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29 July 2011

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Dear Richard

Peer Review of Aviation Forecasting 2011

I have been asked by the Department for Transport to provide "an independent peer review of the development of the 'next generation' of the DfT air passenger demand and CO_2 forecasts, as well as development of our appraisal methods". In practice this has entailed extensive discussion with the Department over many months, culminating in peer reviews of three documents covering some of the key inputs to the Department's UK Aviation Forecasts, and also a draft aviation section for the Department's WebTAG appraisal guidance. These four peer reviews and the first three of the documents reviewed are being published in parallel with this letter and the Aviation Forecasts. The new draft WebTAG guidance I understand will soon be published as a part of WebTAG for public consultation. In an Appendix to this letter I summarise my qualifications for this work and the (entirely satisfactory) access that I have been given to papers and to officials and other technical contributors.

Each of the four peer reviews was written to complement a final summary review covering also the eventual presentation of the work in the document "UK Aviation Forecasts". This final review is provided by this letter. It summarises my four previous reviews and includes additional comments on the Aviation Forecasts document.

This final review is confined to technical and presentational issues related to the documents on modelling and economics that I have already reviewed. It is therefore not concerned with the many other technical inputs to the forecasts, although I have seen no reason to doubt that these have been handled competently, drawing on expertise in fields such as engineering and aviation operation. Nor is this review concerned with data taken from external, authoritative sources, on for example future GDP growth and future oil prices. And it is not concerned with issues of policy.

The overall picture in the areas that I have reviewed is that, although on such complex issues there is always scope for debate about technical development and presentational detail, the current exercise has been technically impartial and competent. It is nowadays fashionable, and

true, to say that all forecasts of this kind are wrong. But such forecast estimates are needed for policy development and these current forecasts are in my view fit for this purpose.

The forecasting framework is shown diagrammatically in Figure 2.2 of UK Aviation Forecasts. My four summaries below first address two inputs into the National Air Passenger Demand Model, namely the econometric analysis of past trends in passenger traffic and a paper on market maturity and other "key drivers". This is followed by coverage of the National Air Passenger Allocation Model and then the draft WebTAG Unit on aviation appraisal.

The econometric analysis of past trends in passenger traffic

The Department's paper on "Re-estimating the National Air Passenger Demand Model Econometric Equations" reports the derivation of income and price elasticities for use in the demand forecasting. The work is outlined in UK Aviation Forecasts in paragraphs 2.12 to 2.26 and in more detail in Annex A (which I understand includes some slight updating of the separately published paper). My work did not review the technical detail of the econometrics, which was where appropriate undertaken by other external experts. It reviewed the procedures taken to ensure that the analysis was competent and unbiased and the work's clarity of presentation for publication.

My review concluded that the econometric work had been a difficult exercise competently implemented, with a satisfactory level of external expert input to check and add to the work's quality. It noted that the data limitations are substantial and that, mainly for this reason, significant subjective judgement is sometimes needed to choose final specifications. However, the final product appears to be close to the best that can be obtained from the currently available data. My review also concluded that there is scope for improvement in presenting and discussing data sources. This is now at least largely met by a subsequent paper, published together with this and other documents, on "Data Sources for the econometrics in the National Passenger Demand Models". It also noted that it must be hoped that the issues identified in the econometrics paper for further work are followed up and not forgotten.

Key drivers and market maturity

The Department's paper on "Reflecting changes in the relationship between UK air travel and its key drivers in the National Air Passenger Demand Model" addresses the question of drivers of air passenger demand whose future impacts cannot readily be captured by the analysis of past data on the effects of income and prices. This includes in particular market maturity and changes in rates of market liberalisation. In UK Aviation Forecasts the work is noted in paragraphs 2.23 to 2.25 and set out in Annex B.

My review concluded that this study is a significant advance from previous aviation passenger forecasts in the handling of market maturity and market liberalisation. It also noted that there are

other drivers or potential drivers of demand that that can be expected to be materially different in future decades, but on which no informed, quantitative judgment can be made. Preparation of this key drivers paper included brief but serious discussion of such issues, including video conferencing, which has subsequently been included in the Forecasts report, and drivers such as the long term balance between terrorist threats and security control and the potential for supersonic transport.

National Air Passenger Allocation Model

The Department made the excellent decision in the summer of 2010 to commission a leading transport modeller, John Bates, to peer review the National Air Passenger Allocation Model (NAPALM), which is illustrated in Figure 2.5 of UK Aviation Forecasts. Versions of the peer reviewer's expert report were discussed with its author at two meetings of the Department's Aviation Forecasting Technical Working Group. The final expert report was followed by a Departmental Response and I subsequently peer reviewed the expert report and the Response.

The expert report is a well balanced document, of very high technical quality, that covers the ground as comprehensively as could have been hoped for in the time available. It also stresses that the consultants who designed and implement the model, with whom the reviewer dealt for information on the modelling, had been extremely cooperative and constructive in answering questions and providing data. The Departmental Response is also an impressive document. It is well structured and comprehensive, with responses that are well informed, well balanced and generally persuasive.

The exercise added greatly to a wider understanding of the model's complexity and of ways in which it might be developed in the short and longer term. It must be hoped that the good intentions for the longer term are followed through.

Draft WebTAG Unit

I peer reviewed a document entitled "Draft Structure of WebTAG Unit on Aviation Appraisal".

In part this fits well into the mainstream of WebTAG by explaining conventions in aviation with respect to a number of impacts that apply across most or all transport modes. These include indirect taxation, time savings, 'wider economic impacts', costs and benefits to non-UK residents, noise, air quality, greenhouse gas emissions and security. The conventions for these impacts are presented clearly, with appropriate cross-references to other WebTAG sections.

It also presents a general explanation of the most complex element of national level aviation forecasting, which is the allocation of forecast aggregate passenger demands across different airports, where some of the airports are capacity-constrained, together with the associated costs and benefits to producers and consumers. This includes a stylised four-quadrant graphical

presentation of the iterative modelling cycle in which airline costs, passenger costs, numbers of passengers and air transport movements (ATMs) are allocated to capacity constrained airports. This looks simple but it is an important advance in promoting understanding of this aspect of the modelling process.

There are some other largely aviation specific factors that might, depending on the particular policy concern being appraised, need to be included in a cost benefit analysis that made use of this modelling, such as more detail on the handling of private financing costs, impacts on global greenhouse gas emissions, and the distribution between sectors and internationally of the rent created by regulatory constraints on supply. But these can reasonably be seen as issues for consideration as the Unit is developed.

This draft is an interesting and informative document and a welcome addition to WebTAG as a first version of a section on aviation appraisal. It is useful as it stands and provides a sound foundation for further evolution.

In addition to the comments above on the three contributory documents and the draft guidance I here record comments on the presentation of the final UK Aviation Forecasts document and the general development process.

UK Aviation Forecasts provides forecast outputs, which are presented reasonably clearly, and also, as should be expected, a fairly comprehensive account of the underlying methodology. But the result is an extremely bulky and complex document. Two of the Annexes, A on the econometrics and B on key drivers, covering nearly 30 pages, are very close, especially in the latter case, to complete reproductions of the background papers that are to be published in parallel. They are also summarised fairly fully in the main text. I understand that the Annexes are slight updates of the background papers, but in future it might be better in terms of both bulk and clarity to omit such Annexes, cross referring instead to up to date supporting papers. Some other material on modelling, such as the extensive validation results, might also be better published separately.

The Department is however to be commended on its Annex E, which presents, as with previous forecasts, an account of the developments in forecasting methods, which for these current forecasts have been more substantial than usual.

One development, explained in Paragraph E.6, is in the method of estimation of “high” and “low” outputs as sensitivity analysis. The paper explains in one context, in paragraph 2.25, that “it is impossible to attach probabilities to different points in the range” and “the higher and lower bounds of the range are regarded as either end of a range of reasonably likely outcomes”. This might usefully have been generalised to all of the sensitivity tests, with an explanation that these tests serve first to make it clear that the central forecasts cannot be very accurate and second to

provide material to help readers who have views on how the inputs might vary with some information to help them assess the effects of such changes.

It might have been wise to mention somewhere in Section 3 the threat from the US in particular to the inclusion of aviation in the EU ETS, even though this is mentioned in a footnote to Section 1. The document notes that, since aviation traffic will move to airports in other countries, constraining UK airport capacity may not reduce *global* aviation emissions. It is a pity that, as the document explains, the available data and modelling capacities are not able to estimate the global aviation impact. But this is of course of limited importance with all of EU aviation in a cap and trade scheme.

The process for developing the current UK Aviation forecasts followed conventional Whitehall practice of a fairly high level "Appraisal Board" to check progress and, more substantially, a Technical Working Group (TWG), as described in the Appendix to this letter, to discuss and coordinate the many strands of technical development. The papers prepared for the TWG were of good quality and the discussions invariably concerned with promoting technically robust and impartial analysis.

The most serious challenge to this work appears to be not so much the obvious ones such as data availability, serious though they are, but the challenges of managing and sufficiently understanding complexity. Very different fields of technical and administrative expertise are necessary, embracing for example logit modelling, international environmental regulation, developments in aircraft size and aviation fuel economy, econometrics and general welfare economics. No one person can be technically on top of all but a modest part of the whole. Experts from different backgrounds cannot always communicate easily with each other. And the modelling itself, as emphasised in the expert peer review of NAPALM, has evolved over the years into an extraordinarily complex and far from transparent creation. This is all now in capable hands, but there may be cause for concern that parts of the process need a long term programme of development to simplify and, more especially, to improve transparency.

Yours sincerely

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APPENDIX: Qualifications and access provided for my peer reviews

My qualifications for the this peer review work are those of a previous senior Treasury microeconomist, with close involvement and subsequently close familiarity with developments in UK government guidance on appraisal methodology. For the past fifteen years I have been an economic consultant advising on the theory and application of appraisal and ex post evaluation of public expenditure and regulation, mainly for government departments or agencies. I am a Special Consultant to NERA Economic Consulting and a Visiting Senior Fellow at the Grantham Research Institute on Climate Change and the Environment at the LSE.

The access provided by the Department for Transport to the development of 2011 UK Aviation Forecasts has been close and constructive. I have been provided with copies of drafts of the documents to be reviewed and appropriate weight has been given to my comments on both presentational and technical issues. Most substantially I have attended the monthly meetings of the Technical Working Group established by the Department to steer the development of this guidance and including, besides technically expert officials from the relevant units in the Department, the principal expert from the Department's modelling consultants, an economist representative of the CAA, and the Department's immediately previous Chief Economist. These meetings have been consistently focused solely on the soundness of the analysis.