Effect Of Tax On Demand For UK Air Travel

The Airports Commission did not consider evidence about aviation's massive tax exemptions for reasons that can be readily surmised. However, tax exemptions are crucial because they affect demand and hence the 'need' for expansion.

Air travel benefits from massive tax exemptions, in particular tax-free fuel. If aircraft fuel were taxed at the same rate as petrol, this would bring in about £10 billion pa to the Exchequer (see appendix). This under-taxation in comparison with other sectors of the economy leads to artificially low prices which generate extra demand. The extra demand in turn leads to a perceived 'need' for more capacity.

If there was a tax on aircraft fuel at the same rate as petrol, demand at 2030 would be 43 million passengers per annum (mppa) fewer than without tax. Yet a new runway at Heathrow would only lead to 17 mppa extra passengers with the current tax regime. So under-taxation is much more significant in determining air traffic than a new runway at Heathrow (or anywhere else).

With a tax on aircraft fuel at the same rate as petrol, a new runway would make virtually no difference to traffic – just 2 mppa.

See appendix for explanation of how these results were calculated and a table summarising the results.

Because demand is being generated by tax exemptions and because a new runway would barely lead to any more traffic if aviation did pay its taxes, it is hard to see what real economic benefit a new runway would have.

It is reasonable to conclude that the case for a third runway is predicated on the basis of massive and continuing tax exemptions.

Appendix

The Airports Commission (AC) forecasts of July are the most up-to-date and definitive forecasts, produced by staff which included many seconded from the DfT.[i] A series of scenarios were run, each making different assumptions about global, European and UK aviation growth. One scenario was chosen finally as the basis for the economic benefit calculations and the final AC recommendations, this scenario being "assessment of need".

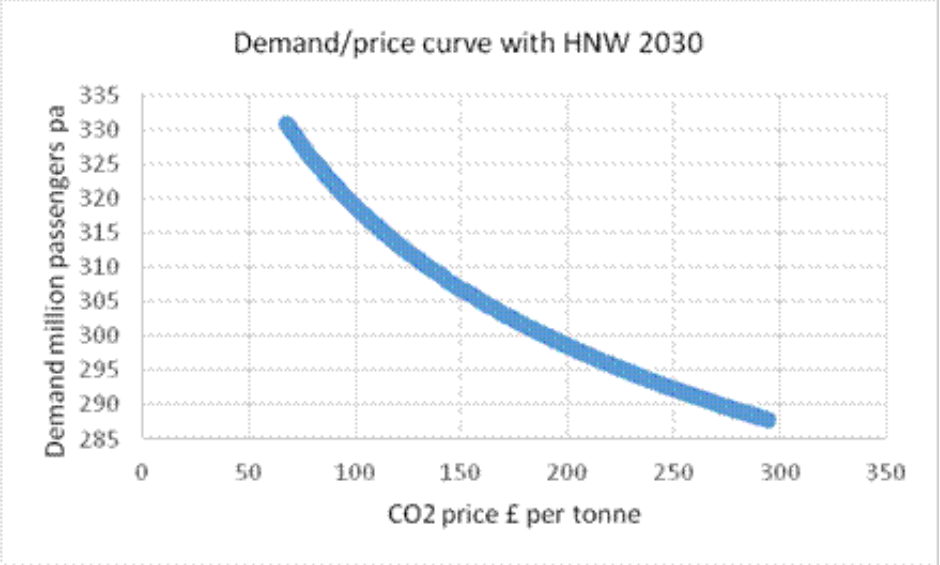
Tables 5.5 and 6.15 are forecasts for a "carbon traded" (CT) scenario while Tables 5.6 and 6.16 are for a "carbon capped" (CC) scenario. CC is where carbon emissions are constrained in order to meet the UK's climate commitments. The allowed emissions are based on advice from the government's Committee on Climate Change (CCC). CT is where there is no constraint on carbon emissions.

In order to derive the CT and CC forecasts, AC assumed a price of carbon which would be included in air fares. For CT, a price was provided by DECC (Department of Energy and Climate Change) which is the price at which carbon permits would need to be traded in a global system to achieve the target of no more than 2° C increase by 2050. However, this leads to carbon emissions much higher than those recommended by CCC for aviation in order for the UK to achieve its emissions target. A new price for carbon was therefore derived such that demand and therefore carbon emissions were reduced to that recommended by CCC, namely CC. (Demand is reduced because a higher cost of carbon in incorporated in air fares.)

By calculating demand with two different price assumptions AC has, in effect, derived an 'elasticity of demand'. (For more on elasticity of demand, see standard economics textbooks). More specifically, it is a

carbon price elasticity of demand. This is not published in the report, but can be derived from the demand forecasts.

With a pair of figures CC and CT for a particular case, eg 2030 with a new north-west runway at Heathrow (HNW), an elasticity of demand can be calculated.[ii] Using this elasticity, a curve may be plotted, enabling the demand to be read off for any price of carbon (CO2). See example below.



A tax on fuel can be converted, without too much difficulty, to a price of carbon. The UK duty on petrol in the UK is 57.95 pence per litre and there is also VAT at 20% on the total price (including duty). The minimum price of petrol (as at 16/8/16) is about 105p per litre, meaning VAT is about 17.5p per litre. Added to duty, the total tax is 75.45p per litre.

From a web search it is ascertained that one litre of kerosene (jet aircraft fuel) emits 2.554 kg of CO2 when burnt.[iii] If the tax is 75.45p per litre, this is equivalent to 75.45/2.554 = 29.54p per kg CO2. That is 29.54 x 1000 = 29,540 p per tonne CO2 or £295.

Once a tax in terms of pence per litre had been converted to tax in terms of tonnes per kg of CO2, the demand for any chosen tax can simply be read off the appropriate price/demand curve (There are different curves for DM and HNW and for 2030 and 2050.)

The table below shows alternative demand figures, depending on the cost of CO2. (A figure of £294 per tonne has been used, not £25). References to tables and figures are to the AC forecasts, footnote [i].

	Demand CT [Price of CO2 £ per tonne]	Demand CC [Price of CO2 £ per tonne]	Demand with tax of £294 per tonne of carbon	Effect of tax on demand compared with CT	Effect of HNW compared to DM - with CT	Effect of HNW compared to DM - with tax
2030 Do Min	313.5 (Table 5.5) [£68, Fig 4.1]	303.1 (Table 5.6) [£116, Fig 4.1]	285.9	-27.6		
2030 With R3	330.9 (Table 6.15) [£68, Fig 4.1]	295.8 (Table 6.16) [£221, Fig A5.2]	287.9	-43.0	+17.4	+2.0
2050	410.5		391.5	-19.0		

Do Min	(Table 5.5) [£196, Fig 4.1]	385.7 (Table 5.6) [£334, Fig 4.1]				
2050 With R3	435.4 (Table 6.15) [£196, Fig 4.1]	368.9 (Table 6.16) [£634, Fig A5.2)	411.2	-24.2	+24.9	+19.7

Do Min" = 'Do Minimum' ie no new runways. ()
"With R3" = with a new northwest runway at Heathrow. (In diagram annotated as "HNW".)
CT = carbon traded
CC = carbon capped

The tax forgone, due to non-taxing of aircraft fuel, can be readily be calculated from the foregoing. The latest figures published by DECC in ' Provisional UK greenhouse gas emissions national statistics 2014' show 34.4 million tonnes of CO2 were emitted by aircraft attributable to the UK. If a tax were applied to aircraft fuel at the same rate per litre as petrol, this is equivalent to a charge of £295 per tonne of CO2. 34.4 million tonnes at £295 per tonne is £10.1 billion pa.

These calculations consider only CO2 emissions. But emissions at altitude of nitrogen oxides (NOx) and water vapour are also potent greenhouse gases. It is estimated that including these gases would add a further 60% to the greenhouse effects of CO2 alone [iv] and it could thus be argued that a larger tax should be applied than on petrol.

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[i] Airports Commission. 'Strategic fit; forecasts', July 2015 at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/439687/strategic-fit-updated-forecasts.pdf

[ii] This was done by iteration. Starting at the CC price and demand, a spot value of elasticity was picked and the price progressively increased in £1 units to give resultant demand at the CC price of carbon. When this gave the wrong CC demand (ie not the AC forecast), the elasticity was altered and process repeated until a fit was obtained. This, then, is the elasticity of demand implied by AC. In order to derive the elasticity it has been assumed that the elasticity is constant, ie it does not very with the price itself. This is the default assumption when using elasticities of demand.

[iii] http://www.icbe.com/carbondatabase/volumeconverter.asp (Other references give minor differences.)

[iv] See 'Government airbrushes aviation's non-CO2 greenhouse gas emissions', Airport Watch, June 2015. http://www.airportwatch.org.uk/wp-content/uploads/AirportWatch_Briefing_on_RF__19.6.2015.pdf