Peer Review of "Re-estimating the National Air Passenger Demand Model Econometric Equations"

1. Introduction

This is a review of the procedures underlying the production by the Department for Transport of the document "Re-estimating the National Air Passenger Demand Model Econometric Equations" as available to me on 4 July 2011.

This is not a review of the technical detail of the econometrics, which has to a satisfactory degree been undertaken separately as noted below. It is a review of the procedures taken to ensure that the analysis is competent and unbiased and of the work's clarity of presentation for publication. This is of one of four reviews[1] produced for publication with the Department's aviation forecasts in July 2011 of the processes leading up to those forecasts. They are written to complement a final review of the forecasts document.

2. The context, purpose and coverage of the econometric equations

The econometric equations are used to derive income and price elasticities for use in future projections of the Department's National Air Passenger Demand Model (NAPDM), which in turn is used to project "unconstrained" passenger demand by UK geographical zone. These figures, together with data on runway and terminal capacities, are fed into the National Air Passenger Allocation Model (NAPALM).

As explained in the document, for econometric estimation the UK aviation passenger market is disaggregated into four types of passenger (UK or foreign resident, and business or leisure) and five categories of route (domestic and four categories of foreign destination[2]), with a further category of international to international travellers changing planes at a UK airport. This generates nineteen component markets[3] each of which is modelled separately.

The econometrics document includes a brief and persuasive summary of the reasons for producing a new set of estimates rather than continuing with those estimated in 2006. These are given as the availability of more data, some refinements to the equation specifications and the inclusion of a fares variable where the data permits. The availability of more data is apparently that arising simply from the passage of time – giving longer as well as more up to date time series from the time that reliable passenger data first became available. Changes of specification – described concisely in this case as "for example by changing the variable or including lagged variables" – could usefully in future be described in the commentaries on the individual models.

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1 The others cover papers on the Passenger Allocation Model and on aviation passenger market maturity and a graphical presentation of how the Allocation Model works.

2 Western Europe, Other OECD, Newly Industrialised Countries, and Less Developed Countries.

3 For domestic fights no distinction is made between UK and foreign residents and international to international passengers are not further disaggregated.

The paper includes a good section headed "Potential future further work", identifying four topics. These include the need to update the allocation of countries to the current four categories (Chile for example, though now in the OECD, is still categorised as an LDC) and possibly to modify the categories to reflect a changing world.

3. Data sources

Much of the data, as in previous aviation passenger forecasting exercises, is from the Office of National Statistics, in particular its International Passenger Survey and data on UK GDP and consumer spending. This is complemented by Civil Aviation Authority data from passenger interview surveys and by data relating to overseas trade from other UK and international authorities.

The available data is far from ideal and the document includes an account of two difficulties arising from the small number of annual observations. It would be good to see in future exercises some discussion of the data limitations, for example explaining why it is not realistic to use a shorter time interval than a year and considering whether there might be scope for improving the data over the long term.

However I see no way in which the choice of currently available data sources could be improved.

4. Assurances of technical quality

The econometric equations have been re-estimated by the Department in-house, using resources well qualified for this work. The document also records a comprehensive account of the methods used and a wide range of additional analyses, testing alternative plausible specifications of some markets.

To help ensure quality the Department consulted three sources of external advice. At an early stage discussions were held with consultants, as explained in the document, about which particular technique would be best to use for the 'non-stationary'[4] time series in question. At a later stage, at the end of all the major work, general advice on the choice of methodology and its application by the Department was sought from Professor Joyce Dargay, an exceptionally well qualified and experienced expert on transport modelling. Also in the later stages, the interpretation and handing of model outputs that appeared to be intuitively surprising or questionable was discussed within the Department's Technical Working Group, which included external experts from the Civil Aviation Authority and elsewhere.

Professor Dargay advises that the methodology used for the econometric modelling is appropriate and has been well carried out and that problems in obtaining suitable models for some markets are to be expected, given the short time series available and the quality of some of the data. It is not unlikely that yet further examination and testing to try to improve the specifications of some of the models would lead to some yet further development. However there is in my view good reason to believe that the outputs finally presented are close to the best that can be expected from the available data, and acceptable for the purpose of forecasting.

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[4] That is, with time trends that are not simply random fluctuations around a constant rate of change.

5. Presentation

The document's descriptions of the econometric methods, the short discussions of each of the models accompanying the detailed numerical results, and the summary presentation of the recommended elasticities are all good. These include a table that usefully compares the new elasticity estimates with those used in the previous published forecasts, in the document 'Air Passenger Demand and CO_2 Forecasts 2009'.

It would be good practice in future for econometrics publications to include an early section explaining and justifying the data sources in some detail. However the Department is in this case publishing an accompanying document providing a good factual description of the data sources.

It would also be helpful, for a published document, to preface the econometrics report with a short account of where it fits into the full forecasting structure, as noted at the beginning of section 2 above. And it would be helpful to explain that the elasticities derived from past data are not applied without qualification to the future, but that many other factors, including a market maturity and airport capacity constraints, are considered in later stages of the forecast modelling.

At a still later stage in the modelling process, in the Passenger Allocation Model (NAPALM), the passenger markets are further disaggregated into segments by type of carrier (charter, conventional scheduled and no-frills carriers). It is sensible, given data limitations among other reasons, for the econometric analysis not to include any significant disaggregation by carrier. However it would be helpful in future such documents to include a sentence or two on why the particular levels of aggregation/disaggregation have been chosen.

6. Conclusion

This econometric work has been a difficult exercise competently implemented, with a satisfactory level of external expert input to check and add to the quality of the work. The data limitations are substantial. Mainly for this reason, significant subjective judgement is in some cases is 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 and suitable for the purposes for which it is used in the subsequent forecasting structure.

There is in my view scope for improvement, in future exercises of this kind, in aspects of the presentation, in particular in presenting and discussing data sources and, if the work is to be published as in this case as a self-standing document, in setting the exercise more clearly in its wider modelling context. More seriously, it must be hoped that the issues identified for further work are acted upon and not forgotten or postponed indefinitely.

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