Air traffic forecasts for the United Kingdom 2000

Contents

CHAPTER 1
Introduction

1.1 This document sets out the Department of the Environment, Transport and the Regions(DETR) 2000 forecasts of air passenger traffic at UK airports. These forecasts supersedethose published in 1997. They are the seventh set of forecasts prepared by DETR (formerlythe Department of Transport DOT) since 1984 and reflect the intention to monitorair traffic developments and to keep assumptions and methodologies under review, as setout in the 1985 White Paper Airports Policy (Cmnd 9542). The forecasts serve a numberof purposes:

- They take a view on expected demand in order to inform policy on airport capacity
- They are a key input to studies on future capacity requirements such as SERAS
- They can be used to examine the economic implications of policy alternatives
- They are used by other Government departments

1.2 The forecasts are for the demand for air travel by UK and foreign residents to and fromUK airports up to the year 2020, extending the forecast period 5 years beyond that in the1997 forecasts.

1.3 The forecasts are used by Government departments, the Civil Aviation Authority (CAA),airports and airlines, together with their own forecasts, for planning and appraisal purposes.They are an input to the assessment of the need for runway and terminal capacity and theimpact of capacity constraints on passengers, airlines and airport operators. The forecastsare also important to ensure that the environmental and development impacts of growthin air traffic demand can be assessed and taken into account in developing Governmentpolicy on aviation.

1.4 The rest of this report is structured as follows:

- Chapter 2: guidance on the interpretation of the forecasts
- Chapter 3: presents a summary of the main forecasts, with a more detailed breakdownof international traffic in Chapter 4 and domestic traffic in Chapter 5
- Chapter 6: discusses the forecasts of scheduled low cost airline traffic
- Chapter 7: sets out and discusses a number of sensitivity tests which were conducted
- Chapter 8: considers the accuracy of previous DETR (DOT) forecasts compared withobserved demand

1.5 The annexes contain details of the methodology used to produce the forecasts and theassumptions about key variables as well as a summary of the forecasts.

CHAPTER 2
Interpretation of Forecasts

Basis of forecasts

2.1 The approach to the 2000 forecasts is similar to that used to prepare the 1997 forecasts.The forecasts are based on econometric equations, which specify a relationship betweenpassenger traffic and a number of explanatory variables, which determine it, using datafrom the early 1960s to 1998. The key variables determining air traffic were found to bedomestic and foreign economic growth (principally GDP); air fares; trade and exchangerates. This is consistent with the results of other research conducted over many years bythe former Department of Transport (DOT) and others into air passenger demand and isalso what would be expected from economic theory.

2.2 The relationships derived from past years data are applied to projections of future yearvalues of the explanatory variables to calculate forecasts of air traffic. Forecasts in thisreport follow the established pattern and are given for five yearly intervals from 2000 to2020. Further details of these assumptions and of the methodology used to produce theforecasts are given in Annexes 1 and 2.

2.3 The total forecast is built up from individual forecasts of 16 international market segmentsand 3 domestic markets. The international markets are disaggregated by UK and foreignresidents, business or leisure trip purpose and four geographic areas: Western Europe; otherOECD countries: the newly industrialised countries of East and South East Asia anddeveloping countries. There are three UK market segments: London to and from regions,the UK to and from the Channel Isles and between regional airports.

2.4 In addition to the 16 markets, which are directly modelled, assumptions are made aboutthe future course of a number of other categories of passenger. The most significant ofthese is airside interliners, international passengers who change flights at UK airports,but do not pass through customs control. Others include travel to and from oil rigs andby diplomats. A separate forecast is also made of scheduled low cost (SLC) airline traffic.The additional growth generated by these airlines is forecast off model and after a periodof rapid growth up to around 2005 is assumed to grow at the same rate as UK short haulleisure traffic.

2.5 Air passenger demand is forecast in this disaggregated way because the precise relationshipbetween passenger traffic and the factors which determine it differs between sectors.Modelling individual segments is likely to produce a more accurate overall picture thantreating the demand for air travel as a whole as a single market.

2.6 The forecasts are long term forecasts and show the trend growth in demand for air trafficto the year 2020. As noted above, a main determinant of air traffic is economic growth.The difficulty in accurately predicting turning points in the economic cycle means thatdeviations from the long run trend occur in any given year. Demand for air traffic in theshort term may also be subject to factors which no econometric forecasting model couldaccommodate, such as wars or terrorist action. Strategic behaviour by airlines can alsohave a significant short-term and perhaps long term effect on demand.

Capacity

2.7 For the purpose of the UK air traffic forecasts, it is assumed that additional airport andairspace capacity is made available as necessary to accommodate growth in passengernumbers. In this sense

they are unconstrained forecasts of the underlying demand for airpassengers, independent of any supply side limitations. Unconstrained forecasts arenecessary to identify where and when the need for additional airport capacity will ariseand to inform decisions about the provision of such capacity. Forecasts constrained bycapacity would not give any useful indication of demand that would exist for new facilities.In order to make an assessment of the case for permitting additional capacity to beprovided, it is necessary to consider underlying demand independent of supply constraints.

Treatment of uncertainty

2.8 All econometric based forecasts depend on a number of different factors, assumptions andjudgements, which subject them to some degree of uncertainty. There are three mainsources of uncertainty:

a. The future path and values of the explanatory variables, GDP, air fares, trade andexchange rates, including the relationships between explanatory variables.

Producing robust long term annual forecasts of factors such as GDP is difficult. Generally,more confidence can be placed in forecasts of long term average growth rates than shorterterm forecasts of turning points, for example, the long term average annual growth rate ofthe UK economy has been broadly stable over the post-war period. Judgements are alsorequired when considering the future path of air fares in the face of liberalisation, slowertechnical advances and environmental measures. Assumptions for the central growthscenario were based upon forecasts by the Department and other organisations, wherepossible. Inevitably, some assumptions had to be based on judgement; these have beenmade on the basis of the best available statistical data.

b. The specification of the statistical relationships used to produce the forecasts and thestability of these relationships over time.

The specification of the statistical models on which the forecasts depend is also in manyrespects a matter of judgement, over such factors as the time period on which therelationships are to be estimated, explanatory variables to include and the functional formchosen to represent the relationship. Decisions on the above were based on the statisticalperformance of the models as well as considerations about market maturity, playing a largerrole in the future. Market maturity refers to the slowdown in growth often apparent inolder, more mature, product markets. It is usually driven by the relationship between keyeconomic variables, in particular GDP, and the growth in air travel changing over time.This change may not be captured in past data and requires a judgement about how itmight develop in the future.

c. The omission from the model of factors that may in future be important determinantsof air traffic.

A further problem with any forecasting model is that relationships based on past behaviourmay not always be accurate for predicting behaviour in the future. There may be changesin national and international policies or attitudes, which will affect demand. By theirnature, it is difficult, if not impossible, to predict when these might

occur and what theirimpact might be. Demand for travel by air has tended to bounce back after one-off shockssuch as the Lockerbie bombing and the Gulf War, although this may not necessarily be thecase in the future. The impact on demand of the introduction of a tax on aviation fuel isdiscussed as one of the sensitivity tests in Chapter 6.

2.9 To reflect these uncertainties the air traffic forecasts include a high scenario and a lowscenario. Generally, the wider the range presented, the greater the degree of confidencethat actual traffic growth will lie within the forecast range, although this makes theforecasts less useful for planning any enhancements to capacity, which typically have longlead times. The forecasts use a range that widens steadily to 15% of the total in 2020. Thiswas chosen to provide a range that is wide enough to provide materially different resultswhen used for investment appraisal but not so wide that it says very little of substanceabout the future level of air traffic.

2.10 The forecasting of high and low scenarios aims to capture the uncertainties inherent inlong term forecasts. In addition, a number of sensitivity tests have been conducted to testthe impact on the forecasts of varying in isolation a number of key input variables. Theseare discussed in Chapter 6 and include varying assumptions about market maturity, GDPgrowth rates, environmental taxes and airport charges. The forecasts have been preparedon the basis of no major changes in Government policy but the aviation fuel taxsensitivity test gives a measure of the importance of Government policy in determiningdemand.

Market Maturity

2.11 A key issue in long term air traffic forecasts is the degree to which a particular market ismature, that is whether or not there will be a significant fall in annual growth rates overtime. The growth in demand for products and services can be characterised into three lifecycle phases: low growth following its initial introduction with limited consumerawareness and supply; followed by rapid growth as the product achieves greater marketawareness and supply expands to fill the new market; finally slower growth once theproduct has become established and the market approaches saturation. The phase in theabove cycle will vary by market segment. In the longer term, time constraints are alsoexpected to limit demand for air travel, particularly for leisure purposes.

2.12 Market maturity implies declining income elasticities over time. That is the relationshipbetween income growth and the demand for further air travel weakens as market becomemore established. This means that for a constant level of GDP growth the growth indemand for air travel declines over time as the income elasticity of demand also declines.

Supply side factors

2.13 Evidence suggests that to date supply side improvements, that is better frequencies andincreases in the number of destinations, have had only a small impact in generating extragrowth in demand for air travel. As the forecasts are based on past data, the trend impactof supply side improvements should be picked up by the equations, and therefore reflectedin the forecasts.

Air passenger demand 1995 and 1998

2.14 The total number of terminal passengers at UK airports grew strongly between 1995 and1998 at an average annual rate 6.9% compared with an annual average of 5.3% for theperiod 1990 to

1998. Of all international passenger segments, growth was generallystronger in foreign resident market segments, and for business as opposed to leisurepurposes.

2.15 Growth rates over the last three years, which peaked at 8.1% in 1999, have been heavilyinfluenced by the expansion of scheduled low cost (SLC) carrier services. Such serviceshave increased demand for air services at a rate over and above the trend level of recentyears. This is particularly difficult to model econometrically partly because there is littlehistorical data and partly because the very high impact that SLC airlines have had ongrowth rates, rather than levels, is not expected to continue indefinitely. In light of thesedifficulties a statistical model was eschewed in favour of an off-model calculation of futureSLC demand. The methodology is set out in Annex 1.

2.16 The sale of duty free goods was abolished in 1999, and the effect of this on traffic volumesis still unclear. In theory, the lower profits that airlines and airports can now make on dutyfree sales might lead to fares increasing to compensate with a subsequent reduction indemand for air travel. Whether this is actually arising in practice is still uncertain and thisparticular consideration is not modelled explicitly in the forecasts, although may bethought of as one of the factors underlying the low growth scenario.

CHAPTER 3
2000 Forecasts ofAir Traffic Demand

3.1 A summary of the main traffic forecasts is presented in Table 3.1 below.

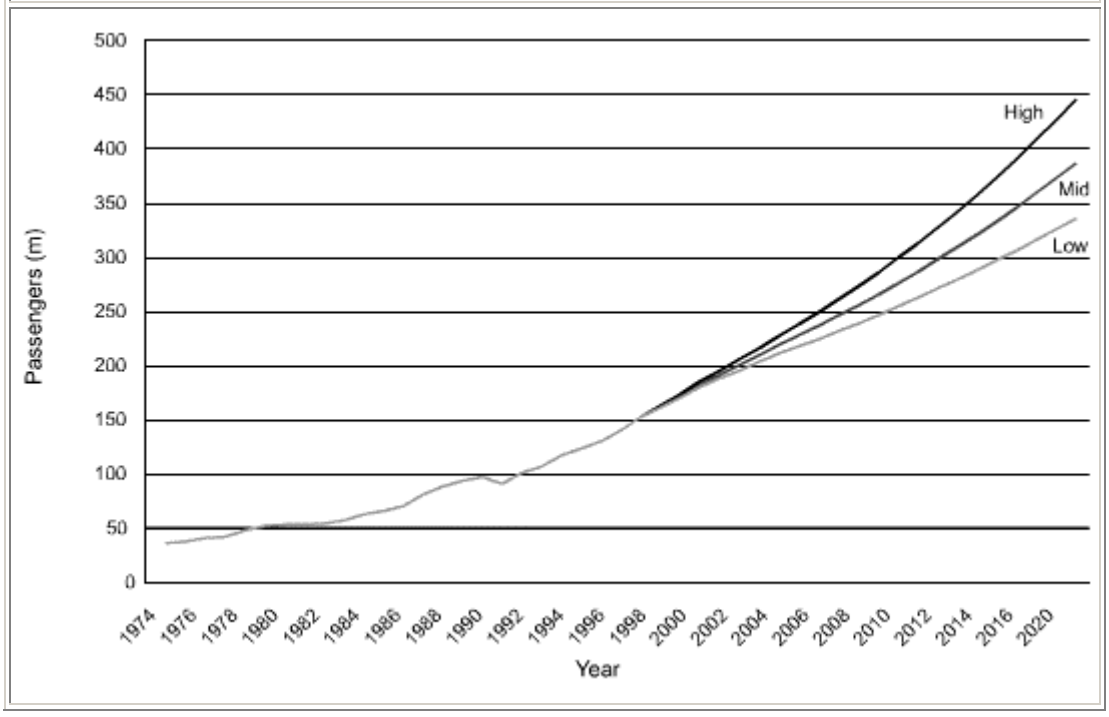
Table 3.1: **Forecast terminal passenger numbers at UK airports, 1998 to 2020 (m)**

	International			**Domestic**			**Total**		
Year	Low	Mid	High	Low	Mid	High	Low	Mid	High
1998		104.1			33.6			160.2	
2005	152.8	158.5	164.4	40.7	42.2	43.8	220.5	228.8	237.4
2010	179.5	193.0	207.5	46.7	50.2	54.0	256.8	276.1	296.8
2015	211.0	234.7	261.1	53.8	59.8	66.5	299.5	333.2	370.6
2020	247.0	284.0	326.6	61.7	71.0	81.7	348.5	400.7	460.8

Note: Total figures include miscellaneous traffic category not in the international or domestic figures.

3.2 Figure 3.1 shows past (actual) growth in air traffic and the Departments central forecaststo 2020. The figure also shows the low and high scenarios, which reflect the likely range ofvalues, given the uncertainty in producing forecasts.

Figure 3.1: **Actual and forecast passenger numbers at UK airports, 1975 to 2020**



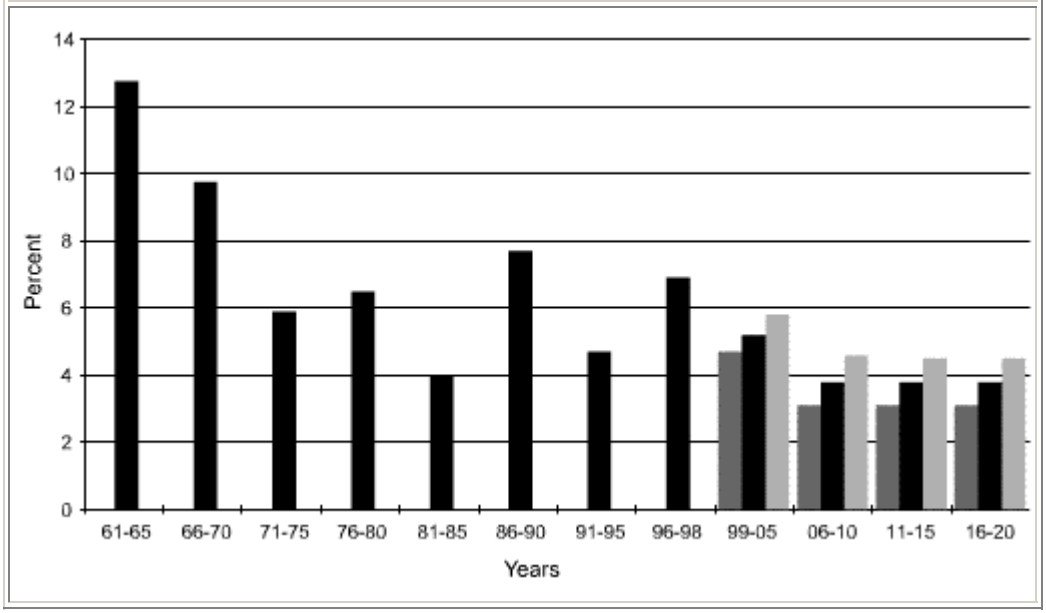
3.3 Air traffic at UK airports is expected to grow at an average of 4.25% per annum between1998 and 2020 under the mid-point of the forecasts and at an average of 3.6% and 4.9%per annum under the low and high scenarios respectively. The 1997 forecasts mid-point estimated 4.5% growth per annum on average between 1995 and 2015 which compareswith 4.4% on average per annum over the period 1998 to 2015 in the 2000 forecasts. Thelower growth rate in the 2000 forecasts over this period means that although the 2000forecasts are higher than the 1997 forecasts in every year the percentage differencebetween them narrows slightly over time.

3.4 The forecast range between the low and high scenarios is smaller in the 2000 forecaststhan in the 1997 forecasts. In the 1997 forecasts, the high scenario was 56% higher thanthe low scenario by 2015, in the new forecasts the high scenario is just under 24% higherthan the low scenario forecast in the same year and is just over 32% higher by 2020.

3.5 No adjustment was made to the forecasting base year to allow for the fact that the period1992 to 1998 has been one of unusually strong growth and that growth is probably abovetrend. The reason for this is that the GDP assumptions used allow for the short-term effectof the economic cycle on demand.

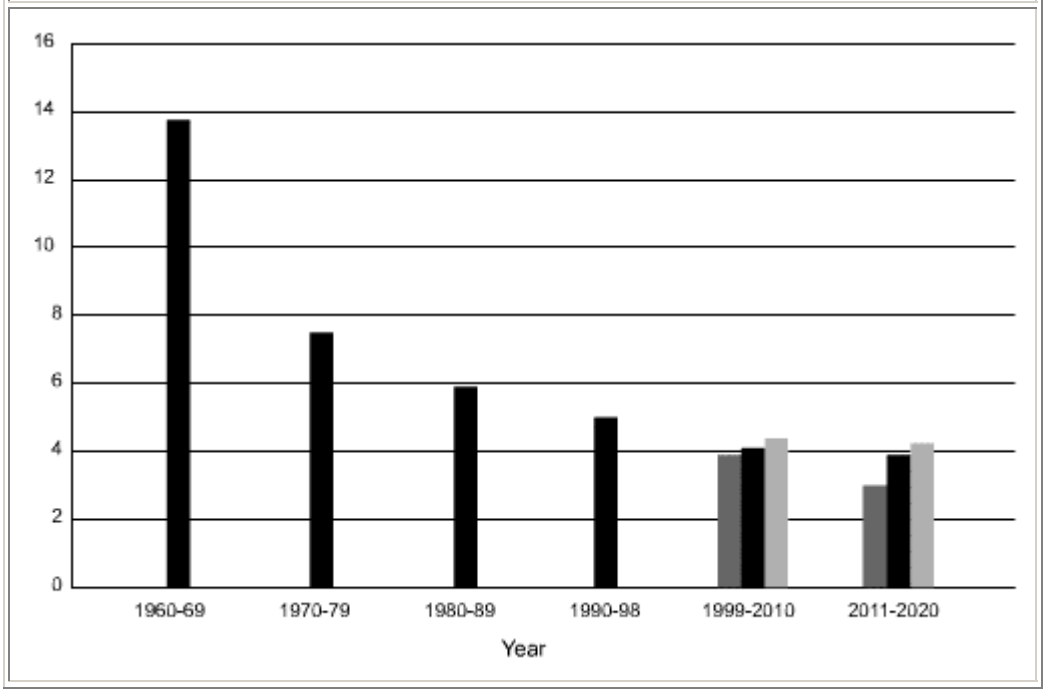
3.6 Figure 3.2 below shows past and forecast average annual growth rates of terminalpassengers at UK airports. Average annual growth rates have generally been declining overtime as the market moves toward maturity, falling from 12% in the early 1960s, to justover 5% between 1990 and 1998. The mid point forecast of an average of 4.3% over thenext 20 years continues the long term trend of a gradual reduction in growth rates.

Figure 3.2: **Average annual growth rates, actual and forecast, 1961 to 2020**



3.7 Although figure 3.2 shows the actual outturns and forecasts, the downward trend ingrowth rates is somewhat obscured by short term influences such as cyclical effects, shocksand the development of scheduled low cost airlines. To abstract from these short termeffects figure 3.2 is presented again below using ten year intervals and leaving out thegrowth due to scheduled low cost airlines for the years where they have the greatest effects(i.e. the 1990s and 2000-2010.)

Figure 3.3: **Trends in Average Annual Growth Rates 1960 to 2020 (%)**

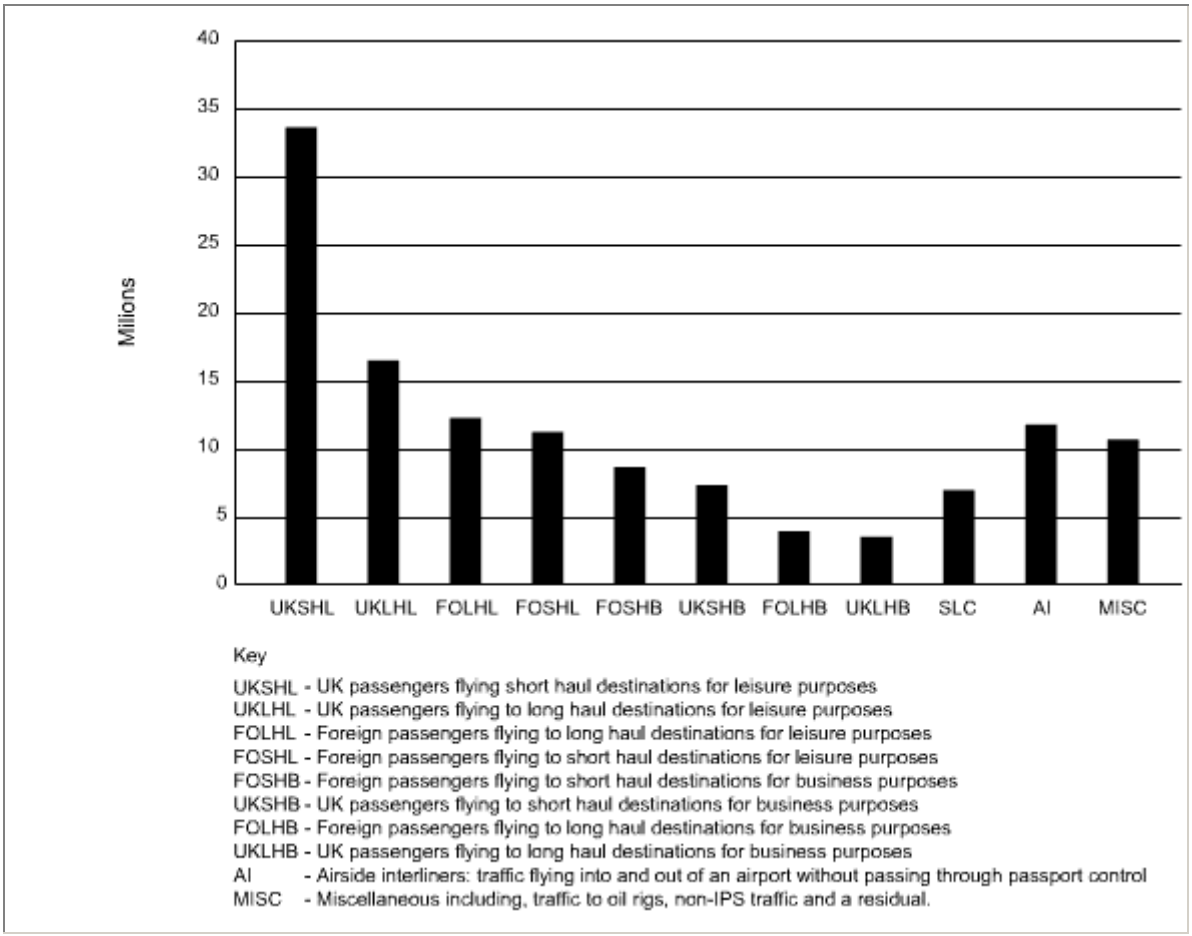


3.8 Figure 3.3 shows that trend growth has declined in every decade since the 1960s. Initiallyat nearly 14% per annum in the 1960s growth fell to 7.3% per annum in the 1970s andthen to 5.7% per annum in the 1980s. Excluding scheduled low cost traffic, trend growthhas been 5.0% per annum in the 1990s, a 0.7 percentage point fall on the trend growthrate from the previous decade. The same reduction is assumed in the central forecasts for1999-2010 with trend growth falling to 4.3% per annum. The high growth case, illustratedby the light coloured bar, assumes the same growth rate for 1999-2010 as was seen for1990-1998. This is the highest plausible upper bound as it is not envisaged that trendgrowth rates will rise in the future. For the second decade of the forecasts, 2010-2020,trend growth is assumed to fall to 3.8%, slightly less than the 0.7 percentage point declinein the previous decade, reflecting that the rate of decline is expected to slow.

CHAPTER 4
International Air Traffic

4.1 Figure 4.1 shows the composition of international traffic in 1998 disaggregated by businessand leisure trip purpose, UK and foreign residents, short haul (Western Europe) and LongHaul (everywhere else) destinations. Scheduled low cost traffic is also shown because it isassumed to be entirely short haul international traffic for the forecasts. These figures havebeen derived from the International Passenger Survey (IPS) and sum exactly to the totalof international traffic in the IPS survey (the domestic component of SLC passengers issubtracted from UK and foreign short haul passengers). Airside interliners, andmiscellaneous traffic categories which are not included in the IPS, are also shown toprovide a complete picture.

Figure 4.1: **International air traffic, 1998, by market segment (millions)**



4.2 As can be seen, the UK short haul market is by far the largest segment, accounting for39% of all international passengers, an increase on 35% in 1995. Trips for leisure purposesaccount for 76% of all traffic, compared with 68% in 1995, with business trips comprising24% of the total. The majority of trips, 65%, made in 1998 were to and from WesternEurope, up from 59% in 1995.

4.3 The major change in the composition of international traffic is the increase in theproportion of airside interliners to 11% of the total from 9% in 1995.

4.4 IPS international traffic is forecast to grow faster than total traffic at 4.6% per annum inthe period to 2020 under the central forecasts. Short haul traffic is expected to grow at4.5% per year over the same period, slightly less than the long haul growth rate of 5.0%over the period to 2020. Total figures for specific years are set out in Table 4.1 below.

Table 4.1: **Forecasts of international terminal passengers, 2005 to 2020 (millions)**

	Short Haul			Long Haul			Total		
Year	Low	Mid	High	Low	Mid	High	Low	Mid	High
2005	99.6	103.4	107.3	53.1	55.1	57.1	152.7	158.5	164.4
2010	115.1	123.7	133.0	64.5	69.3	74.5	179.6	193.0	207.5
2015	133.4	148.4	165.1	77.6	86.3	96.0	211.0	234.7	261.1
2020	155.0	178.2	204.9	92.0	105.8	121.7	247.0	284.0	326.6

4.5 Growth rates for leisure traffic by UK and foreign residents are presented in Table 4.2below. Leisure traffic is expected to grow slower than business traffic at 4.4% per annumover the period 1998 to 2020. Foreign leisure passenger numbers are forecast to grow fasterthan UK leisure passengers at 4.9% per annum and 4.1% per annum respectively over theperiod to 2020. This partly reflects higher economic growth rates for countries outsideWestern Europe.

Table 4.2: **Forecast growth in international leisure travel by residence ofpassengers average annual growth rates (%)**

	UK			Foreign			Total		
Year	Low	Mid	High	Low	Mid	High	Low	Mid	High
1998-2005	5.9	6.4	7.0	5.5	6.0	6.6	5.8	6.3	6.9
2006-2010	2.4	3.2	3.9	3.8	4.6	5.3	4.5	3.6	4.3
2011-2015	2.4	3.1	3.8	3.6	4.4	5.1	4.5	3.5	4.2
2016-2020	2.3	3.0	3.7	3.4	4.1	4.8	4.4	3.4	4.1

4.6 Growth rates for business traffic by UK and foreign residents are presented in Table 4.3below. Business traffic is forecast to grow at 5.5% per annum on average between 1998 and2020, over one percentage point per annum higher than the leisure traffic growth rate.This reflects that business markets are not expected to mature as quickly as leisure marketsover the forecasting period. This follows because leisure trips are constrained by theamount of leisure time available to individuals, which is thought to be increasing moreslowly than leisure air travel. This implies that over the forecasting period air travel forleisure purposes will reach a level at which it is limited to lower growth by a timeconstraint. There is, of course, scope for individuals to substitute several short breaks for alonger break taking the same amount of time. However, this trend is thought to becaptured in part by forecasting the scheduled low cost airline market which has helpeddrive the

increase in traffic in the short break market. Both foreign and UK business trafficare projected to grow at an average 5.5% per annum over the period 1998 to 2020.

Table 4.3: **Forecast growth in international business travel by residence ofpassengers average annual growth rates (%)**

	UK			**Foreign**			**Total**		
Year	Low	Mid	High	Low	Mid	High	Low	Mid	High
1998-2005	5.6	6.2	6.7	4.8	5.3	5.9	5.2	5.8	6.3
2006-2010	4.5	5.2	5.9	4.9	5.6	6.4	4.6	5.4	6.1
2011-2015	4.5	5.2	5.9	4.9	5.6	6.3	4.7	5.4	6.1
2016-2020	4.4	5.1	5.8	4.7	5.4	6.1	4.5	5.2	5.9

CHAPTER 5
Domestic Air T raffic

5.1 Domestic air traffic comprises flights between London and regional airports, between allUK airports and the Channel Islands and between regional airports. The forecasts areunconstrained, that is, they forecast demand before the impact of any major surface accessimprovements, such as the West Coast mainline upgrade. Forecasts of domestic traffic areshown in Table 5.1 below.

Table 5.1: **Forecast passenger numbers in the domestic market (millions)**

	London Regional			**Intra Regional**			**UK Channel Islands**			**Total**		
Year	Low	Mid	High	Low	Mid	High	Low	Mid	High	Low	Mid	High
1998		22.3			9.4			1.9			33.6	
2005	26.7	27.7	28.8	11.3	11.7	12.2	2.6	2.7	2.8	40.7	42.2	43.8
2010	30.5	32.8	35.3	13.3	14.3	15.3	2.9	3.2	3.4	46.7	50.2	54.0
2015	34.9	38.8	43.2	15.6	17.3	19.3	3.3	3.7	4.0	53.7	59.8	66.5
2020	39.8	45.8	52.7	18.3	20.1	24.1	3.6	4.2	4.8	61.7	71.0	81.6

Notes:
1. Domestic passengers are counted at the airports at both ends of the journey, with the exception offlights to the Channel Islands where passengers are only counted at mainland airports.
2. 1998 figures are actuals.
3. Totals may not sum due to rounding.

5.2 Domestic traffic over the forecast period is expected to grow on average by 3.5% perannum using the central scenario, or by 2.8% per annum in the low demand scenario and4.1% in the high demand scenario. In absolute terms, traffic is forecast to slightly morethan double from 33.6 million passengers in 1998 to 71 million passengers in 2020.Growth is lowest in the London Regional market segment at 3.3% per annum over theforecast period. This reflects that the London Regional market is the only domesticmarket that contains an adjustment for market maturity. Growth over the period to 2020is 3.5% per annum on average for Intra-Regional traffic and 3.7% per annum on averagefor traffic to the Channel Islands.

CHAPTER 6
Scheduled Low CostAirline Traffic

6.1 Scheduled low cost (SLC) airlines refer to the new operators such as Easy Jet and Go thathave established operations in the last few years. They offer a qualitatively different serviceto that provided by incumbent airlines, focusing on low fares and low service standardswith a largely undifferentiated product. They tend to operate from second choice airfields,that is airfields that are uncongested, which affords them the fast turn around times andlow airport charges on which their service depends.

6.2 The relatively new proliferation of (SLC) airlines and the consequently small amounts ofdata about them makes them difficult to model using the statistical regression techniquesthat have been used for the 19 international and domestic markets. Neither can theirbehaviour be approximated by the behaviour of other types of traffic because scheduledlow cost airlines are fundamentally different to both more traditional scheduled andcharter airlines.

6.3 To deal with these modelling difficulties a bottom-up approach based on the technicalrelationships in the industry was used, the precise methodology is set out in annex A.

6.4 The forecasts of SLC traffic are divided into business and leisure traffic although as aforecasting simplification they are all assumed to be UK passengers. The precise figures areset out in Table 6.1 below.

Table 6.1: **Forecasts of scheduled low cost airline traffic (millions)**

	Low			**Central**			**High**		
Year	Business	Leisure	Total	Business	Leisure	Total	Business	Leisure	Total
1998				1.7	5.2	7.0			
2000	2.7	8.0	10.6	2.7	8.1	10.8	2.3	6.8	9.1
2005	4.5	13.5	18.0	4.7	14.0	18.7	4.9	14.6	19.4
2010	5.0	15.0	20.0	5.4	16.1	21.5	5.8	17.3	23.1
2015	5.5	16.6	22.1	6.2	18.5	24.6	6.9	20.6	27.4
2020	6.1	18.4	24.5	7.0	21.1	28.2	8.1	24.3	32.4

6.5 Over the forecasting period total SLC airline traffic grows at 6.6% per annum on averagein the central scenario. This compares with 4.25% for annual average traffic growth ingeneral over the same period. SLC traffic is the fastest growing component of the forecastsbut this fast growth is mostly accounted for by an exceptionally rapid phase of growthbetween 1998 and 2005 of 15% per annum on average. This high growth reflects theintroduction of new routes whereas the slower growth rate after 2005 reflects more organicgrowth due to expansion of passenger numbers on existing routes.

CHAPTER 7
Sensitivity T ests

7.1 A number of sensitivity tests were carried out on the main forecasts to identify the impacton demand of changing key input variables. The range in which the Air Traffic Forecastsare presented, reflecting high and low growth demand scenarios, covers a number ofdifferent assumptions, primarily about GDP growth. This section looks more closely atspecific scenarios which alter the mid-point traffic forecasts. The results of these sensitivitytests are discussed below and summarised in Table 7.1.

Lowering medium term trend GDP growth

7.2 The UK economic growth assumptions for the years 1998 to 2020 are based upon theTreasurys long term forecasts of GDP growth. These forecasts, with some adjustments forthe cycle in the short term, reflect the long run trend that has characterised the post-warperiod.

7.3 The sensitivity test assumed that the long run average growth rate fell by 0.5 percentagepoints from 2.25% per annum to 1.75% per annum. The income elasticity used was 1.5.These assumptions reduced passenger growth by approximately 72 million passengers in2020 down to 329 million passengers, approximately 82% of the central growth scenariototal. The implied average annual growth rate under this sensitivity is 3.3% per annumcompared with 4.25% per annum in the central growth scenario.

Market maturity

7.4 A sensitivity test was carried out to assess the effects of greater or lesser market maturitythan assumed in the main forecasts. Market maturity should be reflected in a reduction inthe income elasticity of demand for air travel, that is, if GDP growth stays constant thegrowth rate of demand for air travel should fall. Two market maturity sensitivities weretested, an elasticity of demand of 2.0, which implies less market maturity, and an elasticityof demand of 1.0, which implies more market maturity. The growth rate of GDP wasassumed to be the same as that used in the central growth scenario, 2.25% per annum.

7.5 An elasticity of 1.0 produces a forecast of 351 million passengers in 2020. This is just88% of the total in the central growth scenario and implies an average annual growthrate of 3.6% per annum.

7.6 An elasticity of 2.0 produces a forecast of 451 million passengers in 2020, roughly12% more than the total in the central growth scenario, which implies a growth rateof 4.8% per annum on average.

Introduction of an aviation fuel tax

7.7 Aviation fuel is currently exempt from taxation because of international agreements underthe Chicago Convention not to tax fuel used for international air travel. However, thepossibility of removing that exemption has recently been discussed in a number of fora inresponse to concerns about the environmental impact of air travel, in particular thecontribution of emissions of carbon dioxide and oxides of nitrogen from aircraft to globalwarming.

7.8 The sensitivity assumed that an environmental tax of 10% was introduced in 2006 andthat this was increased by 10 percentage points every year for the next nine years until thetax were 100% of fuel costs in 2015. A number of simplifying assumptions were necessary:

- The fuel tax was introduced globally, in a way that did not affect the existing fuelprice differentials between countries, thereby eliminating the scope for leakagethrough increased tankering.
- All the increase in fuel prices was passed through to fares. In practice airlines mightabsorb some of the increase through lower margins, or increase business fares morethan leisure fares due to the generally lower fare elasticities for business passengers.

7.9 The price elasticity of demand for air travel used was 1.0, reflecting a lower elasticity forbusiness markets and a higher elasticity for leisure markets. Fuel costs were assumed toconstitute 10% of total airline costs. The effect of supply side responses such as theintroduction of more fuel efficient aircraft on the contribution of fuel costs to total costswere assumed to be limited between 2006 and 2020 because of the long operational livesof aircraft. The fuel tax was assumed to be phased in at 10% in 2006 followed by a 10percentage point increase in the fuel tax rate per annum for the next nine years. Thisraises airline costs, all other things equal, by 1% per annum.

7.10 This sensitivity test produces a forecast of 300 million passengers in 2015, approximately90% of the total in the central growth scenario. If the average annual growth rate between2015 and 2020 in the central growth scenario is then applied to this figure the forecast for2020 is 361 million passengers. This implies an average annual growth rate of 3.8%.

Higher and lower fares growth

7.11 In the central scenario fares are assumed to decline at 1% per annum over the the forecastperiod. This reflects a small reduction from trend once the effect of a changing mix intraffic has been stripped out. Two sensitivity tests were conducted with respect to fares:The first assumes a 1 percentage point increase in the central scenario annual growthrate such that fares remain constant over the forecast period; the second assumes a1 percentage point reduction in the central scenario growth rate such that fares decreaseat 2% per annum.

7.12 A fare elasticity of demand of 1.0 was assumed in line with the other sensitivity tests.The assumption of a 2% reduction in fares per annum over the 22 year period to 2020combined with a 1.0 fares elasticity increases demand by 20% or 80 million passengersby 2020. This gives a new forecast of 481 million in 2020 which implies a growth rateof 5.1%.

7.13 The assumption of a one percentage point increase in the central scenario growth rate isequivalent to assuming fares are constant between 1998 and 2020. This reduces demandrelative to the central scenario by 25 % or 100 million passengers. This gives a newforecast of 301 million passengers in 2020 implying an annual average growth rate of 2.9%.These changes are asymmetric because increasing the growth rate by 1% induces a largerpercentage change in fares than does decreasing the growth rate by 1%.

Increases in airport charges

7.11 The impact on demand of higher airport charges or introducing other taxes which affectairline costs was also considered. Airport charges represent a slightly greater proportion orairline costs than aviation fuel, between 10% and 18%. An average of 15% is assumed forthe sensitivity test.

Assuming airport charges are increased by 50% and all of this increasewas passed on to passengers through higher fares and a price elasticity of 1.0, theassociated reduction in demand would be 7.5%. In 2020 this is equivalent to 30 millionpassengers, reducing the total forecast to 371 million passengers. This implies an averageannual growth rate of 3.7%.

Exchange Rates

7.12 A sensitivity test for exchange rates has not been considered. This is based upon the two-wayeffect that exchange rates have on demand for air travel. An appreciation of the UKexchange rate against foreign currencies increases UK tourism overseas but reduces foreigntourism to the UK. For a depreciation of sterling the effects are simply reversed, with UKoverseas tourism being reduced and foreign tourism to the UK being increased. To someextent the two effects cancel one another out and for this reason a sensitivity test has notbeen conducted.

Table 7.1: **Results of the sensitivity tests**

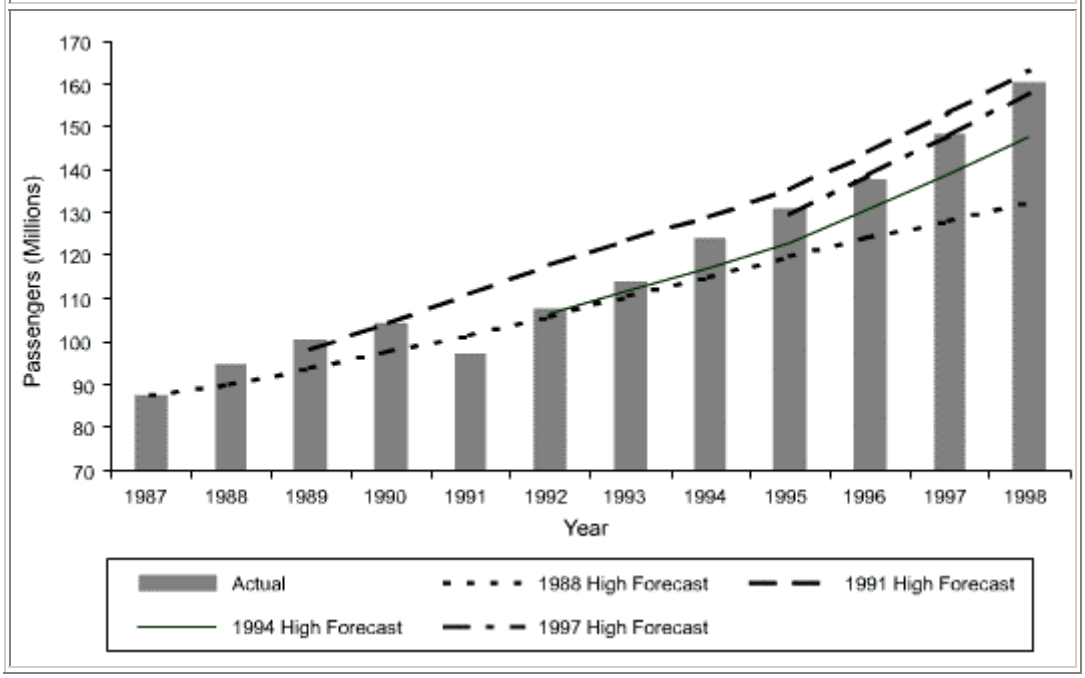
Sensitivity Test	**Mid-point traffic forecast in 2020 (million)**	**Percentage change (%) relative to central scenario**
Central Scenario	401	
Lower medium term GDP growth	333	17%
Greater market maturity 1.0 income elasticity	351	12%
Lesser market maturity 2.0 income elasticity	451	+ 12%
Environmental fuel tax	361	10%
A 1pp increase in fares growth per annum (0%)	301	25%
A 1pp decrease in fares growth per annum (2%)	481	+ 20%
Increase in airport charges	371	7.5%

CHAPTER 8
Performance of Past Forecasts

8.1 Figure 8.1 compares the performance of the upper bound of former DOT and DETRforecasts produced in 1988, 1991, 1994 and 1997 with the actual traffic for all UK airportsin those years. The base year, however, for each forecast is two years prior to thepublication date, reflecting the date of the latest available data at the time of producingthe forecast. The same data is set out in tabular form in Table 8.1. The forecasts areessentially long term forecasts of the trend in growth. Actual traffic may well deviate fromthem in any particular year due to the uncertainties in making accurate assumptions aboutshort term economic growth and other factors necessary to produce forecasts. This needs tobe borne in mind when making comparisons of actual and forecast growth overcomparatively short periods of time.

8.2 Past forecasts have proved to be cautious relative to actual outcomes. In the 1991 and1997 forecasts actual traffic has been close to the upper bound of the forecasts. Actualtraffic has consistently exceeded the upper bound of the 1994 forecast and theunderestimate of traffic in the 1988 forecast has grown over time.

Figure 8.1: **Comparison of actual UK airport passengers and upper bounds ofpast forecasts**



8.3 The past forecasts have performed in different ways relative to actual traffic. Actualpassenger numbers have fallen within the range of the 1991 forecasts with the exception of1991, the year of the Gulf War, in which traffic suffered a temporary downturn which wasrecovered in the following year.

8.4 The 1994 forecasts have been less accurate than the 1991 forecasts withh traffic exceeding the 1991 range in almost every year. There is, obviously, not much data on which to compare the

performance of the 1997 forecasts although it should be noted that actual traffic had exceeded the forecast range by 1998.

Table 8.1: **Comparison of actual UK airport passengers and past forecasts**

Year	Actual traffic	1988	1991	1994	1997
1987	**87.5**				
1988	**94.6**	89.791.3			
1989	**100.6**	93.597.0			
1990	**104.1**	97.5102.9	100.3104.3		
1991	**97.3**	101.6109.3	102.6110.9		
1992	**107.8**	105.9116.0	105.0118.0		
1993	**113.9**	110.4123.2	108.2123.4	107.9111.3	
1994	**123.9**	115.1130.8	111.6129.1	109.7116.8	
1995	**131.1**	120.0138.9	115.0135.0	111.6122.6	
1996	**137.5**	124.0146.6	118.9143.8	115.5130.4	134.1138.5
1997	**148.3**	128.1154.7	122.9153.1	119.6138.7	138.8148.0
1998	**160.2**	132.4163.2	127.0163.0	123.8147.5	143.7158.2

8.5 The forecasts of total air traffic are higher in the 2000 forecasts than they were in the 1997forecasts. Table 8.2 compares mid-point estimates for 2000, 2005, 2010 and 2015 for the1994, 1997 and 2000 forecasts.

Table 8.2: **Comparison of 1994, 1997 and 2000 Air Traffic Forecasts, mid-points(millions)**

Year	1994	1997	2000
1998	-	-	160
2000	150	168	181
2005	188	206	229
2010	232	253	276
2015	-	310	333
2020	-	-	401

Note: The 1998 figure is actual.

8.6 The average annual growth rates differ between the three forecasts with 4.4% per annumfor the 1994 forecasts, 4.2% per annum for the 1997 forecasts and 4.1% per annum for the2000 forecasts. This implies that the progressively higher forecasts for the end year reflecthigher base year traffic totals, rather than increasing growth rates.

ANNEX 1
Methodology

A1.1 This annex describes the data and methodology employed by the Department ofEnvironment, Transport and the Regions in the 2000 forecast of air traffic. The basicprocedure consists of regressing traffic on its determinants, such as GDP, prices, exchangerates and trade and to obtain the relationship between these variables. This relationship isthen used to obtain forecast values of air traffic by inserting assumed forecast values of theexplanatory variables.

Data Sources

A1.2 For the purpose of forecasting, air traffic is broken up into several markets cross-tabulatinglong and short haul travel, UK and foreign residency and business and leisure. The trafficdata for the international market sectors was obtained from the International PassengerSurvey (IPS) carried out by the Department of National Heritage. The IPS provides dataon tourist traffic at UK airports according to trip purpose, nationality and origin anddestination. This allows the forecast of traffic for individual market sectors which mayhave differing relationships with the explanatory variables. The data for the domesticmarket sectors was obtained from the CAA Annual Statistics.

A1.3 Non-tourist traffic such as diplomats and airline and military personnel are excluded fromthe IPS traffic figures, as are passengers to North Sea oil rigs and airside interliningpassengers. Growth rates are applied to the 1998 values of these air traffic categories(obtained from CAA Annual Statistics) to forecast total international traffic. A residualis then added to this total to ensure that the final figure is consistent with the CAAtotal figure.

A1.4 IPS tourist traffic data is split into different market sectors according to destination,nationality of traveller and purpose of visit. Sixteen international traffic forecasting modelsare estimated. Long haul destinations are subdivided into OECD countries not in WesternEurope (called OECD), newly industrialised South East Asian countries (called NICcountries) and developing countries (called LDC countries). This is appropriate becausethese markets are growing at differing rates and the relationships between the underlyingdrivers of air travel demand and air demand may also differ between markets.

A1.5 UK GDP, consumer expenditure and the Retail Price Index were taken from issues ofEconomic Trends. Overseas trade data was obtained from the Monthly review of ExternalTrade Statistics. Foreign GDP, exchange rates and foreign consumer price indices weretaken from IMF Annual Yearbooks of International Financial Statistics. Fares data wasobtained from the CAA and IPS yearbooks.

A1.6 Data on fares paid by air passengers from the IPS was used in estimating all UK residencymodels. This provides a more accurate reflection of the effect of fares on air travel, as usingpublished fares data is increasingly misleading due to the volume and variety of discountair fares on offer. This data is not as yet available for foreign passengers.

A1.7 For all sixteen international market sectors, indices were constructed for fares, exchangerates, foreign GDP and trade volumes using a weighting procedure, with the weightattached to a country depending on the traffic flow by type and trip purpose to / from thatcountry relative to the total traffic for that market.

A1.8 Economic analysis forms the basis of the forecasting equations used by the Department.

Econometric analysis and forecasting procedure

A1.9 Individual models were specified for each of the sixteen international markets and threedomestic sectors. The models included as explanatory variables the key determinants of airtraffic such as GDP, trade, air fares and exchange rates. All econometric analysis involvesjudgements on such issues as the functional form of the equations and the period overwhich relationships are to be estimated. These judgements were based upon economictheory and the statistical performance of the estimated models. By way of example, theoryconcerning air travel market maturity indicates that constant elasticity log-log models bestrepresent business markets while many leisure markets are consistent with decliningelasticities and exponential models. This follows because market maturity, which reducesthe elasticity between income and air travel demand, is more likely to be a feature ofleisure markets. This follows from the arguments set out in paragraph 2.10.

A1.10 All models were estimated in logs to help linearise the relationship between the dependantvariable and the explanatory variables. Differences are used to control for non-stationarityin the data. Non-stationarity, the presence of a stochastic trend, in the data weakens theresults of the OLS estimation procedures used in this study. Initial Dickey-Fuller tests forunit roots (non-stationarity) in the data were positive. To control for this the data wasdifferenced to remove the stochastic trend.

A1.11 Examples of the models used are given below. Equation (1) is a basic example of the log-logform of the model used to forecast business traffic. This functional form producesincome elasticities that are constant over time, implying that the market for air travel forbusiness purposes is not approaching saturation or maturity. While this is broadlyconsistent with past experience it was felt that there would be some decline in growthrates towards the end of the forecast period. This decline was allowed for by multiplyingthe forecasts by the ratio $(Pax_t/Pax_{1995})^{0.x}$ The size of the exponent in this term varieddepending on the degree of taper that was felt to be appropriate. This judgement was basedon economic theory and the forecasts of the estimated model.

$$(1)\ \Delta\ln(\mathrm{Pax})_t = \alpha_1 + \alpha_2\Delta\ln(Fares)_t + \alpha_3\Delta\ln(GDP)_t + \alpha_4\Delta\ln(Pax)_{t-1} + \alpha_5\Delta\ln(GDP)_{t-1} + \epsilon_t$$

Δ is the difference operator i.e. $\Delta\ln(Pax)_t = \ln(Pax)_t - \ln(Pax)_{t-1}$. This is done to removethe stochastic trend to make the variable stationary.

The long run solution to the above equation is given by:

$$\ln(Pax) = \frac{\alpha_1}{-\alpha_4} + \frac{\alpha_5}{-\alpha_4}\ln(GDP)$$

The long run (constant) income elasticity is given by $\frac{\alpha_5}{-\alpha_4}$

$\ln(Pax)_t$ = natural logarithm of passengers at UK airports by market segment in period t.

GDP_t = Gross Domestic Product

ε_t = error term in period t.

A1.12 Equation (2) is an example of an exponential transformation model incorporatingdeclining income elasticities (to reflect market maturity) that was used to estimate mostleisure markets. The exponent k determines the degree of decline of income elasticity. Thehigher the value of k the greater the decline in income elasticity over time and the moremature the market.

$$(2)\quad \Delta Pax_t^k = \beta_1 + \beta_2 \Delta \ln(GDP)_t + \beta_3 Pax_{t-1}^k + \beta_4 \ln(GDP)_{t-1} + \epsilon_t$$

The long run solution is given by: $$Pax^k = \frac{\beta_1}{-\beta_3} + \frac{\beta_4}{-\beta_3} \ln(GDP)$$

The long run declining income elasticity is given by $$\frac{\beta_4}{-\beta_3} \cdot \frac{1}{k \cdot Pax^k}$$

A1.13 All of the chosen determinants of air traffic were tried in the model for each market andomitted systematically if they proved insignificant.

A1.14 Dummy variables were used to control for outlying observations in the data. The dummyvariables used did not always coincide with an obvious international event but most couldbe explained by the oil price shocks, the bombing of Libya and the Gulf War.

A1.15 The models were estimated using OLS techniques and subjected to a range of tests forstatistical adequacy. These tests were the Jarque-Bera test for normality, the RamseyRESET test for structural form, the Lagrange multiplier test of residual serial correlationand a test for heteroskedasticity.

A1.16 Results were consistent with a priori assumptions about the market for air travel. GDP wasthe most important determinant of air traffic, trade was significant in some businessmarkets and exchange rates were significant in both leisure and business markets. Fareswere a significant determinant in fewer markets although this was almost certainly due tothe difficulties of obtaining a representative fares series. The long run income and priceelasticities implied by the estimated models were within the broad range of economictheory. Income elasticities were in a range from 0.4 to 0.8 and price elasticities wereapproximately 1.3 in leisure markets but 0.5 in business markets. This is consistent witheconomic theory as we would expect fares to be have a stronger effect on the decisions ofleisure travellers.

Miscellaneous

A1.17 The IPS air traffic data on which the 16 international and three domestic estimatedmarket models are based, excludes three categories of air traffic and a residual differencebetween CAA and IPS figures. The three categories are: North Sea oil rig traffic; airsideinterliners and non-tourist traffic, which includes military and airline personnel anddiplomats. These three categories and the residual are combined under the categorymiscellaneous. The assumptions for North Sea oil rig traffic were: no growth in the highscenario; 1.5% per annum decline between 1996 and 2001; 1.08% decline per annumbetween 2001 and 2006; and zero growth / decline between 2006 and 2015. These growthrates are based on estimates of employment in the oil sector prepared by Aberdeen CityCouncil and Aberdeenshire Council. Airside interliners were assumed to grow at the samerate as total foreign traffic. Non-tourist traffic and the residual term are assumed to stayconstant over the entire forecasts.

Domestic traffic

A1.18 Domestic traffic is divided into three market sectors: traffic between London and regionalairports, traffic between the regional airports and traffic to the Channel Islands. Theregression analysis and forecast procedure adopted followed that applied to theinternational markets, described above.

Scheduled low cost airlines

A1.19 Scheduled low cost (SLC) airlines refer to the relatively new no frills scheduled serviceoperators such as GO and EasyJet which have emerged over the last few years. These airlinesoffer a qualitatively different service to either charter operators or full service scheduledcarriers which has resulted in rapid growth in passenger volumes. The different nature ofSLC airlines product and the effect it has had on traffic growth is not easily modelledusing the econometric equations used to forecast more established markets. SLC passengergrowth is forecast based upon simple rules about the development of the key drivers in theSLC market, which are somewhat different to the drivers for the market in general.

A1.20 The methodology adopted uses the rule that very few SLC routes have been operated withfewer than 70K passengers per annum. This was assumed to incorporate both an abstractedelement of traffic (30%) and a generated portion of traffic (70%). The assumption of anabstracted portion of traffic on all routes is consistent with the methodology, whichassumes future SLC routes will only be on city-pairs already served by incumbent airlines.The assumption of 30% of traffic being abstracted from incumbent airlines implies thatonly routes with 100K passengers or more per annum can support an SLC airline and thatfor every 100K incumbent passengers a further 50K are generated after an SLC airlineenters the route. This calculation was applied to every route with 100K passengers or moreand the total additional traffic calculated.

A1.21 To produce a specific forecast of the generated traffic attributable to SLC airlines the totalof additional traffic was assumed to be phased in in equal amounts over the next sevenyears and to grow at the same rate as UK short haul scheduled leisure traffic thereafter.The SLC figures presented in the report also include the existing element of SLC trafficwhich is also assumed to grow at the same rate as UK short haul scheduled traffic.

Summary of differences between methodologies used in the 1997 and 2000 forecasts

A1.22 The econometric methodology employed by the Department in calculating the 2000 AirTraffic Forecasts is very similar to that used to calculate the 1997 forecasts.

A1.23 The availability of an extra three years data in the estimation of the models used toproduce the 2000 Air Traffic Forecasts inevitably results in different forecasting models tothose used for the 1997 forecasts. The models used in the 2000 air traffic forecasts are notthe same as those used in the 1997 forecasts but, nevertheless, model selection was basedon econometric and forecasting criteria.

A1.24 For estimation of forecasting models, total air traffic from UK airports is disaggregated intoindividual markets by destination region. For the 2000 Air Traffic Forecasts it was decidedto continue with the split of long haul traffic into OECD, NIC and Developing Countriesintroduced in the 1997 forecasts. This distinction remains relevant, especially in theaftermath of the South East Asian crisis.

ANNEX 2
Assumptions

A2.1 Assumptions about future economic growth rates, trade volumes, real exchange rates andair fares are required to produce the Air Traffic Forecasts. Assumptions are presented foreach explanatory variable used in the forecasting equations that generate the centralscenario.

A2.2 In order to reflect the inherent difficulties in forecasting demand it is important to build arange around the central forecast based upon differing assumptions about the underlyingvariables. The upper and lower bounds of the range are expressed as high demand andlow demand scenarios of air traffic. This chapter discusses the assumptions that underpinthe central scenario and the considerations required in constructing the forecast range.

Economic Growth

A2.3 GDP growth is a major determinant of the growth in demand for air travel with higherlevels of GDP and higher growth rates being associated with higher levels of, and growthin, demand for air travel. Table A2.1 reports the specific assumptions used in the centralgrowth scenario made for each geographical market.

Table A2.1: **Real GDP growth assumptions (% change p.a.)**

	UK	W Europe	OECD	NIC	LDC
1999	2.25	2.0	3.7	5.2	3.5
2000	2.5	2.7	2.6	5.1	4.8
2001	3.0	2.1	2.5	5.0	4.9
2002-15	2.25	2.1	2.7	5.0	4.9
2016-20	2.25	2.1	2.7	3.0	4.0

A2.4 The central assumptions for UK GDP growth are based on the central assumption in the1999 Budget Report which makes short term forecasts of a range of 2.25% to 2.75%growth in 2000 and 2.75% to 3.25% growth in 2001. (Page 6, 1999 Budget Report, HMT).After 2001, growth is assumed to return to trend, 2% to 2.25% per annum, until 2011 afterwhich growth is expected to be in the range 2.0% to 2.5%. (Page 88, 1999 Budget Report)Although the Budget Report forecasts a range for GDP growth, the air traffic forecasts usethe mid-point of this range, 2.25% per annum. UK consumer expenditure, used indomestic markets, is expected to grow in line with UK GDP over the long term.

A2.5 Assumptions about economic growth in Western Europe, Other OECD (excluding Korea),Newly Industrialised Asian Countries and Developing Countries are based on the May1999 IMF World Economic Outlook. The specific assumptions are detailed below.

Western Europe Short haul markets use the IMF growth assumptions for EuropeanUnion countries for 1999, 2% growth and for 2000, 2.7% growth. After this the averagegrowth rate in the 1990s for the EU, 2.1% per annum, is assumed to apply over the next20 years.

OECD OECD markets use the IMF projections for Major industrial countries for 1999,2.6% growth, and 2000, 2.5% growth, and then the OECD average for the 1990s, 2.7%per annum, is assumed to apply for the next 20 years.

NIC The assumptions for NIC markets are the IMF projections for Newly IndustrialisedAsian economies for 1999, 5.2% growth, and 2000, 5.1% growth, then the NIC averagefor the 1990s reduced slightly to 5% per annum is assumed to apply for the next fifteenyears, and then reduced even more for the following 5 years to 3% per annum.

LDC The IMF projections for developing countries for 1999, 3.5% growth, and 2000,4.8% growth, form the growth assumptions for developing countries. Growth of 4.9% perannum is assumed until 2015, with 4% per annum growth assumed between 2016 and2030.

Trade Volumes

A2.6 The growth rates used for the trade volumes in the central growth scenario are set out intable A2.2 below. The assumptions about trade growth are based on IMF World EconomicOutlook assumptions of trade and GDP growth and the Treasury assumptions of UK GDPgrowth. In most cases trade growth is assumed to be faster than GDP growth in the shortterm but the growth rates converge over time such that the proportion of GDP accountedfor by trade stabilises. The same growth rates are applied to exports and imports to reflectthat, in the long run, exports and imports are not likely to display different trends.

A2.7 The trade variables are not important in all of the business markets and therefore havelittle independent effect over the forecast range. The high growth scenario reflects ahigher growth in trade volumes in line with the higher growth in GDP assumed in thatscenario and the low growth scenario assumes a lower growth in trade volumes in line withthe lower growth in GDP assumed in that scenario.

Table A2.2: **Visible trade growth assumptions (% change p.a.)**

	UK	**W Europe**	**OECD**	**NIC**	**LDC**
1999	4.25	4.25	3.0	3.0	3.0
2000	4.5	4.5	2.75	6.2	2.75
2001	4.0	2.75	2.75	6.0	2.75
2002-15	2.25	2.75	2.75	6.0	2.75
2016-20	2.25	2.75	2.75	3.0	2.75

Exchange Rates

A2.8 Exchange rates have a conflicting influence on the overall volume of air travel. A realappreciation of sterling will lower the cost to UK residents of travelling abroad, stimulatingdemand, but at the same time raising the costs to foreign residents visiting the

UK,reducing demand. In aggregate the relationship between exchange rates and the demandfor air travel should be positive, that is an appreciating pound should be associated withincreasing air travel overall. This holds because far fewer foreign residents fly to and fromthe UK than British residents. This means that, say, an appreciation of sterling has agreater effect in increasing travel by UK residents than it does on decreasing travel byforeign residents.

A2.9 Given the particular uncertainty in forecasting the path of exchange rates, the central caseof the forecasts assumes that real effective exchange rates maintain their current values.

A2.10 The high and low scenarios, which do not make explicit assumptions, can be thought of asreflecting that combination of GDP and exchange rates that generates higher growth ratesoverall in the high scenario and that combination that generates lower growth overall inthe low scenario.

Air fares

A2.11 The key factors considered in choosing the air fare assumptions for the 2000 forecasts areaviation fuel prices, aircraft technology, competition and deregulation.

A2.12 **Aviation fuel prices** The price of oil is assumed to stabilise around its current value of $25a barrel, although in the longer term it may decline. As fuel is approximately 10% of costseven a 50% change in the price of oil has a modest effect on air fares but nevertheless asignificant one compared to other drivers.

A2.13 **Aircraft technology** With the exception of very large aircraft and developments inregional jets, it is assumed there will be no major step changes in aircraft technology whichreduce operating costs. The impact of regional jets is assumed to be captured in theforecasts as they are already being used on some routes and therefore the increment togrowth due to the qualitative impact of regional jets is, at least in part, in the dataunderlying the forecasting assumptions. To fully reflect the stimulus to growth thatregional jets may have, including their lower operating costs, it is necessary to takeaccount of the downward pressure they will have on fares. This, in aggregate, is likely to bea small effect compared with other influences, such as the price of oil or environmentalmeasures. Very large aircraft are likely to operate only on a limited number of long haulroutes and are therefore ignored. Overall, there is expected to be little downward pressureon fares from technology advances as there has been in the past. This means there couldbe some divergence from the historic rate at which fares have reduced over the last twentyor thirty years, of about 2% per annum in real terms.

A2.14 **Competition and deregulation** The market is assumed to become increasingly deregulatedand competitive. In particular, alliances and open skies are assumed to have a long termeffect in putting downward pressure on fares.

A2.15 The air traffic forecasts assume that in the central case fares decrease by 1 percent perannum between 1999 and 2020. This is a divergence from the historic trend of 2% perannum which has been partly driven by a changing mix of traffic types, so that theunderlying trend, due to structural factors, is probably nearer to 1.5%. Technologyimprovements have also driven this trend and given the assumption of only smalltechnological advances in the aviation industry over the forecast period the trend growthhas been assumed to 1%.

A2.16 One possible consequence of scheduled low cost airlines is a potential convergence of faresand standards across the whole market for short haul scheduled flights. This would changethe

forecasts, particularly for later years through the fares assumption and the forecasts ofscheduled low cost airlines. The effect of more rapidly declining fares is considered as asensitivity test in Chapter 7.

Forecast Ranges

A2.17 The forecast range reflects a high growth scenario and a low growth scenario which areintended to handle the inherent uncertainties that surround the specific assumptions madefor the central growth scenarios. The high growth scenarios can be thought of as reflectinga consistent set of circumstances that generate higher growth and the low scenario asimilarly consistent set of circumstances generating low growth. The difficulties of definingprecisely and quantitatively a consistent set of assumptions for either scenario has led to achoice of a 15% adjustment to the central scenario to create both the low and the highscenarios.

A2.18 One way of interpreting the forecast range is to ask what difference the chosen rangewould imply in the underlying explanatory variables. The high scenario is broadlyequivalent to an increase in GDP growth of 0.4 percentage points per annum using thesame assumptions as used in the central scenario for the other explanatory variables and anincome elasticity of 1.5. The low scenario is similar to a reduction in GDP growth by 0.4percentage points per annum with the other explanatory variables following their centralscenario assumptions.

ANNEX 3
Summary of 2000Air Traffic Forecasts

(Million passengers)													
	1998	**2005**			**2010**			**2015**			**2020**		
	Base	**Low**	**Mid**	**High**	**Low**	**Mid**	**High**	**Low**	**Mid**	**High**	**Low**	**Mid**	**High**
INTERNATIONAL													
UK Leisure													
Short Haul	33.6	47.1	48.8	50.7	52.1	56.1	60.3	57.8	64.3	71.5	64.0	73.6	84.6
All long haul	16.5	21.9	22.8	23.6	26.0	28.0	30.1	30.4	33.8	37.7	35.2	40.5	46.6
OECD	7.7	11.7	12.1	12.5	14.6	15.7	16.8	17.9	19.9	22.1	21.6	24.8	28.5
NIC	1.3	1.9	2.0	2.1	2.3	2.5	2.7	2.7	3.0	3.3	3.0	3.5	4.0
LDC	7.5	8.4	8.7	9.0	9.1	9.8	10.6	9.9	11.0	12.3	10.6	12.2	14.0
UK Business													
Short Haul	7.3	8.6	9.0	9.3	10.9	11.7	12.6	13.8	15.3	17.0	17.3	19.9	22.9
All long haul	3.6	5.4	5.6	5.8	7.1	7.7	8.2	9.4	10.4	11.6	12.2	14.1	16.2
OECD	1.8	2.3	2.3	2.4	2.8	3.0	3.2	3.5	3.8	4.3	4.3	4.9	5.6
NIC	0.4	0.9	0.9	0.9	1.3	1.4	1.5	1.9	2.1	2.4	2.6	3.0	3.5
LDC	1.4	2.2	2.3	4.9	3.0	3.2	5.8	4.0	4.5	6.9	5.3	6.1	8.1
Foreign Leisure													
Short Haul	11.3	14.5	15.0	15.6	18.0	19.3	20.8	22.3	24.9	27.6	27.7	31.9	36.7
All long haul	12.3	19.7	20.4	21.2	23.3	25.0	26.9	27.0	30.0	33.4	30.7	35.3	40.6
OECD	7.9	13.1	13.6	14.1	15.9	17.1	18.3	18.8	20.9	23.3	22.1	25.4	29.2
NIC	0.7	1.2	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.9	1.7	1.9	2.2
LDC	3.7	5.4	5.6	5.8	6.0	6.4	6.9	6.6	7.4	8.2	7.0	8.0	9.2
Foreign Business													

Short Haul	8.7	11.4	11.8	12.3	14.1	15.1	16.3	17.4	19.3	21.5	21.4	24.6	28.3
All long haul	3.9	6.1	6.3	6.5	8.1	8.7	9.3	10.7	11.9	13.3	13.9	16.0	18.4
OECD	2.3	3.5	3.6	3.7	4.4	4.7	5.1	5.5	6.1	6.7	6.7	7.7	8.9
NIC	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.0	0.9	1.1	1.2
LDC	1.4	2.2	2.3	2.4	3.1	3.4	3.6	4.5	5.0	5.6	6.2	7.2	8.2
Misc.	21.2	27.1	28.1	29.2	30.5	32.8	35.3	34.8	38.7	43.1	39.7	45.7	52.6
Low Cost Airlines	6.9	18.0	18.7	19.4	20.0	21.5	23.1	22.1	24.6	27.4	24.5	28.2	32.4
Total International	125	180	187	194	210	226	243	246	273	304	287	330	379
DOMESTIC													
Intra-Regional	9.4	11.3	11.7	12.2	13.3	14.3	15.3	15.6	17.3	19.3	18.3	20.1	24.1
London-Regional	22.3	26.7	27.7	28.8	30.5	32.8	35.3	34.9	38.8	43.2	39.8	45.8	52.7
Channel Islands	1.9	2.6	2.7	2.8	2.9	3.2	3.4	3.3	3.6	4.0	3.6	4.2	4.8
Total Domestic	33.6	40.7	42.2	43.8	46.7	50.2	54.0	53.7	59.8	66.5	61.7	71.0	81.6
GRAND TOTAL	**160**	**221**	**229**	**237**	**257**	**276**	**297**	**299**	**333**	**371**	**348**	**401**	**461**

Notes: 1998 figures are actuals. Column totals may not sum due to rounding. Low cost airline figures include bothdomestic and international traffic. Figures for total international traffic include additional generated domesticpassengers on low cost airlines.

Annual Growth Rates	Actual 19881998	Forecast 19982010	Forecast 20102020

Low		4.0 %	3.1 %
Mid	5.4 %	4.6 %	3.8 %
High		5.3 %	4.5 %

Notes: Figures show the average annual growth rate needed over the given period to achieve the forecast values. Allgrowth rates assume either low, mid or high values throughout