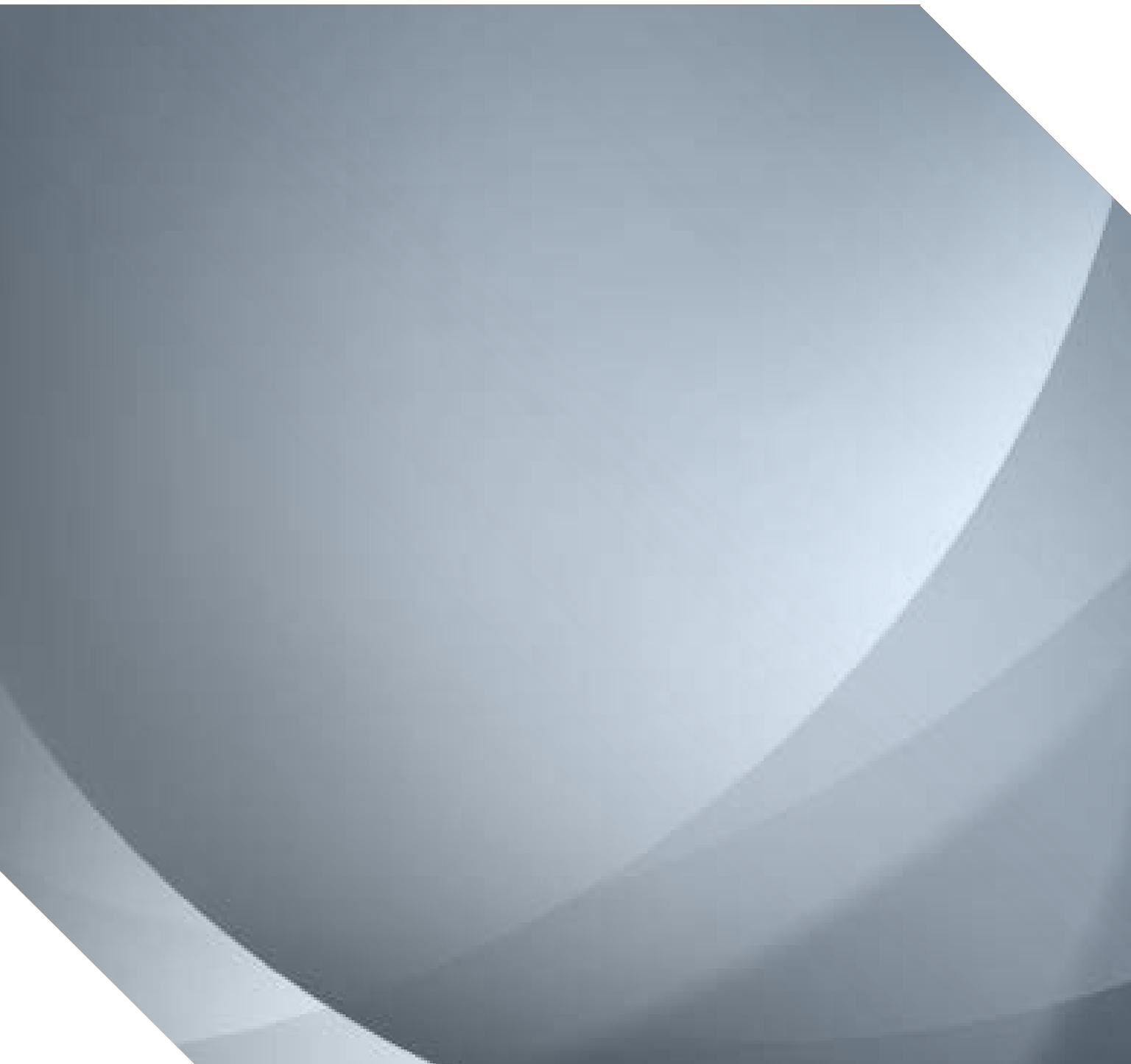


# CAA Response to the Airports Commission discussion paper on demand forecasting

**CAP 1012**



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## SECTION 1

### Introductory remarks

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- 1.1 The CAA welcomes the Airports Commission's discussion paper on demand forecasting. Given the timelines involved in delivery of transport infrastructure, it is important for the Commission to develop an informed view on the likely trajectory of future demand.
- 1.2 As the UK's specialist aviation regulator, the CAA has significant relevant expertise. The CAA collects a broad range of statistics and survey data, some of which is used as input data in the DfT forecasting model. In addition, the CAA has previously been represented on the DfT's peer review panel for the demand forecasting model.
- 1.3 Before addressing the specific questions that are set out in the discussion paper, there are a number of general observations to be made about forecasting as a science or art.

#### **1. Forecasts are typically wrong.**

Any forecasting model is only as good as the input data and the assumptions upon which it is based. Both input data and assumptions are prone to error.

This is not intended as a criticism of the DfT forecasting model – the track record of industry models is little better, as demonstrated by the set of forecasts generated by all parties in the previous round of price controls for all regulated airports.

#### **2. The past is an imperfect guide to the future**

Structural changes, such as developments in airline business models can have a profound effect on passenger demand. 20 years ago, it is highly unlikely that any demand model would have predicted the radical changes in the European short-haul market that would be brought about by liberalisation of the Single European aviation market and the growth of low-cost airlines.

#### **3. There is some evidence that aviation forecasts exaggerate demand cycles**

In Annex C of its April 2008 reference to the Competition Commission of its proposed Q5 price control for Stansted airport<sup>1</sup>, the CAA analysed

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<sup>1</sup> [http://www.caa.co.uk/docs/5/ergdocs/stansted\\_reference\\_apr08.pdf](http://www.caa.co.uk/docs/5/ergdocs/stansted_reference_apr08.pdf)

the accuracy of previous long term (10 to 20 years ahead) forecasts for the London airports system. Table 1 contains a selection of forecasts for the London system of airports, indicating the accuracy they achieved at ranges of less than five years, from five to ten years and over ten years. The light grey shaded cells represent forecasts for a period beyond five years from the date that the forecast was made. The colour shaded cells with bold text represent forecasts for a period beyond ten years from the date that the forecast was made.

**Table 1: Terminal passengers in the London area** (million passengers per annum)

Forecast date (base year or publication date)	Forecast organisation	Year of forecast							
		1975	1980	1985	1990	1995	2000	2005	2010
Actual		29	40	48	68	83	116	134	127
1967	BOT (a)	31.5	<b>48.5</b>						
1971	Roskill	36	57	<b>83</b>					
1971	WPTC (b)	33.0	54.5	<b>87.0</b>					
1972	BAA		59	<b>87</b>					
1973	CAA		58	<b>84</b>					
1974	DTp			<b>67</b>	<b>96</b>				
1975	DTp				<b>87</b>				
1978	DTp		39.5	57.5	<b>77.5</b>				
1979	ATFWG			58.0	<b>75.0</b>	<b>91.5</b>	<b>104.0</b>		
1981	ATFWG			48.0	61.5	<b>74.5</b>	<b>79.5</b>		
1983	DTp				57.5	<b>69.0</b>	<b>80.5</b>		
1983	BAA			50	66				
1984	SII			47	61				
1984	DTp				61.0	<b>77.5</b>	<b>96.0</b>		
1987	DTp				65.5	83.0	<b>101.5</b>	<b>124.0</b>	
1988	RUCATSE					81.2	<b>96.3</b>	<b>113.5</b>	
1991	DTp					80.5	103.5	<b>129.5</b>	
1994	DTp					75	93	<b>116</b>	<b>138</b>
1997	DTp						103.0	122.5	<b>151.0</b>
2002	SERAS						116	131	140

Source: CAA CAP 548, CAA CAP 570, DfT UK Air Passenger forecasts, various years.

Notes: (a) Heathrow/Gatwick/Stansted; (b) Heathrow/Gatwick.

Where forecasts are produced as ranges the mid-point has been used.

- 1.4 The majority of the forecasts made before 1975 over-forecast in the long term, as they did not predict the shift in demand caused by the oil crisis of the early 1970s. The same is true for forecasts made in the late 1970s, which follow a similar trend whilst starting from a lower base. By contrast, long term forecasts from the 1980s tend to underestimate the strength of demand growth, and are all under-forecasting by the mid-1990s. Similarly forecasts from the 1990s somewhat underestimated growth potential, although these forecasts are generally more accurate.
- 1.5 The above observations are not intended to question the value of forecasting models as a tool in policy making. Unbiased forecasting models can perform an important role in setting out an objective evidence base for policy development and appraisal. Although the DfT forecasting model has its weaknesses, in common with all forecasting methods, the CAA is not aware of a superior approach that the Commission could use. The CAA also judges that the key relationships underpinning the model are sound.
- 1.6 However, given the uncertainty inherent in demand forecasting policy makers should exercise judgement in interpreting model outputs. The CAA recommends that an appropriate approach to dealing with uncertainty is to adopt policy choices which are not overly dependent on a specific forecast future state but which perform well across a range of potential future states, accepting that such choices may appear sub-optimal in hindsight.
- 1.7 Accordingly, and on the basis of these observations, the CAA agrees with the Airports Commission's principle that any proposed solution must be robust to different scenarios.

## SECTION 2

### General questions

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**Q2. To what extent do you consider that the DfT forecasts support or challenge the argument that additional capacity is needed?**

**Q3. What impact do you consider capacity constraints will have on the frequency and number of destinations served by the UK?**

- 2.1 The latest demand forecasts, published by the Department for Transport in February 2013, predict that Heathrow and Gatwick will be full by 2020 with all airports in London and the South-East operating at their maximum capacity by 2030<sup>2</sup>.
- 2.2 Current evidence suggests that the extent and distribution of existing capacity in the UK is poorly suited to meet the demands of the future. For example, while Heathrow is already operating at or close to capacity many regional airports currently have significant excess capacity.
- 2.3 Airport and airspace capacity constraints in London and the South-East are already beginning to affect consumers by: restricting competition, restricting route choice, affecting value through higher fares, and affecting service quality as a result of resilience issues. These impacts are expected to become more pronounced in the future as a result of forecast demand growth.
- 2.4 Capacity constraints at London's airports may already mean that airlines are less willing or able than airports in other European cities to adjust as global economic activity shifts to emerging markets such as China, India and South America. This trend is likely to become more pronounced.
- 2.5 Capacity constraints will increasingly shape network configuration by reinforcing the trend towards focusing on the most profitable, high-yield routes. At Heathrow this is likely to lead to further specialisation on long-haul routes, in particular those routes for which geography or economic, cultural and historical links give London an advantage.
- 2.6 The additional 'opportunity cost' of launching new routes (in that an existing route must be withdrawn to provide for a slot for the new route

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2 DfT, UK Aviation Forecasts 2013

at a congested airport) may result in airlines being less likely to 'take a chance' on launching services to emerging markets from London, especially where UK-based demand does not generate a sufficient volume of premium traffic.

- 2.7 The lack of available capacity at Heathrow has already had a negative effect on the UK's ability to liberalise Air Services Agreements with foreign states, which would potentially open up routes into emerging markets. This trend is likely to become more acute as London's other airports become more congested.
- 2.8 There are clear implications for the passenger experience. Analysis carried out for the CAA in 2008<sup>3</sup>, and updated in 2011 for the South-East Airports Taskforce, demonstrated the trade-off between throughput and delay as airport utilisation approaches capacity. This relationship becomes increasingly severe as congestion grows. The analysis suggested that the optimal level of capacity utilisation, beyond which the congestion cost of adding additional services outweighs the consumer benefits of the additional flights, is likely to be significantly less than an airport's technical capacity.
- 2.9 A further effect is the likely increase in fares. The Department for Transport's forecasting model generates a 'premium' on fares to simulate the additional costs to passengers where capacity constraints become binding. The level of demand growth predicted by the 2013 forecasts suggests that the value of fare premiums resulting from capacity constraints at UK airports is predicted to total £1.0bn in 2030. Spreading this equally across the 313m terminal passengers predicted to use UK airports in 2030, this equates to £3 per terminal passenger or £6 per return journey. There is much variation in how this impact is distributed with significant increases at some airports and very little impact at others. The implied 'premium' per one-way trip at Heathrow would be £7 with the maximum predicted increase being £10 per terminal passenger at London City.
- 2.10 The CAA therefore concludes that the DfT forecasts suggest a case for additional capacity and that the impacts of not delivering additional capacity would lead to less choice and higher prices for consumers along with reduced resilience.

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3 Both reports can be accessed at [www.caa.co.uk/apfg](http://www.caa.co.uk/apfg)

#### **Q4. How effectively do the DfT forecasts capture the effect on UK aviation demand of trends in international aviation?**

- 2.11 As discussed in the introductory remarks, any forecasting model would have struggled to predict some of the major structural changes that have taken place in the aviation sector over recent years and decades, such as the growth of low-cost airlines in response to market liberalisation.
- 2.12 Looking forward, any potential relaxation of market restrictions such as ownership and control rules would be likely to have an important impact on the structure of the global industry and also on demand.
- 2.13 Moreover, there are aspects of the DfT forecasts which may impair its ability to capture some trends in international aviation:
1. Demand for individual routes (or route groups) is treated as independent, and therefore the model allows no possibility for, say, leisure passengers to substitute between destinations in the face of price or availability restrictions;
  2. The allocation model treats Full Service, No Frills Carriers (NFCs) and Charter demand as separate market segments. However, there is some evidence that passenger demand has in the past switched between these types of carrier. The model will therefore be limited in its ability to predict future such shifts of demand between airline business models. This is likely to become increasingly significant as the differences between these categories diminish.
- 2.14 The rates of economic growth used as model inputs for foreign states are calculated over a large average geography, in particular for less developed countries (LDCs) and newly industrialised countries (NICs). The average growth is then applied to individual routes / route groups in the allocation model. In a global context where the major source of growth in global demand for aviation is expected to be emerging markets, this might be expected to have significant implications for the accuracy of demand forecasting over the medium to long term.

## **Q5. How could the DfT model be strengthened, for example to improve its handling of the international passenger transfer market?**

### **International passenger transfer market**

2.15 The CAA shares the Airports Commission's interest in being able to model the international passenger transfer market. However, the CAA is unaware of any airport-level forecasting models that are currently set up to model the dynamics of the international passenger transfer market. A solution which tried to model the UK share of hubbing traffic between world areas would likely be subject to a great deal of uncertainty around the future level of demand for travel between those areas, possibly outweighing any improvement gained in modelling the UK share of such markets.

### **Congestion**

2.16 The CAA considers that there may be potential to improve the modelling of the impact of congestion and crowding within the DfT forecasting model. The CAA notes that congestion is currently modelled by applying a shadow cost, or fare premium, at airports where demand has reached 100% of available capacity.

2.17 Research commissioned by the CAA for the DfT in 2008 and updated in 2011 indicated that congestion costs start to be incurred well before capacity utilisation reached 100%. Indeed, the research suggested that there would be consumer benefits from not operating UK airports at 100% of technical capacity.

2.18 The CAA considers that there may be merit in testing sensitivity of the demand forecasts to lower levels of capacity utilisation at UK airports in order to allow scope for resilience and recovery from disruption.

## **Q6. What approach should the Commission take to forecasting the UK's share of the international aviation market and how this may change in different scenarios?**

2.19 There may be some scope to generate a hub attractiveness model, based on such factors as: fare, schedule convenience, total elapsed journey time, connection time etc. However, it should be noted that these parameters are primarily airline rather than airport focused. Accordingly, a necessary first step would be to forecast the airline response to any policy scenario. As noted already, it might prove

difficult to calibrate accurately such a global model and use it to produce forecasts of future international demand.

### **Q7. How well do you consider that the DfT's aviation model replicates current patterns of demand? How could it be improved?**

- 2.20 The DfT's aviation model is primarily designed to forecast aggregate demand. While the CAA has some reservations about the granularity of some of the input data, for example, as related to economic growth assumptions in emerging economies, we feel that the model is largely sound.
- 2.21 However, we judge that, largely in view of its design objective as an aggregate demand forecasting and appraisal tool, the DfT's model is weaker in addressing a number of commercial aspects of the aviation sector.
- 2.22 For example, in addition to those points made in paragraph 2.13:
1. The model does not attempt to incorporate network effects within airlines/alliances or model competition between airlines at a given airport;
  2. The model takes little or no account of yield decisions, i.e. reflecting the fact that some passengers are more valuable to airlines than others, beyond applying different values of time to business and leisure passengers.

## SECTION 3

### Detailed questions

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#### **Q8. Do you agree with the source of the input data and assumptions underpinning the DfT model?**

- 3.1 As noted in section 2, any model is only as good as the assumptions and input data on which it is based. The responses to the questions in section 2 outline a number of observations regarding input data and modelling assumptions.
- 3.2 However, all aviation forecasting models will be subject to weaknesses, either in their ability to include factors which affect air travel, or their ability to accurately calibrate and forecast the inputs which affect those factors.
- 3.3 The CAA believes that the input data for the DfT model are derived from sound sources and that the key relationships underpinning the model are valid. For example:
1. Passenger demand is linked to GDP and other factors;
  2. Airport choice is based on surface costs and route availability;
  3. In the long term supply should follow demand (although grandfathering rights for slots along with other frictional factors may make the market less responsive than assumed in the DfT model).

#### **Q9. Do you agree with the choice of outputs modelled?**

#### **Q10. Do you consider that the DfT modelling approach presents an accurate picture of current and future demand for air travel? If not, how could it be improved?**

#### **Q11. Is the DfT model suitable to underpin an assessment of the UK's aviation connectivity and capacity needs?**

- 3.4 The CAA considers that the DfT model is largely fit for purpose as an aggregate demand model. However, the CAA cautions against relying too heavily on the DfT model (or any other model) for detailed forecasts of airline or airport network choices.

- 3.5 The model may well be good enough to support a generic, national-level 'statement of need'. However, given the importance of network effects and airline decision making, particularly if or where transfer traffic is judged to be important, the model is likely to be less accurate when predicting route specific trends and therefore is not well placed to support conclusions about how routes might distribute around airports i.e. whether additional capacity should be focused at a hub airport or distributed across multiple airports.

**Q12. What alternative or complementary approaches could be used to assess the impact of international competition?**

**Q13. What factors, if any, are missing from the DfT's modelling approach? How can these be more effectively analysed?**

- 3.6 For the Commission's purposes, better modelling of network effects and hub attractiveness may be useful. Either or both of these considerations could be used as 'bolt-ons' or complements to the existing modelling toolkit. However, as already noted, the CAA can see challenges in accurately calibrating such additions or using them to forecast future demand.

**Q14. Is the DfT model granular enough to underpin the Commission's assessment of future demand?**

- 3.7 See paragraphs 3.4 and 3.5 in response to question 10.

**Q15. Does the DfT approach to demand uncertainty capture a reasonable range of uncertainty? Could the approach be improved?**

- 3.8 One key aspect of the DfT model's demand forecasts is its assumptions around market maturity. In its recent peer review process, the DfT examined in detail this aspect of its forecasts and made improvements to it, but there is still a large inherent uncertainty in future demand levels due to this effect.
- 3.9 The combinations of assumptions which are used in the high and low case scenarios are significantly different from those included in the 2011 forecasts and may lead to high and low boundaries that are too extreme.
- 3.10 However, uncertainty is inherent in long-term demand forecasting and the CAA is unaware of modelling approaches that can fully account for

all potential outcomes. Indeed, within six months of their publication, most forecasts underpinning public policy attract some criticism for not taking account of the latest data and developments.

- 3.11 Accordingly, and as set out in the introduction to this response document, the CAA agrees with the Airports Commission's principle that any proposed solution must be robust to different scenarios.

**Q16. Would a probability based approach to dealing with uncertainty help the Commission to test the robustness of the model's outputs?**

- 3.12 A probability based approach has some advantages, but additional assumptions need to be made in order to assess the probability distribution of input variables, and these assumptions may add inaccuracies to the forecasts. The current approach of using a range of input scenarios may prove more useful to the Commission.

**Q17. We have reviewed four alternative forecasts. Do you consider that there are others we should be looking at and why?**

- 3.13 Whilst a number of industry organisations such as NATS, individual airports and airlines all generate traffic forecasts for their own purposes, CAA knows of no other UK level forecasts than those which the Commission has described. Other forecasting methods, such as Delphi, exist, but CAA considers that the DfT forecasts form a good basis for the Commission's work.