme dropped in 2004, and two more years of planning and consultation to produce the 2006 “Blueprint for Kai Tak”. This had scaled down residential housing plans, but also included sports facilities and a cruise ship terminal. Consultation on that plan saw further revisions to increase green space significantly, and preserve some specific harbour views.

That plan, which is now proceeding, includes 90,000 new homes, two new primary schools, park space, a “Trade and Industry Tower” and “centre of excellence in Pediatrics”. However, to date the primary activity has been construction of the cruise ship terminals and extensive environmental remediation of the adjacent waterways.

¹⁷ Full text at

http://www.gov.hk/en/residents/government/policy/government_reports/reports/docs/new_airport_report.pdf

The redevelopment of Kai Tak is still not complete, with the primary delay being the extensive public controversy about various plans. This may be cited in part due to the harbour setting of the former airport. However, Hong Kong has very high demand for both housing and commercial property, especially this close to Kowloon. This would seem to indicate that even with high demand for property, the lack of consensus over the planning approach and decisions can result in substantial delays in realising the value of the site. No valuation has been found for the Kai Tak site or measure of the likely net receipts from sale/lease of the site.

4.2.2 Munich

Name of Airport Closed	Munich – Riem
Annual ATMs on closure	Est. 200,000
Annual passengers on closure	12 million
Year of closure	1992
Size of site	450 ha (562 ha made available)
Distance from city centre of old airport	7 miles
Distance from city centre of new airport	17 miles
Old airport runway capacity	1 runway 2,814m ¹⁸
New airport runway capacity	2 independent runways of 4,000m

The original decision to build a new airport for Munich was made in 1969, but actual construction did not begin until 1980. However, major decisions on the future of the site were not finalised until the closure of the airport. The primary reason for the relocation was to provide space for expansion, and the prevailing noise (which at the time the decision was made involved aircraft significantly louder, though fewer in number, than those operational today, such as Boeing 707s and 727s).

There appear to be no reports that the relocation of operations from Munich Riem airport to the new airport near Freising was problematic. Flughafen München GmbH cites itself as having particular expertise in managing the logistics of an overnight transfer of operations from one airport to another, and it is assisting in the planning of the Berlin airport transfer. At the time, Munich was not a hub airport (Lufthansa having chosen to create a second hub at Munich after the new airport was opened).

Once the site was vacated, it was initially used for rock-concerts and dance-events with the location being branded Kulturzentrum Riem. This reflects the relative ease by which the site could be adapted for those purposes. In 1996 it was redeveloped into Messestadt Riem (Convention City Riem), as the State of Bavaria had decided to develop the site into a mix of open space, housing and “environmentally sustainable” and “technology-led” businesses. An additional 112 ha of land of surrounding areas were incorporated into the redevelopment. 47% of the area has been allocated to green/open space, 19.5% into residential usage, 14.2% for office space and 11.5% for exhibition/convention purposes. 10,000 new homes to be developed onsite, but with 70% of them either publicly owned or subsidised social housing. The site has been seen as being driven substantially by policy direction to attract more environmental and technology led businesses for Munich, by creating a new (small) borough of the City of Munich.

Munich continues to see Riem as a location for future growth of business, and sees the major investment in housing by the state as a way of attracting a potential labour force to meet such demand. However, it is unclear that housing would be developed on the site on the scale now underway if it were

¹⁸ A second cross cutting runway of 814m also existed, but not suitable for jet airliners.

not for large levels of public sector expenditure. No valuation has been found for the reuse of the Riem site.

4.2.3 Denver

Name of Airport Closed	Denver – Stapleton
Annual ATMs on closure	Unknown
Annual passengers on closure	15 million
Year of closure	1995
Size of site	1,902 ha
Distance from city centre of old airport	3 miles
Distance from city centre of new airport	25 miles
Old airport runway capacity	6 parallel dependent runways between 1,484m and 3,658m
New airport runway capacity	6 independent runways between 3,660m and 4,900m

The construction of a new airport for Denver was controversial at the time, not least because the scale of the site that remained is five times the size of downtown Denver itself, and the size and expense of the new airport. It is unknown if there were any substantial issues with the airport relocation.

The original airport location at Stapleton was very close to downtown Denver and being such a large area of land, its availability for development would have a high impact on land prices and demand for land in Denver.

The first major step for preparing the site for reuse cost over £134m (in 2012 values), including environmental remediation and demolition.¹⁹

Forest City Stapleton Inc. was appointed to be the master developer of the property and in 2001 construction began of new homes on the site, with a range of housing from apartments to single-family houses. A mix of commercial and residential development is allowed on the site, including establishment of office parks and large “big-box” residential developments. A key element for the development so far of the project has been its proximity to central Denver, and the intention to make it an exemplar case of intensification and the “new urbanism” philosophy of town planning. However, market conditions are such (particularly given Denver’s relatively unconfined geography) that it is unclear if there is sufficient demand for higher density housing in the city to meet expectations.

2,300 homes had been built by 2006, and the developers anticipate a total of 12,000 additional homes will have been built on the site by 2020. It anticipates 13m square feet of commercial property and 445 ha of parks. It is expected to take 25 years for the full development of the site to be achieved, but that may be seen as optimistic. The city anticipates that it will gain only US\$75 million in total from the sale of the site, given the costs of clearing the site and providing basic utility infrastructure.

¹⁹ Rocky Mountain News, 27 September 2006.

4.2.4 Athens

Name of Airport Closed	Athens – Ellinikon
Annual ATMs on closure	Est. 190,000
Annual passengers on closure	11 million
Year of closure	2001
Size of site	530 ha
Distance from city centre of old airport	4.3 miles
Distance from city centre of new airport	18 miles
Old airport runway capacity	2 closely spaced runways of 3,184m and 3,500m ²⁰
New airport runway capacity	2 independent runways of 3,800m and 4,000m

Athens had planned a new airport on the planned Messogheion site for many years, so businesses near the airport and the Athens property market had started taking into account its eventual opening some years in advance. It was clear once Athens won the right to host the 2004 Olympics that the new airport would finally be built. The airport itself did not appear to induce significant secondary commercial or industrial business activity that was unrelated to the airport itself. However, compared to Heathrow, Athens was not a major or even a secondary hub airport, with little interlining activity beyond connections to domestic flights within Greece.

Once the contractual commitment had been made to build the new airport, the five years before closure of Athens Ellinikon Airport saw increases in residential property values in anticipation of the airport closure because of the removal of noise. In anticipation of the airport's closure, apartment prices in the municipalities bordering the former airport rose by 84% in the three years before the airport was closed.

The primary business/employment impact of the relocation was a slow scaling down of commercial property occupation near the airport from 1995 (as some businesses supplying the airport chose to locate conveniently for the new airport in anticipation of rising property prices). However, this relocation has tended to not be adjacent to the new airport as much as being adjacent to transport networks that are convenient for both the city and the airport.

Cargo and logistics firms have progressively relocated over time to be more conveniently located to the new airport, but this has not necessarily been adjacent to the airport, in part to avoid the toll charges of the new highway and because of the importance of accessibility to central Athens. This indicates that the airport closure was as much as opportunity to reconsider business location more generally rather than just a reaction to the airport.

To date, much of the Athens Ellinikon Airport site remains undeveloped. After it was closed, an open international design competition was held for redevelopment of the site, which was won by a consortium of DZO Architecture, Philippe Coignet, Ryosuke Shimoda and Erwin Redl.

The primary developments to date have included conversion of terminal buildings into an exhibition centre and construction of sports stadiums and parks on the site, which supported the 2004 Summer Olympics. However, in 2005 the winning consortium was asked to develop an updated plan for redevelopment.

²⁰ A third cross cutting runway also existed of 1,800m, but also could not operate independently of the other two.

The main plan for “Ellinikon SA” provides for a major metropolitan park to be developed, primarily because of the lack of green space in Athens. 100 ha of the site is to be developed for luxury housing, the revenues from which will help pay for the park (400 ha) and another 30 ha to be used for a convention/exhibition centre and a hotel. However, the Greek economic crisis has effectively stalled any further development, although there has been some publicity about the alleged potential value of the site, it has been insufficient to date to encourage large scale property development.²¹ A tram line was constructed in 2004 to improve access to the site and the neighbouring suburbs to central Athens, a planned metro line has been stalled due to the national fiscal situation. Meanwhile, an aviation museum has also been developed on the site.²²

It was only in September 2013 that the government finally legally declared the airport at Ellinikon to be permanently closed, ending speculation that it may be made available for general aviation. Meanwhile, most of the existing activity at the airport site is confined to the exhibition/convention centre and sports grounds.

In the vicinity of the new airport site around Spata, highway infrastructure was developed in time for the opening of the new airport. The A6 toll motorway opened for the new airport and was financed by private investment, but the metro line extension was opened in 2004 and the direct commuter rail link in 2007. This helped transform a rural area into one with more residential development, retail, office space and light industrial usage. The Messogheia plain area had increasingly attracted a skilled workforce seeking housing, supported by the enhanced transport links. This produced a “virtuous cycle” of increased commercial development to support this population. This was supported by the final decision in 1995 to confirm the new site for the airport, although there had been discussion for many years about the site as being the likely location for a new airport.

The effect on property values from the new airport appears to have been positive. This was attributed to the anticipated growth in employment from the location of the new airport. However, no valuation has been found for the redevelopment of the Ellinikon site.

4.2.5 Oslo

Name of Airport Closed	Oslo – Fornebu
Annual ATMs on closure	171,000
Annual passengers on closure	10.1 million
Year of closure	1998
Size of site	340 ha
Distance from city centre of old airport	5 miles
Distance from city centre of new airport	31 miles
Old airport runway capacity	2 dependent runways 1,800m and 2,370m
New airport runway capacity	2 independent runways of 2,950m and 3,600m

As with most other airport relocations, the closure and relocation of the operations at Fornebu was primarily due to it being extremely difficult to expand the site, and the intensity of residential land use near the site. Nevertheless, there was some local lobbying calling for the airport to be retained for smaller scale airline operations (particularly short-haul operations, not dissimilar to London City Airport).

²¹ <http://edition.cnn.com/2012/11/22/business/greece-hellinikon-airport/>

²² <http://www.forgottenairfields.com/greece/attica/ellinikon-s295.html>

However, this was rejected. The site was owned by central government and the City of Oslo jointly, and both agreed to sell the land to developers once a master plan had been developed for its future.

The opening of the new airport at Gardermoen corresponded with an overnight relocation of airport activities from Fornebu on 7 October 1998, with much equipment shifted by road that night. Fornebu was a minor hub for SAS, which did not appear to experience significant difficulties in shifting operations.

Once the airport had been closed, developers were expected to develop roads and open (green) space, whereas the local municipality would develop infrastructure. However, developers were slow to invest given the cost of preparing open space and the municipality had limited resources, so central government agreed in 2002 to fund and develop open space and transport infrastructure, with the municipality retaining responsibility for developing schools, children's day care, recreation and cultural facilities. Road connections were enhanced, new bus routes opened and longer term plans now include extensions to Oslo's metro to service the site.

130 ha was set aside for green space, with 200 ha for building development. 6,300 residences have been planned for the site, with 25,000 jobs expected to be located there once the development is complete in 2030.

The land was ultimately sold to developers for 400 million Euro (£339 million in 2011 values), with the primary development to date been to support the location of businesses on the site.

As a result, the impact of the airport's closure on the local economy has not been high, given some companies remained at the site (the Norwegian offices of SAS remains located at Fornebu). The development of the site has subsequently seen other companies choose to locate on the site, such as Statoil, Telenor and Aker Group. Whilst there appears to be some unofficial state encouragement of government companies locating on the site, the site is also supported by good highway connections around Oslo, as it is adjacent to the main ring road. Housing is also being developed, although it appears that it will take some years before the total planned number of residences is completed.

4.2.6 Berlin

Name of Airport Closed	Berlin – Tegel, Schönefeld and Tempelhof
Annual ATMs on closure	166,000 (Tegel), 70,000 (Schönefeld)
Annual passengers on closure	18.2 million (Tegel), 7.3 million (Schönefeld)
Year of closure	2014 (Tegel, Schönefeld)
Size of site	466 ha (Tegel)
Distance from city centre of old airport	5 miles (Tegel), 11 miles (Schönefeld)
Distance from city centre of new airport	11 miles
Old airports runway capacity	Tegel 2 dependent runways 3,023m and 2,428m. Tempelhof 2 dependent runways 1,840m and 2,094m. Schönefeld 1 runway 3,600m
New airport runway capacity	2 independent runways of 3,600m and 4,000m (includes Schönefeld runway)

In Berlin, the new Brandenburg Airport is planned to replace Tegel and Schönefeld airports (and the closed Tempelhof Airport), albeit that Brandenburg Airport will use part of the existing Schönefeld site. The main driver for the new airport is to remove the effects of noise from the residential and commercial areas near Tegel and to provide a less constrained site for airline operations to expand at Berlin. Unlike most capital cities in Europe, Berlin does not have a major airline hubbing operation, with

relatively few long haul flights operated to the airport. Lufthansa has notably chosen Dusseldorf over Berlin as its third hub in Germany.

Once the airport is closed, the Tegel site is expected to be used for a mix of new parks and woodland, housing and a new research and technology park.²³ The emphasis being to make the area into a new business park, that is well connected to Berlin and neighbouring areas. However, whilst the existing airport remains open, it appears that little public or media attention has been given to site reuse. When it does, it may face challenges in getting sufficient private investment without early public sector commitments to infrastructure or incentivising higher commercial land use once the airport is closed.

4.3 Conclusions

The relocation and closure of Kai Tak Airport has been the largest airport relocation to date. In 2012, Heathrow handled over 475,000 ATMs and nearly 70m passengers (CAA, 2012).²⁴ This compares with Kai Tak Airport in 1998 when its operations were relocated to Chek Lap Kok in Hong Kong. At that point it was handling 221,000 ATMs and 29.5m passengers per annum. Therefore, an airport relocation on the scale of Heathrow is unprecedented and carries risks that may be proportionately larger, but are different and unknown.

The Kai Tak case indicates the importance of getting public agreement to redevelopment plans. Although the Hong Kong authorities went to some effort to get agreement in advance of the airport closure, it was not until Kai Tak closed that there was adequate public attention paid to the plans for the site. The subsequent legal challenge and delays in development indicate that even in a city with extremely high demand for land, and a relatively light-handed planning environment, redevelopment of large urban sites can take some considerable time. It is now 15 years since Kai Tak was closed, and today, much of it is now a construction site, indicating that it will be some years before the full value of the site will be realised.

The Oslo Fornebu site appears to have been somewhat successful in attracting development and new business, although it too saw some delays primarily in project governance in addressing responsibility for the costs of developing green areas. The main success has been in providing new accommodation for office space, which is at a premium in Oslo. However, some of the early occupants of the site are companies that have substantial state ownership, indicating that state support for the commercial development has been important. Clearly having high quality (and relatively uncongested) road access to much of Oslo, and early provision of new bus services have assisted in supporting this development by ensuring reasonable access to a skilled labour pool. However, housing has taken more time. The 2030 date for completing redevelopment of the site supports the hypothesis that airport site redevelopment can take some time.

In Athens there were significant impacts on the property market from the anticipated airport relocation, but the state made the redevelopment of the site highly dependent on commercial investment. Notwithstanding the almost complete collapse of the Greek property market due to the economic crisis, the requirements imposed on commercial developers to fund open greenspace and infrastructure appears to have deterred investment. In addition, there were considerable delays in development due to the reuse of the site for Olympics venues. However, the property market response to the relocation is pertinent to Heathrow. Commercial property prices started to drop before the airport closure as some businesses preferred to relocate in advance of the airport closure, to gain “first mover advantages” with favourable leases. Residential property prices increased, as investors anticipated a gain from the removal of airport noise. Regardless, it appears that in Athens much of the site remains undeveloped,

²³ http://www.mvrdv.nl/projects/452_tegel_fields/#

²⁴ Source: CAA UK Airport Statistics. Table 03 1 Aircraft Movements 2012 and Table 02 2 Summary Of Activity at UK Airports 2012

despite it being in a relatively prime location, with good transport links. It appears this is largely because developers are uninterested in bearing the costs of clearing parts of the site for development and having full responsibility for all infrastructure costs.

The Munich case appears to be an example of a smooth relocation, but in terms of economic impacts it is clear there was extensive state investment to make the site into a new business park (a decision and plan that itself took some years to agree on after the airport was closed) and to develop a significant part of the new housing as public sector or subsidised housing. It is likely that without such a heavy state investment, much of the site would not have had the development that has occurred to date.

Finally, Denver is perhaps the least useful case, in part because the size and location of the Stapleton site is such that it had been difficult for the property market to absorb.

In summary, the key lessons to take from other examples are:

- Airport relocations are large, complex and risky, and no airport approximating Heathrow in size and intensity of operation has been relocated.
- The effect of airport relocations on businesses is to incentivise some early relocation and to depress commercial property values in the vicinity of the site, unless it is particularly close to a central city location that has shortages of high quality land for such development. In most cases, airport sites do not tend to attract much new business.
- The effect of airport relocations on residential property prices are to increase them in the vicinity in anticipation of the removal of the noise nuisance, but this does not necessarily translate into large scale investment in new residential property on the airport site.
- The costs of clearance, decontamination, provision of infrastructure (including open space) are considerable barriers to private investment in property development of former airport sites.
- Even with large scale early agreement on plans for redevelopment of an airport site, public attention to the issue is not high until after the airport is closed. There is a risk of public pressure to revise plans, particularly if local property owners have some key issues of concern.
- Early development on airport sites typically involves considerable public sector investment, partly because of the disruptive effect large airport sites have on local property markets.
- The timeframes for airport site redevelopment tend to be in terms of decades, through a combination of planning issues, site preparation, infrastructure and the local property market;
- In no cases has redevelopment of the airport site been seen as a major contribution to the financing costs of the new airport.

5 HEATHROW SITE REDEVELOPMENT

The key phases in the relocation and redevelopment may be:

1. Policy decision by Government on construction of a new hub airport for London, in parallel with closure of Heathrow Airport.
2. Legislation enabling the airport development, relocation and closure.
3. Signing of primary contract for development of new airport and associated infrastructure.
4. Acquisition of Heathrow Airport as a going concern.
5. Consultation and development of programme management capability to manage redevelopment of the site.
6. Planning approvals for redevelopment, including enabling legislation to facilitate early approvals of a Heathrow redevelopment Master plan.
7. Closure of the airport.
8. Revision of the master plan according to market conditions.
9. Demolition, decontamination and preparation of the site for redevelopment.
10. Development of utility and social infrastructure for the first phase of development of the site.
11. Development of green/open space including open water space.
12. First phase of commercial development (e.g. first stage residential, retail and shopping centre development).
13. Subsequent phases according to market demand.

5.1 Closure and relocation

5.1.1 Process of relocation

Besides the complexities of constructing a new hub airport, including providing the surface access infrastructure to support it, there are many parallel processes that need to be undertaken to enable the existing airport operation to be repositioned at the new airport.

It is premature to speculate on the exact sequencing or timing of such a transition. However, the experience of other major airport relocations (Hong Kong, Oslo, Denver and Munich) has been for operations to be essentially transferred in one step overnight, albeit such a date selected to ensure the transition happens on a date with relatively lower air traffic volumes. In the case of Heathrow, such relocation is also likely to be best undertaken at a period of minimal demand, as many airlines will be able to consolidate some services.

From a risk mitigation perspective it is useful to phase the opening of such a large complex facility, but one of the underlying economic benefits of a hub airport are based on airlines being able to interline with each other which imposes considerable pressure to make any relocation period as brief as possible. It is reasonable to expect that preparatory programme planning for the relocation would include extensive consultation with airlines, so that a suitable phasing process could be developed. However, it is highly unlikely that airlines will want to prolong such a relocation of services for more than a few days.

For example, it is reasonable to expect British Airways to want to relocate all of its existing Heathrow flights to a new airport in one step, or at the very most over a series of days. Its alliance and codeshare partners are likely to want similar treatment. This contrasts considerably with the planning around opening the new Terminal 2 at Heathrow in 2014, which involves airlines relocating over a period of over six months (following the lessons learned from the two stage transition for the opening of Terminal 5). Such a transition is possible within a single airport, as interlining connections are commonplace between different terminals. However, it is unlikely that airlines will accept a phase in of operations over such a timeframe, given that they regard a key benefit of flying into Heathrow is being able to access the networks of other airlines as feeders. This is also important for passengers, cargo operators, suppliers and other users of the airport, given the complexities and costs involved.

Given the long lead time for any such relocation, there will be adequate time for all parties to plan, and to utilise the experience of other airport relocation projects. There will need to be a strong and empowered programme management capability to develop a detailed programme, and direct stakeholders to be prepared for the complexities involved in relocation. Although it is reasonable to expect most businesses at Heathrow to bear the costs of relocation as long as they are assured (at least) comparable premises at the new airport, there will still need to be an extensive airport/public sector role in managing the transition for operational, security and safety critical dimensions of the airport.

5.1.2 Employment transitions

There are a large number of individual employers at Heathrow Airport, of which Heathrow Airport Ltd is not the largest. Around 76,000 people are employed on the Heathrow site, with around 320 employers²⁵ but there are tens of thousands of others employed offsite in positions that would also relocate with the airport, in sectors such as surface transport, accommodation and logistics. Of that 76,000, around 62% are with airlines and airline handling agents, with the next largest category being “other public passenger services”²⁶ at around 10%. All other categories are smaller proportions of the total (e.g. Heathrow Airport Ltd staff, catering, retail, building and maintenance contractors, government services and other companies).

All of the airlines, the airline handling agents, caterers, UKBA, the large number of private food and retail premises, building and maintenance contractors of Heathrow Airport Ltd and ground transport companies will all have different logistical issues. Most can be expected to want control of their own transition programme, but will also seek guidance on the interdependencies they have with other businesses and suppliers. For example, an airline will need to have co-ordination with the airport, its ground handler, caterer, fuel supplier, ground transport, accommodation for crew, etc. It will not be confident of its own plans for relocation until it has assurances from its suppliers.

However, in all cases, the decision to proceed with the relocation of the airport operation will have been foreshadowed over a decade in advance of the date of it happening, providing adequate time to plan and to manage risks. Although, with such a timeframe, neither staff nor technology and systems are static, so it is not necessarily true that a longer timeframe to prepare will lower risks, when those who are trained and the systems being discussed may no longer be relevant when the time comes to relocate operations.

The key challenge is that for some period, whilst Heathrow is fully operational, those employed at the airport will need to be trained and sufficiently experienced with the equipment and systems at the new airport, so that they can relocate on the day of opening. This will require additional staff to cover a set period, as existing staff are trained and exposed to how they will interact with the airport.

²⁵ Source: Heathrow: On-airport Employment Survey, 2008/09, Heathrow Airport Ltd 2010.

²⁶ Support for rail, underground, bus, private hire vehicle and hackney carriage services.

Given the UK's labour turnover rate of between 9.3% and 17.8%²⁷, it would mean that between the time of the policy and legal commitment by government to build a new airport and close Heathrow, and the actual relocation, many if not most of the employees dependent on Heathrow would have retired or left their jobs given the timeframe of at least a decade.

Those remaining might seek to negotiate recompense from their employer for any higher commuting costs or costs to relocate their homes. However, it is difficult and probably not advantageous for any central decisions to be made about this at an early stage, other than critical employers around safety, security and operations will need to take active steps to ensure that the transition is seamless, which may need to involve contracted labour (many of whom will need security clearance and training). It can reasonably be expected that airlines and retail premises, both of which face intense competitive pressure (and so face revenue risks of not being adequately prepared), would be likely to have sufficient incentives to do so. However, security, border control, airport ground control, ground handling and some other service providers may be more critical, but face less intense commercial pressure to provide adequate staff in the initial days of operation. The airport's owner will need to plan closely with all such employers to ensure that any transition is a success, and that adequate back-up strategies exist to cover the inevitability of some staff not appearing on the day of opening of the new airport.

5.1.3 Equipment relocation

Given the long lead time for the new airport, it is likely that it will be predominantly equipped with new systems and vehicles, so that from day one it can be operational (and efficient). However, some equipment, notably surface access vehicles and aircraft, are likely to need to be shifted largely overnight.

The experience of other airport relocations has been that airlines will arrange for crews to reposition aircraft from the closing airport to the new one, and that readily portable equipment may be readily shifted overnight. The key variable in managing this activity is weather.

The relocation would be likely to create airspace and highway access issues during that time, however, these do not appear to be insurmountable.

5.1.4 Airport supply chain and businesses ancillary to the airport

A wide range of businesses are dependent on the customers of Heathrow Airport, and will make appropriate plans in advance to establish new operations adjacent to the new airport and to make appropriate decisions on the business viability of retaining such operations at their existing sites. This includes rental car firms, hotels, service stations, car park operators and surface transport (bus and cab) companies. There is likely to be some significant contraction in those sectors in the vicinity of Heathrow as many of their key customers will be located at the new airport and there is unlikely to be a business case to retain most of such operations at the Heathrow site.

5.2 Use of the Heathrow site

5.2.1 Initial planning

The approximate area of the Heathrow Airport site itself is 1,200 hectares. This size of site is larger than any of the case studies, with the exception of Stapleton, Denver. By way of comparison Heathrow, from west to east, reaches from around Hyde Park to Aldgate and from north to south from Oxford Street to Elephant and Castle. Of course, this is not an indicator of the potential value of the site. Land is valuable because it is demanded for specific uses driven by its location and accessibility to other locations.

A key issue will be whether any of the land adjoining the site would be acquired to support redevelopment (as was done in Munich). For those sites currently used to directly support the airport

²⁷ Source: "Resignation rates at lowest level since 2007" Laura Chamberlain, Personnel Today, 21 August 2012.

(e.g. with hotels, car parking and industrial sites) this may make some sense, but a wider question needs to be asked as to whether a wider regeneration programme is sought taking into account improvements to use of public space and infrastructure. It may make sense to utilise existing social infrastructure in those suburbs, but also to improve the integration of the new site with its environs. Heathrow's site is bounded by a mix of commercial/industrial property directly related to the airport, housing and rural land. As such, it is difficult to assess the extent to which neighbouring property may usefully be incorporated in any redevelopment. However, it is clear that any substantial redevelopment is likely to have significant impacts on the value and demand for such property, particularly during construction/redevelopment phases. Clarity on plans for the site will help provide certainty around any investment in property adjoining the site. However, given the size of the site on its own, it would be ambitious to consider widespread redevelopment that went well beyond the scale of the site.

The key dimensions to redeveloping Heathrow (as described on page 32) will be:

- agreement of the master plan for the site;
- establishment of a governance and commercial structure that clearly allocates roles and risk, especially for decontamination, demolition, development of different types of infrastructure, development of open spaces and for property development; and
- development of a commercial property management and deal-making process to facilitate private sector investment in the site.

It is important not to underestimate the expense or complexity of these stages. The master plan development will involve consultation, legal challenges and extensive planning, with many different public and private sector interests seeking input. The governance and commercial structure will be critical in managing costs and providing the framework for private sector investment in the site, whereas the process of striking deals with investors and developers will need to be astute to ensure the public sector obtains the value it seeks from redevelopment. However, it is highly unlikely that any development that is led by a (what is assumed to be) publicly owned airport, will not have wider public policy goals attached to it, which may be controversial and have uncertain impacts on the commercial viability of the development.

5.2.2 Developing Heathrow site

Once the airport is closed, the land may need decontamination and extensive site clearance. Parallel to this, some buildings may be able to be converted for reuse at an early stage (e.g. other closed airports have reused terminal buildings for exhibition/convention centres). However, to make effective use of the rest of the site will require reconstruction of major utilities, in particular water, sewage, electricity and gas, as well as preparations for open space, including any water based features of the redevelopment. Most of the site will not be available for development until such work is substantially completed. The timeframes for doing this may be at least five years. However, it may be possible to focus some redevelopment on a corner site for a single development, such as a major shopping centre (on the scale of the "Bluewater" development). Given the high quality of road and rail access to the site, it would appear to be conducive to this. However, given the planning approval processes required for similar such centres in the UK, it is also likely to take some years after airport closure for construction on this to commence, not least because detailed designs and surveys of the site to enable such construction would be complex and time-consuming before the airport is closed.

Given the size of the site and the likely effect of closing Heathrow on demand for industrial and commercial property, the most likely expected property development of the site will be predominantly residential, with commercial development to support a new residential population (i.e. retail, social infrastructure). It is likely that the on-going high demand for housing in London, particularly at locations

with good transport links to central London, will mean it should be possible to generate commercial interest in residential development on the site. However, the pace of such development will be dependent on market conditions. However, government may want to fund social housing as part of the development (which has been the case in Oslo and Munich), which will impact on private sector development in housing, as it will affect demand.

Claims of the scale of housing development that may be possible on the site range from 14,000²⁸ to 80,000 homes.²⁹ Anything within this range may be technically possible, and would produce different outcomes in terms of density, quality and market value of housing. Yet commercially, any of this would be highly dependent on market conditions (to support commercial development) and public sector funding (to support social housing). Clearly the greater the proportion of subsidised housing, the lower the commercial return on market-based residential property development and the scale of such development, as it will affect demand for and the costs of such development. Certainly it is unlikely that commercial development of residential property on the site will seek to add to the supply of housing in the area at a pace or on a scale that would significantly reduce returns.

5.3 Key enablers of development

Given the controversial nature of airport policy and the long lead times involved in such development, there is likely to be some initial caution amongst investors about the probability of a new airport being developed in the first place. Creating confidence about the redevelopment programme will be an important enabler to maximise commercial interest in the site.

Of course, knowledge about the eventual closure of the airport is likely to affect the property market around it by reducing demand for commercial property, and increasing demand for residential property (in the expectation that prices will rise once the airport is closed due to less noise, in spite of the withdrawal of employment).

Cohen and Paul (2003)³⁰ concluded that the impact of proximity to transport infrastructure is reflected in property values. Industrial property is predominantly supported by airports, but residential property values deteriorate at noise levels of over 65 decibels (regardless of transport mode).³¹ It can be expected that removing such an impact may encourage some transfer or release of suppressed demand for housing, particularly given the relatively good rail, road and underground connectivity of the Heathrow site and areas most highly affected by the flight paths. This suggests that at Heathrow, this apparently contradictory effect on property prices would seem possible. However, the effect on residential property prices would be partly offset by the anticipated withdrawal of employment and the short term effect this would have on rental prices. Given the very long lead times involved in forecasting demand for any property, it is difficult to have much confidence in short term property investment impacts, although over the longer term there is a clear trend to support growth in residential property in London.

To attract interest in the Heathrow site for redevelopment, legal and financial commitments from government about both the new airport and closure of the old airport are the first key step to ensure that developers will take serious interest in the possibilities of the Heathrow site. Given that, there is likely to be a 10-15 year period within which legislation, consultation and agreement on a “master plan”

28 Source: Town & Country Planning Tomorrow Series Paper 12, Heathrow Garden City, Graeme Bell, May 2012.

29 Mayor of London submissions to the Airports Commission on long term capacity.

30 Jeffery P. Cohen and Catherine Morrison Paul, 2003. “The economic impacts of proximity to Airports and highways”.

31 Source: Espey, Molly and Lopez, Hilary, 2000 “The Impact of Airport Noise and Proximity on Residential Property Values”, *Growth and Change*, 31, 408-419

can be developed to ensure that once Heathrow is closed, its development is not delayed by court injunctions, political interventions or extensive plan revision.

Of course, there may be some minor revisions of timescales and development priorities, based on market conditions. However, it is critical that the period of construction of the new airport be carefully managed to exhaust as many objections, concerns and legal issues as is possible, before Heathrow is closed. The experience of Hong Kong is that both legal challenges and public pressure over redevelopment proposals can delay redevelopment by many years.

It is inevitable that public and political focus on redevelopment of the site will increase substantially once the airport is closed. As local politicians change and the residents near the airport site change, views over redevelopment may also change, so it will be a key risk to manage challenges and opposition to development proposals over the long lead time between agreement to redevelop the site and commencement of the first phase of the redevelopment.

Given the scale of the site, it will require development of social infrastructure (schools and recreation facilities) on site, or convenient to the site to support a new population of residents in the tens of thousands. This is almost certainly going to need significant public sector commitments of funding.

Without demonstrable commitments to adequate infrastructure, private investment in residential property would be more constrained, as it would reduce the attractiveness of any such investment (as the value of such property can be enhanced by the presence of desirable schools and recreational facilities).

Key dimensions to making such redevelopment work are:

- planning approval well in advance, with no substantial legal challenges and widespread political consensus at central, London wide and local levels;
- agreement on responsibility and timescales for the provision of the infrastructure necessary to facilitate property development (not just utilities and roads, but social infrastructure);
- early clarity the structure of the deal/deals to facilitate development (including status of the land on the site related to developers, including whether land will be sold or leased); and
- underlying demand for the property development proposed.

5.4 Likely potential for redevelopment

It is likely that residential development, with commercial retail (supermarkets and a major shopping centre accessible from the M25), could be developed over time. However, it will take some years for the site to recover interest in the area for office and industrial usage, as the removal of the airport will leave a surplus of such property available for some years.

Although there is clear potential to use the site for residential purposes, it will take many years to extract significant commercial returns from the site after the closure of the airport, given not only the planning, clearance and infrastructure development needed in advance, but also the likely interest of property investors in taking a gradual approach to investment in the site. Observing current practice in planning and development, it is likely that at least 40% of the site could be dedicated to public open space to make it attractive for new residents, and concurrently the commercial developments to support them (i.e. supermarkets, town centre retail). It will also take some years for such public space to be developed. We estimate that it could take up to 20 years for a full development of the site to be completed, based on progress with such redevelopment in other cities and the size of the site.

Even then, there is a considerable risk that the net value (after clearance and construction costs) of such a redeveloped site may not be sufficient to recover the cost of acquiring the airport. This should be assessed by a more detailed survey and modelling projection of real estate development scenarios if there is reliance sought from expected revenues of such redevelopment. Given the possible timeframes involved to realise the full value, the potential for commercial returns from the land at Heathrow does not appear to be a compelling reason in itself to relocate the airport.

5.5 Development of housing at a new hub airport

There are a wide range of factors that will affect the scale and extent of housing development that is readily accessible to a new hub airport. These include:

- national and local planning approvals for housing developments;
- support for the provision of infrastructure necessary to allow housing development; and
- market interest in housing at proposed sites.

There will be additional demand for labour at the new airport site due to the new employment generated for the area. In response to this new demand, housing developers are likely to consider how best to respond to decisions to build a new airport (or expand an existing one considerably). Simply responding to demand for housing at a new airport, rather than to meet demand for commuting into a wider range of sources of employment (i.e. central London), will be riskier. Therefore, it is more likely that most residential property development related to a new airport will follow its opening, rather than be in anticipation of its opening.

This is because of inherent uncertainty around demand for property in anticipation of the airport opening. There would be considerable costs involved in developing a new town or major housing development for those employed at the airport in advance of the airport opening, but it is likely that increased demand for housing in towns near the airport will promote more house building incrementally rather than large scale developments. However, it is plausible that with considerable public sector support, specifically to manage risk, major housing developments could be catalysed in advance of a new airport opening to help ensure that the airport's labour market pool could more easily relocate.

6 CONCLUSION

Heathrow Airport is an important contributor to the economy of West London, and neighbouring boroughs in Berkshire, Buckinghamshire and Surrey. Its presence means that there may be over 80,000 jobs in the area that would relocate if the airport was closed and replaced with a new hub elsewhere.³²

Heathrow also contributes towards the attractiveness of the M4/Thames Valley corridor and neighbouring towns (including Reading and Guildford) as a location for high value businesses. Yet while closure of Heathrow is likely to have a short to medium term impact on the economy of the vicinity of the site, the scale of impact over the longer term is less certain. It is likely that it may marginally weaken the attractiveness of the M4/Thames Valley corridor as a location for businesses with a high propensity to fly, but it is unclear whether such businesses would choose to locate to access the new hub airport, as there are a range of reasons for business location decisions. Of similar importance to business location decisions is access to skilled labour and local accessibility to central London, so whilst closure of Heathrow would have a negative effect on the local economy, it is unlikely to result in the significant withdrawal of the internationally-focused businesses that are located in the area.

Nevertheless, closure of Heathrow may depress demand for commercial and industrial property in the area, but may promote investment in residential property because of the anticipated benefit of the removal of aviation noise and the high quality surface transport links (once redesigned for the site's alternative use). This is likely to help make the site attractive for primarily residential property development.

However, such development would need considerable lead time for demolition, clearance, installation of utility and social infrastructure. This would require a considerable policy, legislative and cross public-sector (central, London regional and local borough) commitment to planning approvals that would support such development to occur early. Regardless, it is likely to take at least 20 years from the start of development for most of the value to be realised, and even so the net value (after costs of clearance and utility development) is unlikely to be close to the RAB value of Heathrow Airport.

³² See Table 2

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