Department for Transport

Data sources for the econometrics in the National Air Passenger Demand Model

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Department for Transport
Great Minster House
76 Marsham Street
London SW1P 4DR
Telephone 0300 330 3000
Website www.dft.gov.uk

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1. Introduction

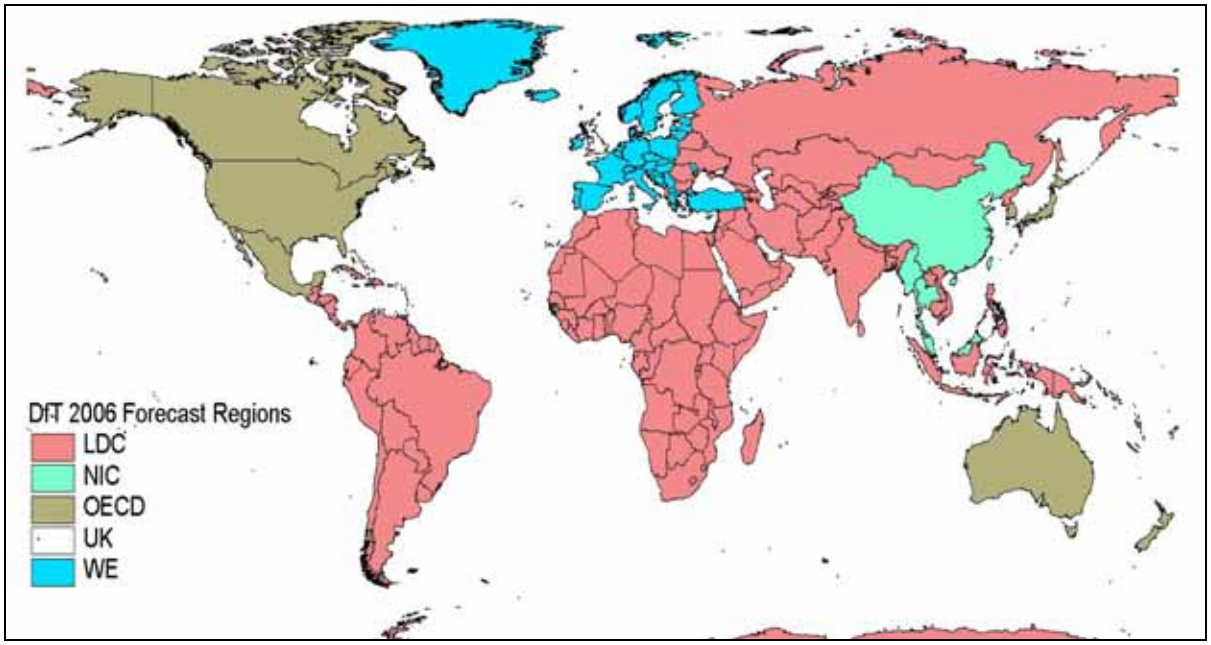
1.1 The purpose of this note is to accompany the 'Re-estimating the National Air Passenger Demand Model Econometric Equations' paper, providing information on data sources, length of data time series, and how the data was assembled and used for re-estimating the econometric models in the National Air Passenger Demand Model.

1.2 In the National Air Passenger Demand Model, demand is split according to whether the passenger is a UK or overseas resident; passenger journey purpose, type of flight, whether the passenger is making an international to international using a UK airport, and the global region the passenger is travelling to and from. There are 4 geographical zones used, the composition of the groups remain the same as in the 2009 published forecasts[1]. Figure 1 shows the 4 geographical zones, these zones are:

- Western Europe
- OECD (Excluding Western Europe)
- Newly Industrialised Countries (NIC)
- Less Developed Countries (LDC)

[1] '*UK Air Passenger Demand and CO2 Forecasts*' DfT (2009)
Available at http://www2.dft.gov.uk/pgr/aviation/atf/co2forecasts09/

Figure 1: Global regions used in the National Air Passenger Demand Model



1.3 Handling of the Channel Islands remains problematic. In terms of passenger allocation and the definition of 2008 total traffic, they are regarded as an international destination, but for explanatory variables such as GDP, exchange rates, trade they cannot be easily separated from the UK data. The approach taken is to omit the Channel Islands from the Western Europe and domestic data used to estimate the econometric models, but to include base Channel Islands demand in Western Europe for forecasting.

2. Data Assembly – Traffic

International Passenger Survey (IPS) Assembly

2.1 The IPS is the core source for international traffic. IPS interview data was used for the period 1986-2008. Data was also received from an earlier 1984 survey; we were unable to find data for 1985. Therefore the IPS time series starts from 1984, and 1985 is an average of the 1986 and 1984 surveys. The final time series ranges from 1984-2008

2.2 A total of 4.7 million cleaned air passenger interview records were processed to a consistent structure in Microsoft Access format. The 1984-2008 output data, albeit an aviation specific subset, is an invaluable and comprehensive source which has not previously been available for national forecasting.

2.3 The use of IATA codes and FIPS/ISO country codes on all records allows all traffic to be grouped to the four geographical groupings: Western Europe, OECD, NIC and LDC. An algorithm was developed to identify ultimate destination country out of the data.

2.4 Care was needed on IPS Irish data. Air travel to Ireland was only included in the IPS from 1999 onwards. This is a major discontinuity which distorts all time series derived from the IPS. In the current forecasting Ireland has been omitted from the calibration datasets, although it is included in the 2008 base markets to which growth from the econometric models is applied to develop the forecast.

CAA Passenger Interview Surveys

2.5 All CAA passenger interview surveys up to 2008 which are available in electronic format were also assembled into a consistent Microsoft Access database. This data is a valuable supplement to the IPS which has been used to:

- Identify I to I interliner traffic time series
- Provide domestic traffic time series
- Provide an independent validation of IPS.

2.6 In order to make a database of this size manageable, only a simplified and coded subset of fields has been retained. The database comprises 3.215m passenger interviews.

CAA Domestic Origin-destination Returns

2.7 The new domestic econometric model purpose-split between business and leisure excludes domestic interlining traffic, which is captured in the international models. The purpose-split and proportion of interlining traffic on each route has been extracted from the CAA passenger survey database and CAA airport statistics. This database is intermittent in the regions and everywhere pre-1998. Route by route interlining proportions have therefore been extended backwards until the next survey observation. Any unobserved routes are given the average for the destination.

3. Data Assembly – Explanatory Variables

Fares

3.1 In the 2004 base model used in the DfT's previous published forecasts, all forecast fares were leisure fares and there were no business fare elasticities in the econometric demand models. In the new 2008 base model the single leisure fare is replaced with the facility to create separate fares for both the business and leisure markets, in the expectation that the new econometric demand models would also include some business fare elasticities.

3.2 Fares were taken from the Office of National Statistics International Passenger Survey (IPS) data, supplemented by CAA Passenger Survey data. IPS and CAA data have the advantage of being actual fare paid rather than published fare, and of being accurately purpose split and omitting interlining fares.

3.3 International UK passenger fare data has been assembled from the IPS and an average for each country within each geographical area can be prepared for each year for the period 1987-2008. However, the IPS does not collect data on fares paid by foreign residents and fares paid by UK resident's data was only collected from 1987 onwards. Data from 1982-1987 was assembled in the form of an index from the earlier DfT forecasting exercise undertaken in 2002. The retail price index (RPI) was used for the indexation. Figure 2 shows the indexed real fares for UK leisure passengers, while figure 3 shows the indexed real fares for UK business passengers.

[2] '*Air Passenger Forecasts for the United Kingdom*' DETR (2000)

Figure 2: Indexed real fares – UK international leisure passengers

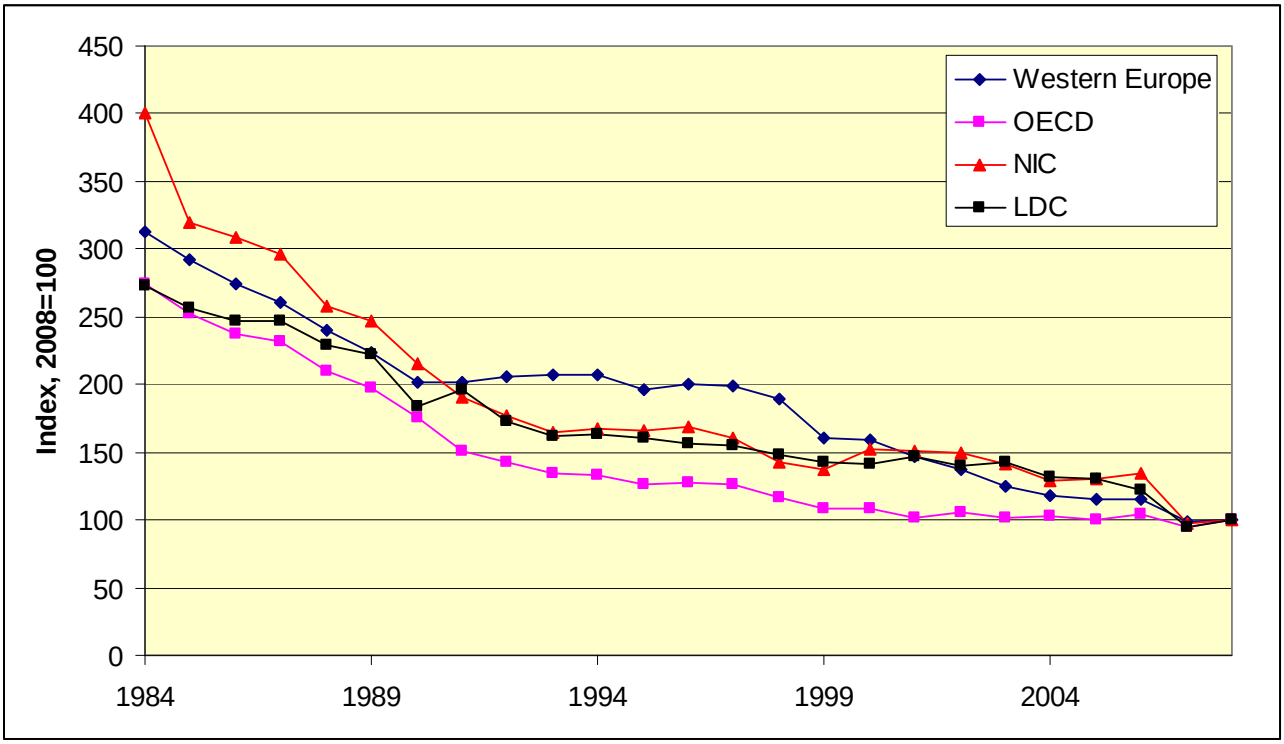
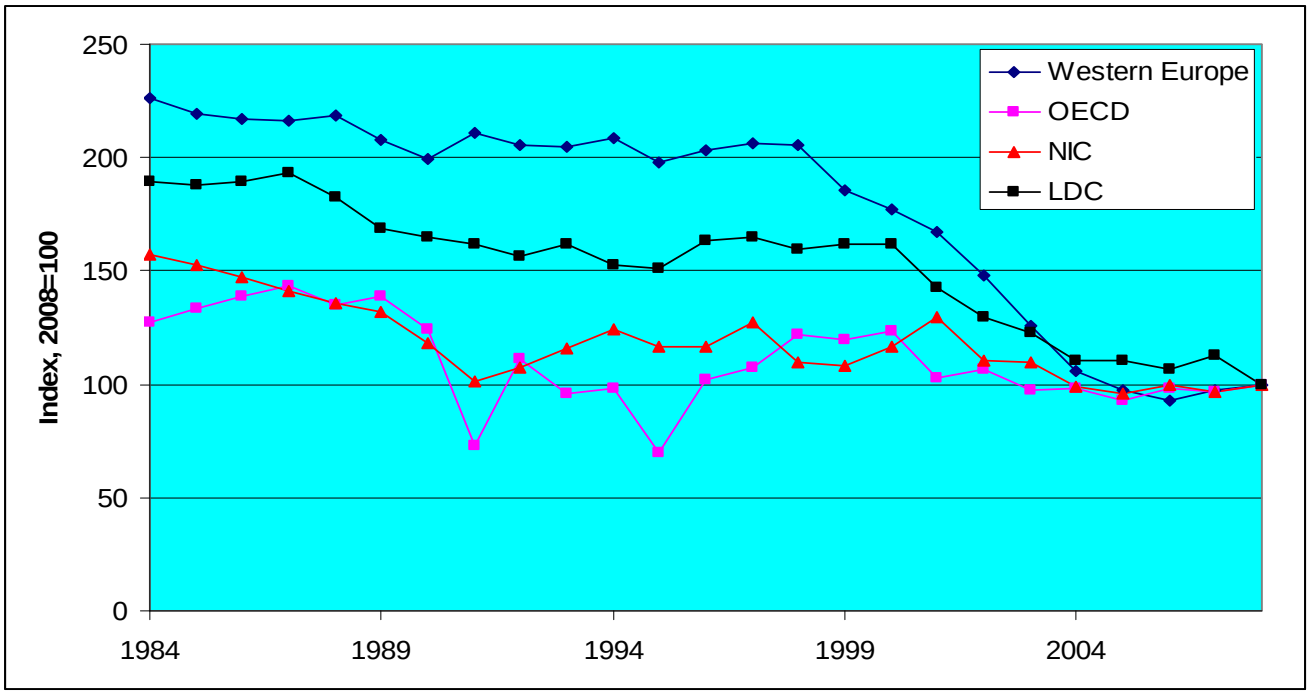
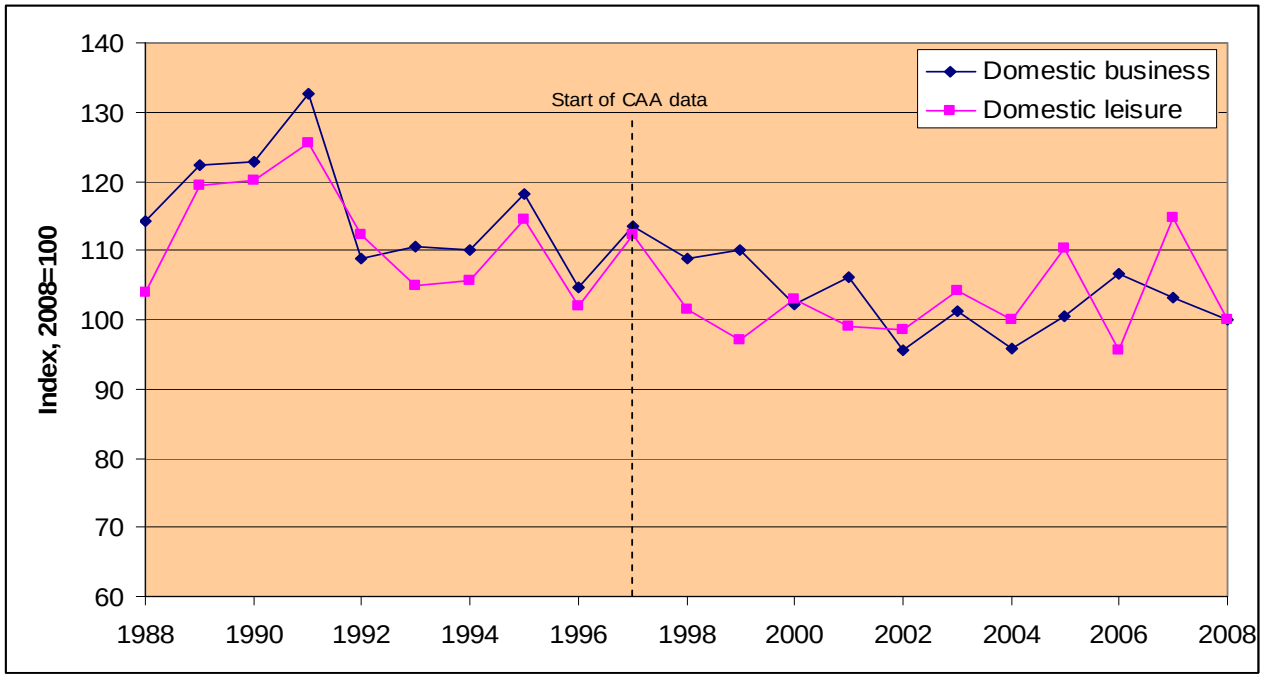


Figure 3: Indexed real fares – UK international business passengers



3.4 A continuous time series of domestic passenger fares paid by purpose has been extracted from the CAA interview data from 1997-2008. As with the IPS international fare data, this has the advantage of being actual fare paid rather than published fare, allowing the exclusion of fares paid by transfer passengers. Care is required in processing as CAA interview fares can be one or two way and fares need to be converted to singles. Fare data is absent from CAA interview data prior to 1997. Extension of domestic fare data back to 1988 has therefore required using a proxy short haul foreign route from the international fare series derived from the IPS as an index. Figure 4 shows the indexed real fares for domestic passengers. The vertical line at 1997 highlights the change from the fare proxy to CAA data.

Figure 4: Indexed real fares for domestic passengers



3.5 Foreign passenger fares are not captured in the IPS. Some observations of the actual fares paid by foreign passengers are in the 1997-2008 CAA passenger surveys. Previous attempts at compiling foreign fare indices from this data, which used fares paid in native currencies and converted to sterling, failed to produce indices that were significant in the econometric models in explaining passenger trends. Therefore the IPS fares of UK passengers were substituted. However, these were re-

Exchange Rates

3.6 There are a wide range of currencies to be combined, weighted by UK traffic to the country, and there are numerous discontinuities in the time series. A comprehensive set of exchange rates against the US Dollar has been derived from UN GDP data[3]. The UN Statistics Division provides GDP for all countries (with country codes) in both current and constant prices and also in current local and current dollar prices. The current local prices were divided by the current dollar prices to provide a comprehensive time series set of local exchange rates against the dollar. These have been validated against Bank of England and EU published rates for the major conversions. Exchange rates for each country are converted into an index with a base of 2008, and the index itself is weighted by UK Business, UK Leisure, Foreign Business and Foreign Leisure traffic to each country, as appropriate, for accumulation into a final purpose weighted exchange rate index for the forecasting region. The GDP data from the UN statistics division allowed a time series of exchange rates to be created from 1984-2008.

3.7 Some discontinuities in the exchange rates are inevitable as a result of political change and other upheavals. Although, the original goal was to provide a comprehensive set of exchange rates, it has been necessary to remove groups of countries from the dataset prior to aggregating into geographical areas. Significant excluded countries include the former Soviet Union and Balkan/former Yugoslav states.

GDP and Consumption Expenditure

3.8 Each overseas national GDP has been stored in a database covering 1979-2008 in constant $2008 prices. The principal data source is UN

[3] http://unstats.un.org/unsd/snaama/dnllist.asp

Statistics[4] in $1990 - which was subsequently re-based to 2008 using the US CPI. UK GDP in 2008 constant prices is available from the ONS. The GDP data allowed us to create a GDP time series from 1984-2008.

3.9 Traffic weightings based on the volume of traffic from the UK to each country split by journey purpose are applied each year to weight each national GDP prior to aggregation into forecasting region Previous forecasts used proxy countries for the newly industrialised countries (NIC) and, in particular, the (less developed) LDC markets; however the new models use total traffic and total GDP in preference to samples of these of countries.

3.10 Models that require an index of consumer expenditure rather than UK GDP (e.g. UK Leisure – Western Europe) use the ONS series ABJR 'Household Final Consumption Expenditure' which is converted to 2008 real prices. The index used was seasonally adjusted and updated on 29th March 2011 by the ONS.

Trade (Imports and Exports)

3.11 Comprehensive trade data (visible imports and exports) for all destinations has been taken from HM Customs and Excise uktradeinfo website for the period 1997-2008 (http://www.uktradeinfo.com/). Separate time series have been produced for exports and imports. All values are converted to constant 2008 UK prices using the RPI. For years 1984 to 1997 country data is taken from the CSO Annual Abstracts of Statistics and the CSO Business Monitor Series MM20 and MM20A Overseas Trade Statistics of the United Kingdom. This source for the earlier years is less disaggregate and introduces some discontinuities and some short haul countries have been excluded. Despite these discontinuities continuous short haul trade data is available for 94-97% of UK Business, 84-88% of UK Leisure, 95-98% foreign business and 94-96% of foreign leisure.

3.12 Trade with OECD states is 100 percent reported throughout the period. Of the NIC states, Hong Kong trade is added to China throughout the period and only the absence of earlier trade data for Brunei and Macau prevent 100 percent reporting. NIC countries with continuous trade statistics account for 97-99% of UK Business, 98-99% of UK leisure, 95-98% of Foreign Business and Foreign Leisure traffic. The LDCs have much the smallest sample of countries with continuous trade statistics. At

[4] ibid

present the LDCs used in the continuous trade time series are Indonesia, India, Iran, Israel, Kuwait, Nigeria, Pakistan, Philippines and Saudi Arabia. These nine countries account for 35-38% of UK Business, 39-47% of UK Leisure, 44-54% of foreign business and 46-55% of foreign leisure demand.

3.13 The procedure for weighting imports and exports by the total volume of traffic by purpose to each country within each geographical grouping is the same process as applied to foreign GDP and exchange rates described above.

4. Length of Data Time Series

4.1 Given the one-off structural changes to the political geography of the world which occurred in the late 1980s and early 1990s – particularly the break up of the Soviet Union and former Yugoslavia and the re-unification of Germany – it was prudent to limit the extension of the time series backwards in certain markets where there is clear evidence of interruption to the time trend.

4.2 Table 1 reports the length of time series used for the 19 market sectors for which econometric models have been estimated.

Table 1: Summary of length of time series for each of the market sectors

Market Sectors	Length of Time Series	Comments
International Sectors	1984-2008	
Domestic Sectors	1989-2008	Pre-1989 data on traffic and air fares could not be obtained
I – I Interliner Sector	1996-2008	Pre-1996 data on traffic and air fares could not be obtained