

# Future Scottish air travel: potential policy constraints

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## Introduction

The DETR has requested responses to its consultation document on the future of air transport services in the United Kingdom (DETR, 2000). A number of alternative policy responses are set out which are rooted in the DETR's most recent forecasts for passenger growth. The forecasts of demand for air travel are and will continue to be at the core of these policies. However, it is argued in this paper that potential policy responses to the forecasts run the distinct risk of being contradictory, socially divisive and a threat to the continued expansion of air travel services in Scotland and also in all regions outwith London.

In the case of Scotland the 'demand constraint' option runs counter to the recent argument from the Secretary of State for Scotland that the country is still poorly served in terms of air transport. This article is concerned with setting out the context of the issues, the efficacy of the forecasts upon which the 'policy options' are being mooted and the implications for Scottish air travel if several of these options are taken up. First it is useful to present some background information on UK air passenger growth.

Between 1974 and 1999 the number of air passengers travelling into and out of the United Kingdom (UK) has increased from 49 million to 171 million, an increase of almost 250 percent (DETR, 2000). The average annual increase in passenger numbers has been slowing down since the 1960s (Table 1):

**Table 1: Annual average growth rate in passenger numbers to and from UK**

Decade	1960-69	1970-79	1980-89	1990-99	2000-10
Growth Rate %	14	7.3	5.7	5.1	4.3

Source: DETR, 2001

The declining rate of growth reflects a consistent movement towards market maturity in passenger air travel for the UK. The decline is expected to continue in the present decade towards an annual average growth rate of 4.3 percent and is expected to stabilise around this rate for the foreseeable future. This is consistent with forecasts suggesting a doubling in passenger air traffic over the next ten years (ICAO, 2000) and a near doubling in the last ten years (Boeing, 2000) on a global basis. Although the expected lower rate of growth for the UK in the next ten years is considerably less than that recorded in the 1960s and 1970s it has become a source of concern to the UK Government in terms of its likely impact on airport capacity requirements, land utilisation, social effects and particularly its environmental effects. It is with both the social and environmental issues implied by the UK Government forecasts and by the latter's potential response to these that this paper is primarily concerned.

There is no doubt, at least in the environmental sphere, that the political context has been and continues to be an extremely strong determinant of the *raison d'être* of much Government sponsored research in the UK. It could be argued that since 1997 the new Government has fully embraced the dire warnings of global warming in relation to almost all forms of mechanised transport. However, there is also an element of contradiction in the case of air transport where the UK has consistently been arguing for the adoption of an open skies policy in the EU to foster competition. This is hardly consistent with the threat of demand constraining policies!

It is within this potentially contradictory context that current policy on UK air travel is being formulated. Hence it is very important to consider a number of aspects of the 'problem' as it has been perceived by the Government. This is because the forecasts for the next twenty years may be sufficiently in error such that any further costs imposed on the industry and/ or the passengers (as a result of the forecasts) may be significantly out of proportion to the 'problem'. Such an outcome will damage both the industry in the UK and the UK's competitiveness relative to other developed economies. In Scotland we have seen significant growth in both passenger numbers and freight traffic in the 1990s and there is no reason to expect this to wane in the absence of policy intervention. This is especially the case if the forecasts understate passenger growth since restrictive policies are likely to have an even larger impact on UK competitiveness than anticipated. In this paper we examine a restricted set of questions in relation to the current forecasts of air passenger traffic to and from the UK. These are:

- How accurate have past forecasts been?
- How accurate are current forecasts likely to be?
- Do alternative forecasting methods produce different results?

- Should future demand be constrained?
- What are the implications for social equity and regional competitiveness?

These questions are addressed separately in the following sections of the paper. First it is useful to present some descriptive statistics of the trends in air passenger traffic in the UK.

### The context

As can be seen in Figure 1 the growth in air passenger numbers for the UK has been consistent for the past twenty-five years.

A fall in passenger numbers was recorded during the recession of the early 1980s and again in 1991, primarily due to the Gulf war and the recession in 1990-91. The combined effect of both these events reduced air passenger traffic in the South-East by 7.8% and by 4.7% across the regional airports of the UK. By the end of 1991 this had reversed and the South-East recorded a growth in air passenger traffic of 10.2% while regional airport passenger numbers rose by 11% (DETR, 2000). This was a very rapid recovery and growth continued until the events of September 11<sup>th</sup>. To put 1990 into some context as compared with September 11<sup>th</sup>, 2001 it has been reported by IATA that passenger numbers had dropped by 17% by the end of October, 2001. It is simply not possible at this stage to estimate when and to what degree the very recent downturn in air passenger traffic will be reversed in the UK or elsewhere.

It may well be the case that the forecasts being analysed in this paper will need to be shifted forward by several years to allow for the adjustments being made in response to September 11<sup>th</sup>. We can only surmise that the latter is the most likely outcome and on that basis we return to a more evidence based analysis of air passenger growth in the UK.

Although there has been consistent growth, as shown in Table 1, this has been falling since the 1960s and is expected to stabilise at around the 4 percent level in the future. Even if this turns out to be the case the absolute level of passenger arrivals and departures as of 1999 will ensure that this stabilised growth rate produces a doubling of the numbers in just the next 15 years. However, given the context of this paper, i.e. the possible policy responses to this forecast, it is important to 'unpack' the forecast for the UK in order to get a clearer picture of the trends in passenger numbers. The Government figures suggest total expansion in the next ten years of approximately 108 million passengers. Of this total increase only about twenty million will be purely domestic, i.e. intra-UK passengers. And of this increase in intra-UK traffic 65 percent will be between UK regional airports and London. In fact this percentage share of the increase in domestic traffic is consistent with the share of London in UK domestic traffic for many years.

This suggests that any social and environmental concerns about these forecasts perhaps ought to relate to the effects on London airports and their environs since the UK regional airports are still a long way from 'market maturity'. In the case of non-domestic traffic over 75 percent of the growth is likely to be focused on London airports. Between 1989 and 1999 the UK regional airports' market share of international traffic only increased by three percentage points. Even a rapid increase in traffic from and to Scotland would only marginally change this share.

The vast majority of this has been due to the entry into this market by the so-called 'low cost' airlines, particularly for short haul trips to the rest of the EU and to London from the regional airports. These have primarily been focused on the business and short leisure break market and have opened up access to many European cities for small businesses and UK citizens who previously either would not or could not pay the high fares charged by the dominant UK based airlines. Indeed this issue of accessibility and mobility is very much part of the whole 'social inclusion' agenda of the UK Government. As we will see in a later section, this may be at risk from some of the policy responses under consideration.

### Possible policy responses to the forecasts

The UK Government has recently embarked on a consultation exercise to ascertain views on many aspects of the implications of continued growth in air passenger numbers in the UK. These range from localised impacts, which are likely to be the most significant (see Morrell & Lu, 2000 and Feitelson et al, 1996), through to potential legislation designed to constrain demand.

There are essentially three inter-related issues which have come to the fore as a result of the demand forecasts: the level and nature of competition, impact on social equity of 'constraint' policies and the environmental effects of continued growth in passenger numbers. In terms of these three issues the main options put out for consultation include:

- Should demand be constrained?
- Should aviation incur more of its environmental costs?
- If it does, should extra airport capacity be provided?
- Should the UK continue as a hub for international traffic?
- Should the emphasis on environmental impacts shift from regulation to economic instruments e.g. taxation? If so, who should pay?
- Could short haul (intra - UK) be substituted for by rail. If so, how?

The implications for passengers and for the industry are quite clear. If the dominant view in addressing these questions is in the affirmative then the price of air travel to and from the UK will inevitably increase relative to other prices if capacity was to remain constant. However there are already real indications, as pointed out above, that carrying capacity is reducing. This in itself is likely to have an upward effect on the average price of air travel excluding those impacts of the policy 'alternatives' listed above. This would represent a reversal of the trends of the past twenty years and therefore a threat to the continued improvement in mobility, accessibility and social equity in transport in general, but particularly in air transport. Indeed it would represent a shift towards greater social exclusion in air transport instead of greater social inclusion. It could be argued that firms (and workers) in Scotland are already at a disadvantage given the distance to the south coast and Channel tunnel and so raising prices (via taxation or other means) will simply exacerbate this disadvantage.

A fundamental rationale for such an approach (demand constraint via taxation) is the environmental argument. However as Janic (1999) argues, the social and environmental costs of air travel are considerably less than those of highway travel US\$7.4 per 1000 passenger kilometres compared with US\$29 per 1000 passenger kilometres for road. It is noteworthy however that in the UK Government forecast paper a number of sensitivity tests are conducted, one of which is on the possible impact on demand of an 'environmental tax' on air travel. The Government consultation paper states that this is:

'... in response to concerns about the environmental impact of air travel, in particular the contribution of emissions of carbon dioxide and oxides of nitrogen from aircraft to global warming.'

That there is concern over this is entirely valid but it needs to be put in perspective. It has been estimated by NASA (1996) that the contribution to global warming from aircraft pollution has been approximately 5 percent in total over a 20 year period and less than 4 percent over a longer period of time. This is within the context of extremely rapid growth in air travel over the period. It therefore follows that any environmental impact is most likely to be felt at a localised level i.e. associated with road traffic to and from airports and with the activities within airports themselves.

This would seem to suggest that policies aimed at constraining the demand for air travel per se are aimed at the wrong target – far better to improve environmentally friendlier access to airports in the first place. However, if one were to take a more cynical view of the 'problem' it could be argued that, since air travel at present attracts a zero tax on aviation fuel it is a prime target for Government who simply see it as a potential source of revenue. In this context the environmental 'argument' might simply be viewed as a pseudo-intellectual justification for raising tax

revenue. Whether this is a view likely to achieve wide acceptance is of course another matter.

The point is clear however – irrespective of the efficacy of forecasts it needs to be remembered that they can become tools used by others to achieve an outcome which is technically inconsistent with the 'problem' but politically consistent with the dominant paradigm regarding 'solution'. The discussion above has laid out the context within which the current forecasts of air passenger growth have been produced. We now move on to an examination of the forecasts themselves.

### **An examination of the UK forecasts**

A number of forecasts of air traffic have been made for the UK over the past fourteen years with base years at 1988, 1991, 1994, 1997 and most recently 2000. Going back to the first question set out earlier in the paper (How accurate have the forecasts been?) we can see that the performance of the first three, in terms of the Mean Absolute Percentage Error (MAPE), is highly variable as displayed in Figure 2.

It is quite clear that the more recent forecasts have been performing less well although the reasons for this are not entirely clear. A possible explanation is that the 1988 forecast consistently over predicted the growth in air passenger traffic until 1994 and the 1991 and 1994 forecasts were designed to take this into account. However, it appears both 'overshot' the desired adjustment to the model.

The 1991 forecast performed much better than 1994 in the sense that the actual out-turn fell within the low to high range of the forecast. In the case of the 1994 forecast however the actual out-turn has exceeded the upper forecast value in every year. This particular forecast has been performing in the opposite way to the 1988 forecast, i.e. severely under predicting passenger volumes. It would be inappropriate to consider the performance of the 1997 forecast (too little data) but it is worth pointing out that actual volumes had already exceeded the top of the forecast range within a year of the forecast, i.e. by 1998. In other words it appears the latest forecasts are likely to strongly under predict passenger growth volumes. This would tend to suggest, in answer to the second question (How accurate are current forecasts likely to be?) that the current set of forecasts are very unlikely to be accurate. As we will see later there could be a very significant under prediction involved. A clearer picture of forecast performance is given in Figure 3.

As a result of both the 1994 and 1997 forecasts those based on 2000 are higher reflecting another adjustment to the forecasting models. It does seem odd however that the 1988 forecast, even by 1998, was still performing better than the 1991, 1994 and the 1997 forecasts. In the case of the 1994 forecast the deviation from actual out-turn

steadily increased while that for 1991 decreased before steadily increasing. The 1988 forecast over predicted up to 1994 and then began to under predict after 1994, although its under prediction was less than both the 1991 and 1994 forecast.

What this may suggest is that, with no consistent direction of error evident perhaps there have been too many adjustments to the econometric forecasting models or simply that these models cannot cope with extraneous events in any consistent way. This brings us to our third question (Do alternative forecasting methods produce different results?). We decided to approach this question in a straightforward manner based upon simple visual inspection of the trends. The most obvious starting point using this approach was the logistic model.

Fitting a simple logistic model to the data does indeed produce a more accurate forecast than the econometric model(s) used in the official forecasts. This produced the following model:

Logistic Model:

$$Passengers_t = \frac{601}{1 + \left[ \frac{601}{28} - 1 \right] * e^{-0.07 * (t - 1970)}}$$

sse = 1146 and fitted MAPE = 3.7%. The official and logistic forecasts for the period 1974 to 1998 are plotted in Figure 4.

Of course the advantage of the econometric approach is that it provides an analytical view of the key drivers behind the forecasts and is amenable to sensitivity tests on each of these. This being the case we would argue that if forecast performance is to be the key indicator of the efficiency and reliability of any forecasting system then perhaps the UK Government should be combining both the econometric and logistic approaches to provide the twin advantages of analytical inference and forecast efficiency. This is particularly important where fundamental policy shifts may be the result of the forecasts themselves, as is implied in the Government consultative document.

**Table 2: Mean absolute percentage errors of official and logistic forecasts**

Forecast Year	M.A.P.E.	
	Official	Logistic
1988	3.96	23.35
1991	4.65	2.44
1994	11.61	1.72
1997	3.19	1.75

Source: Authors' calculations, DETR

The performance of the simple logistic was used as a benchmark for the official forecasts made in 1988, 1991, 1994 and 1997. The performance, in terms of the MAPEs, is shown in Table 2. The difference in magnitude between the two is quite striking, especially for 1994.

On all but those made in 1988 the logistic model outperforms the official forecasts. The logistic model failed to reflect the sharp rise in passengers that started in the late 1980s – but once this data was incorporated the model performed well.

A comparison of future official forecasts with those made by the logistic model is displayed in Figure 5.

The logistic forecast would suggest that passenger air traffic growth for the UK is likely to be about forty percent higher than predicted in the current official forecasts.

Given that the official forecasts, which are already the basis of concern in the UK, are likely to be understated (especially given past performance) this brings into play the fourth question set out above (Should future demand be constrained?). If the answer to this is to be in the affirmative then it can only be justified on the grounds of environmental sustainability and social cost. As we have already argued the evidence for both is weak.

In terms of the competitiveness of the UK and its role as an important international hub for air travel it would appear that such policies represent an even bigger threat to current and future employment, business development in the industry and possibly technical advances in the UK air industry than is already anticipated. In this context the avoidable costs in environmental terms (demand constraint policy) are likely to be outweighed by the opportunity costs of such a policy in terms of employment and income. This outcome also needs to be set within the context of question five (What are the implications for social equity and regional competitiveness?). As already discussed above, the UK (and the EU) currently follow a very detailed strategy aimed at raising the degree of social inclusion by the socially and economically disadvantaged. The Scottish Executive is fully in support of these initiatives.

There are many types of 'social exclusion' and accessibility and mobility are two critically important ones. This is especially the case in the UK and many other EU countries where 'low cost' air travel is very often cheaper than either road or rail! This is only likely to be important for occasional trips (holidays, family visits etc) for individuals but it is very important to many small businesses. The 'low cost' airlines are also extremely important to the UK's regional airports in providing jobs and spin off opportunities for small businesses. An attempt to constrain the future growth in demand for these services is simply inconsistent with a socially inclusive society and also inconsistent with regional development. If the UK does indeed currently have a 'two-speed' economy then this is likely to become a permanent

feature of the economy if the more radical demand constraint policies are introduced. Two industries in Scotland are particularly at risk in this context: electronics and tourism. The former is predominantly an export sector which produces mainly 'light' goods which lend themselves to air cargo more than any other means of transportation. The latter has already taken a battering from the strength of sterling relative to other EU currencies, from the recent foot and mouth outbreak and substantially from the events of September 11<sup>th</sup>. The last thing these two crucial sectors need is additional costs imposed on their businesses and on their customers.

## Conclusions

This paper has not attempted to examine the technical aspects of the air traffic forecasts produced in the UK. The focus has been on the past performance of the forecasts and the likelihood that the latest forecasts are 'accurate'. There has been a long history of under-prediction in this area but even this has led to a call for demand constraining policies, principally on the basis of environmental effects. However a simple alternative forecasting procedure (logistic) would suggest that the current forecasts are heavily under-stated and therefore demand constraining policies could be even more damaging to the economy than currently envisaged. This would be the case in both absolute and relative terms depending on both the severity of the constraint and the degree to which different regional airports could absorb the effects of reduced traffic. Regional airports dependent mainly on one carrier, such as Prestwick, and exhibiting only nascent growth (Dundee, Aberdeen, Inverness, and Prestwick) would therefore be put at greater risk under many of these policy alternatives.

There is also the key issue of what type of forecast should be driving policy in this area. As discussed above the essential environmental and social cost problem for the UK would appear to be the London airports, not the regional airports. Hence it would seem reasonable that regional forecasts ought to be the basis for regional and local policy responses. The imposition of a 'one size fits all' policy on air traffic demand growth would be very damaging at the regional and local level and in terms of jobs in particular. Indeed one could argue that such a policy would be yet another example of the South-East driving national policy within a context which clearly requires a regional focus. This is because the congestion in airspace in the South-East is simply not mirrored within Scottish airspace and therefore in the case of Scotland it might be argued that a strongly Scottish focus is required to resolve many of the issues raised in the Governments' consultation document.

A particularly relevant issue worth considering is the possibility (and practicability) of introducing passenger demand constraining policies only where it is sensible to do so in terms of the likely costs and benefits to the regional economy. This approach would produce solutions, which are relevant and appropriate to each region and would not be

driven by the problems of the South-East. Perhaps this is also an argument for the devolution of this work to the regional level where (central) institutional factors are less likely to determine method, culture and interpretation. In Scotland there is no reason why the Scottish Executive should not take this function on board.

The paper has shown the importance of forecasting in either helping to set the 'political' agenda or as a potential tool for reinforcing an agenda already in place. This also reinforces the importance of trying alternative forecasting procedures and not relying on a single approach, econometric or otherwise, since the implications can be and often are very far reaching and the resulting policy prescriptions may be very damaging in the long term – especially where the 'number crunching' is so dominated by a single geographical area within an otherwise very diverse economy.

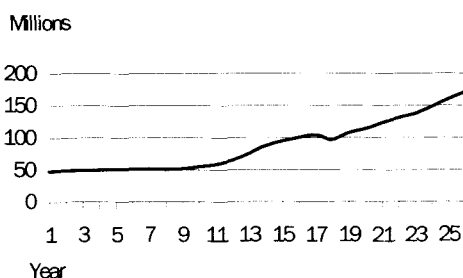
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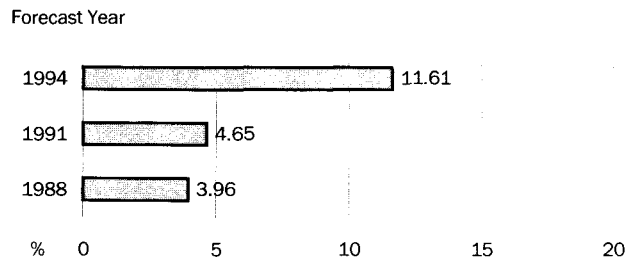
**Endnotes**

1. The consultation exercise closed in April 2001.
2. Which is given considerable weight in the Consultative paper.
3. The same concern is also expressed at the level of the European Union (EU) since similar growth figures have been forecast for many of the EU's main hub airports.
4. The proposal was vetoed by Spain due to its continued wrangle with the UK over the ownership of Gibraltar – nothing to do with environmental concern over air pollution!
5. The forecasts made by DETR are based on a family of econometric models.
6. The Money Programme, BBC Television Special Report, 7<sup>th</sup> November, 2001. This puts the current level of traffic back to that of 1996.
7. Increased security, strong advertising and seat promotions have not had a great impact so far. Added to this, the demise of both Sabena and Canada 3000 will certainly reduce operational capacity in the short term. The economic downturn is complicating the 'future picture' for aviation even more.
8. An excellent example of this has been Prestwick Airport where over 90% of passengers are carried by one 'low cost' airline. Any threat to the 'low cost' operation is also a threat to the sustainability of the airport itself and the many jobs dependent on it.
9. This relates primarily to the rise of the low cost airlines, particularly those based at regional airports within the UK.
10. Based on a 10% aviation fuel tax rising by 10 percentage points each year for nine years. This 'regime' is remarkably similar to the car 'fuel escalator' introduced in the UK in the 1990s!
11. This is under the Chicago Convention not to tax aviation fuel for international air travel although it does not preclude a Government from imposing a fuel tax on domestic flights.
12. Primarily in relation to the growth in 'no-frills' airlines and revisions of Treasury GDP forecasts.
13. The DLTR will be publishing six regional consultation documents (including one for Scotland) on the issues discussed in this paper in the near future.

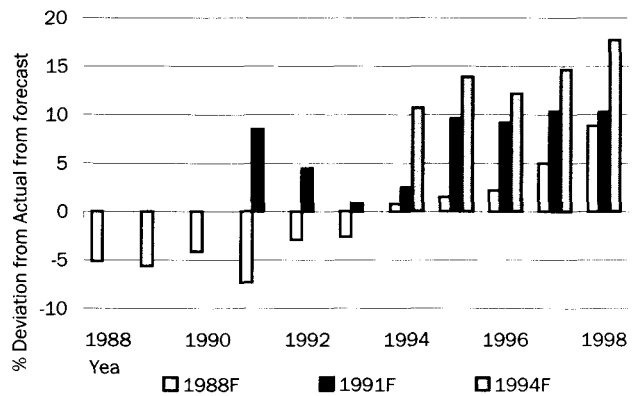
**Figure 1: Growth in UK air passenger numbers**



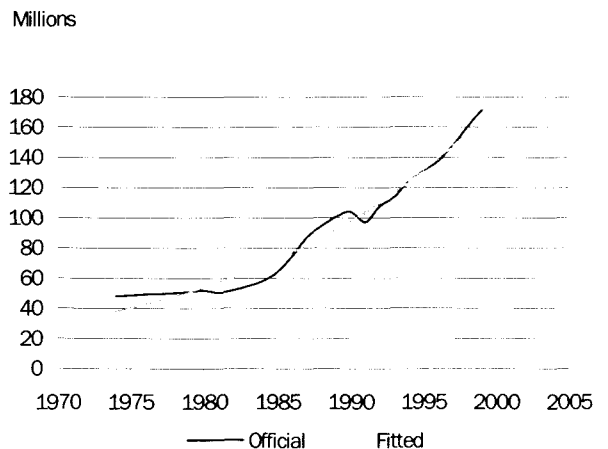
**Figure 2: Mean absolute percentage errors for three forecasts**



**Figure 3: Forecast errors**



**Figure 4: Air passengers**



**Figure 5: Forecasts of UK air passengers**

