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Estimate of the Impact on Emissions of a Reduction in Air Departure Tax in Scotland

2017 update

Introduction

This paper updates and extends the assessment published by Transport Scotland in 2014[1] which estimated the initial one-year greenhouse gas emissions impact from a 50% reduction in UK Air Passenger Duty (APD)[2].

The methodological approach adopted for the analysis outlined in this paper is broadly the same as that used in 2014.

The analysis outlined here provides an extended estimate of the emissions impact beyond the first year of a 50% reduction in Air Departure Tax (ADT) (2018), through to 2021, by forecasting passenger demand. In assigning passengers to tax bands, it takes into account the increasing proportions of international flights relative to domestic flights, in particular long haul flights. It also takes account of the aircraft fleet becoming more efficient over time as older planes are withdrawn from service and replaced with newer ones.

Data Sources

The data sources for emissions and passenger data remain as per the previous paper, but more up to date data on emissions up to 2015 and passenger numbers (2015) have been used.

The latest Department for Transport (DfT) aviation forecasts, including elasticities, remain as set out in their 2013 paper. Scottish passenger numbers for the period 2018-2021 were projected using the latest outturn data (2015) and the underlying growth forecast for Scottish passenger numbers in the DfT aviation forecasts (2013).

Airline ticket price estimates in each band and rate of the tax[3] were made using a flight price comparison site and a data set compiled by RDC Aviation (not publicly available).

Passenger numbers

Passenger data for 2015 was sorted by destination country, and then apportioned to a tax band using the schedule of destination countries published by HMRC of the existing APD. Table 1 below sets out the latest totals and shares of return journeys numbers for UK domestic (Band A) flights, short haul international (Band A) flights, and long haul international (Band B) flights. It is assumed that all passengers were travelling on return journeys, and hence total passenger numbers in terminals in

[1] See https://www.transport.gov.scot/media/31954/j340458.pdf
[2] The 2014 paper refers to the Air Passenger Duty (APD) which is the tax currently charged by the UK Government on flights from UK airports. Air Departure Tax (ADT) is the tax which is expected to replace APD for flights from Scottish airport from 1st April 2018.
[3] Further information on the APD bands and rates can be found at: https://www.gov.uk/government/publications/excise-notice-550-air-passenger-duty/excise-notice-550-air-passenger-duty

Scotland by destination were divided by two to approximate the number of return journeys in each.

Table 1: Numbers and share of return journeys from Scotland airports by tax band and destination (2015)

Band	Return Journeys (000's)	Proportionate Share
A Domestic	6,705.6	52.5%
A International	5,387.3	42.2%
B International	673.6	5.3%
Total	**12,766.5**	**100%**

The projected growth in return journeys is based on the DfT forecasts for UK aviation which contain a set of forecasts for key Scottish airports[4], which account for 95% of current passengers. The average annual growth rate across Scotland as a whole over the period 2016-2032 is estimated at around 1.9%, and this growth rate is applied to the 2015 outturn passenger numbers to create a projection of total passenger numbers for 2018-2021. The proportion figures take account of the growing share of international flights, and in particular long haul flights.

By examining commonly used aircraft for flights in each band, approximations were made of the proportion of seats on board in the lowest class, in which passengers pay the reduced rate, and other classes, in which passengers pay the standard rate. The assumptions made were applied to each band in Table 1, and the split in return journeys between destinations and bands is set out in Table 2.

Table 2: Distribution of return journeys by destination, band and taxation rate (2018-2021)

Destination	Tax Rate and Band		Tax Rate Share	Return Journeys by year 000's			
				2018	2019	2020	2021
Domestic	A	Reduced	100%	6,967.6	7103.3	7,241.7	7,382.9
		Standard	0%	0	0	0	0
International	A	Reduced	95%	5,541.8	5,649.8	5,759.9	5,872.2
		Standard	5%	291.7	297.4	303.2	309.1
International	B	Reduced	90%	653.8	666.5	679.5	692.7
		Standard	10%	72.6	74.1	75.5	77.0
TOTAL				13,527.5	13,791.1	14,059.8	14,333.8

[4] The key airports are Aberdeen, Edinburgh, Glasgow, Inverness, and Prestwick.

Ticket Prices

The average ticket prices of return flights within each band and rate are shown in Table 3[5]. The latest DfT aviation forecasts of real ticket prices out to 2050[6] are used to project these prices forward. The DfT forecast suggests that real airline ticket prices will, on average, remain flat in the near term, so the price estimates generated for 2015 are used in the calculation and out to 2021. The prices for each rate and band were examined with consideration towards the most popular destinations in each band. The prices used were similar to those used in the 2014 analysis at the reduced rate.

Table 3: Average return journey ticket price (2016/17) to selected destinations by tax band and rate.

Destination and Band	Ticket Price for Reduced Rate	Ticket Price for Standard Rate
Domestic Band A	£120	£200
International Band A	£160	£350
International Band B	£410	£810

ADT Rates

As in the 2014 analysis, it is assumed that ADT is implemented immediately at 50% of the current APD equivalent rates from 2018, and remains at that level in absolute cash terms until 2021.

Both APD and ADT apportion banding based on final destination instead of domestic or international status. It is worth noting that all Band A flights have the same rate regardless of whether they are domestic or international. This analysis assumes that ADT retains the same banding structure currently in place for APD, but notes that, at the date of the publication of this analysis (26 June 2017), the Scottish Government has yet to make a final determination of the banding structure under ADT.

Table 4 outlines the current (2017) APD rate, and the assumed ADT rate (50% of current APD)from April 2018.

[5] Ticket price data was obtained from the RDC Aviation tool (for flights in 2016) and from Skyscanner for International Band B flights to be taken in September 2017.
[6] See annex C4 in the DfT UK Aviation forecasts (2013) https://www.gov.uk/government/publications/uk-aviation-forecasts-2013

Table 4: Current APD rates (2017) and new ADT rates from 2018

Band	Reduced Rate		Standard Rate	
	APD (2017)	ADT (2018)	APD (2017)	ADT (2018)
A	£13.00	£6.50	£26.00	£13.00
B	£75.00	£37.50	£150.00	£75.00

Emissions

Using the most up to date emissions data from 2015 and the number of return journeys in that year, emissions per return journey for each type of flight have been estimated. These are shown in Table 5, disaggregated by domestic and international.

Table 5: Emissions ($MtCO_2e$) per return journey 2015

Destination	No. of Return Journeys (000s) 2015	Aviation Emissions ($MtCO_2e$) 2015	Emissions per return journey (tCO_2e) 2015
Domestic	6,705.6	0.512	0.076
International	6,060.9	1.315	0.217
Total	**12,766.5**	**1.827**	

The emissions per journey figures are subsequently adjusted to take account of recent industry performance, where there is evidence that improved aircraft efficiency should reduce emissions by 0.8% per annum[7]. This small percentage reduction is applied to the 2015 emissions per journey figure and each year thereafter to 2021.

Assumptions

This analysis has assumed that airlines pass the tax cut on to their passengers in full by lowering prices, so the proportional change in price is the absolute reduction in tax over the return journey price. With the relevant elasticity and ticket price this change in price results in a change in demand in each category. This percentage change is then applied to the relevant baseline passenger estimate to calculate the increase in journeys in each year within each category of demand. The increase in domestic and international journeys is multiplied by the appropriate journey emissions per return journey.

[7] https://www.transport.gov.scot/media/10168/j202258.pdf

Table 6 shows that, based on the number of return journeys in 2015, a 50% reduction in ADT would increase the number of return journeys by 420,700.

Table 6: Additional Return Journeys following a reduction in ADT (based on 2015 return journeys figures)

Band	Destination	ADT Rate	Elasticity	% Change in Price	% Change in Journeys Demanded	Additional Return Journeys (000's) (2015)
A	Domestic	Reduced	-0.7	-5.4%	3.8%	254.3
		Standard	-0.3	-6.5%	2.0%	0
A	International	Reduced	-0.7	-4.1%	2.8%	145.5
		Standard	-0.3	-3.7%	1.1%	3.0
B	International	Reduced	-0.3	-9.1%	2.7%	16.6
		Standard	-0.2	-9.3%	1.9%	1.2
Total						420.7

Consideration is also given in the analysis to switching. This is the potential for passengers in the north of England to switch to Scottish airports to take advantage of the lower air fares in Scotland compared to England, assuming that APD in the rest of the UK is not reduced when ADT is introduced in Scotland. Table 7a shows the additional passenger numbers from a 50% reduction in ADT, excluding switching.

Table 7a: Additional Return Journeys from a reduction in ADT (excluding switching) (2018-2021) (000's)

	Band	2018	2019	2020	2021
A	Domestic	264.19	269.33	274.58	279.93
A	International	160.85	163.98	167.18	170.43
B	International	19.28	19.66	20.04	20.43
	TOTAL	444.32	452.97	461.80	470.80

Estimates of the number of additional passenger numbers associated with switching are based on research conducted by HMRC (2012). This shows that reducing APD in Scotland by 50% might lead to between 200,000 to 300,000 terminal passengers [8]switching from airports in Northern England to Glasgow and Edinburgh. The net maximum and minimum change passengers from Scottish airports published in the research is adjusted to take account of the projection out to 2021. The trips are distributed in proportion to the baseline distribution of destinations and rate of ADT. Table 7b presents additional return journeys from a reduction in ADT including switching.

[8] It is assumed that these passenger will depart and arrive back at the same terminal, and so are classified as return journeys.

Table 7b: Additional Return Journeys from a reduction in ADT (including switching) (2018-2021) (000's)

	Band	**2018**		**2019**		**2020**		**2021**	
		Min	Max	Min	Max	Min	Max	Min	Max
A	Domestic	367.2	418.7	374.4	426.9	381.7	435.2	389.1	443.7
A	International	247.1	290.2	251.9	295.9	256.8	301.6	261.8	307.5
B	International	30.0	35.4	30.6	36.1	31.2	36.8	31.8	37.5
	TOTAL	**644.3**	**744.3**	**656.9**	**758.8**	**669.7**	**773.6**	**682.7**	**788.7**

Aviation Emissions Estimates

Using the set of assumptions outlined above, the potential impact on aviation emissions from a 50% reduction in ADT has been calculated for years 2018 to 2021 (see Table 8). The estimated net growth in emissions (including the effects of passenger switching) range from between 0.087 and 0.101 $MtCO_2e$ in 2018 to between 0.090 and 0.105 Mt CO_2e in 2021.

Table 8: Estimated Net Growth in Emissions (range) 2018-2021

Net Growth in Emissions (kilotonnes CO_2e)	**2018**		**2019**		**2020**		**2021**	
Excluding switching	58.5		59.1		59.8		60.5	
With Switching	Min	Max	Min	Max	Min	Max	Min	Max
TOTAL	87.0	101.3	88.0	102.4	89.0	103.6	90.0	104.8

Conclusions

This paper updates a previous publication from 2014 which examined the single year change in greenhouse gas emissions of a 50% reduction in APD in Scotland. The latest input data on passenger numbers and emissions have been used and the analysis methodology has been extended. The main change is to take account of the impact of a tax reduction over a four year period from the proposed introduction date of ADT (2018 – 2021)[9]. In addition, some further adjustment factors have been introduced to take account of the growing proportion of international flights relative to domestic flights (and, of those international flights, long haul flights in particular), and to account for improving aircraft efficiency over time.

The previously published analysis concluded that the initial impact of a 50% cut in the tax would increase single passenger numbers by 742,000, or 371,000 return journeys. This was estimated to increase greenhouse gas emissions by 0.034

[9] This covers the four year period from 1st January 2018 to 31st December 2021.

$MtCO_2e$. The latest analysis estimates an increase in return journeys of between 644,300 and 744,300 in the year of introduction (2018), which is estimated to increase annual greenhouse gas emissions by between 0.087 $MtCO_2e$ and 0.101 $MtCO_2e$, which is a marked increase on the previous analysis.

The reason for the difference is that the proportional increase in demand as a result of the tax reduction is larger in absolute terms (i.e. a greater number of return flights) than in the previous analysis. This is because the baseline passenger figures are notably higher. Assuming that such growth will continue, it is estimated that by 2021 annual greenhouse gas emissions will increase by between 0.090 $MtCO_2e$ and 0.105 $MtCO_2e$.

TRANSPORT
SCOTLAND
CÒMHDHAIL ALBA

Transport Scotland
Finance, Corporate and Analytical Services
Buchanan House, 58 Port Dundas Road,
Glasgow G4 0HF
info@transport.gov.scot

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