ESTIMATE OF THE IMPACT ON EMISSIONS OF A REDUCTION IN AIR PASSENGER DUTY IN SCOTLAND

Background

1. Air Passenger Duty (APD) was introduced on UK flights in 1994 in a simple two-band structure. It was only in 2007 though that APD rates began to increase significantly with a four band APD structure introduced in 2009 in an attempt to take better account of the impact different flight lengths had on emissions. These bands were based on the distance between London and its equivalent capital in the destination country. Further APD rate increases were introduced in 2010, 2012, 2013 and 2014. A full breakdown of the history and rates of APD charged in the UK is shown in Annex A.

2. The Scottish Government made a commitment in Parliament to publish an estimate of the impact that a reduction in APD would have on emissions. This note fulfils that commitment by reporting the likely impact from a 50% reduction in APD alongside the methodology used to generate the estimate.

Data requirements, data availability and assumptions

Data requirements

3. Transport Scotland does not possess models capable of producing an estimate of the impact on emissions from altering APD. This calculation is built instead on published price elasticities and data available from a range of sources. These data include APD bands and rates, demand price elasticities, ticket prices by destinations, passenger numbers by broad destination and aviation emission estimates. Unfortunately these data are not all framed in terms of current APD bands so require some manipulation.

4. The realities of the aviation market also create a number of complications, particularly in relation to data on ticket types and prices. Air travel is not a single homogenous commodity but instead a series of interconnected overlapping markets and prices with different ticket classes, APD rates and travel purposes. Having multiple markets and products makes interpreting the available data more complex as well as introducing greater uncertainty into the analysis and results. This issue is discussed in more detail below.

Air Passenger Duty

5. Charged on most UK flights from 1994, since 2001 there has been a differentiation by price in respect of the class of ticket. If the entire flight is a single class, usually economy, then all tickets are charged APD at the reduced rate. Any tickets purchased for a higher cabin class – business or first are charged at an increased rate. A further higher APD class was introduced from 2013. The vast majority of tickets sold in the UK (90% or more) are charged at the reduced rate of APD.

Aviation price elasticities

6. Research suggests that the most inelastic, i.e. least price sensitive, trips are long haul business journeys followed by longer haul leisure trips. Short haul leisure travel – both domestic and international - tends to be the most elastic. Focusing in on the UK aviation market, DfT publishes estimates of price elasticity of demand for flights from the UK. These elasticities vary by travel purpose (broken down into business and leisure) and by destination (separated into short haul or long haul or level of economic development). The most recent DfT estimates were published as part of *UK Aviation Forecasts* in January 2013.

7. Table 1 below sets out the elasticity estimates used in this analysis. These elasticity values cannot be directly read from the 2013 DfT paper (the paper does not break down elasticities by APD band) so an explanation of how they were created from the DfT work is shown in Annex B.

Table 1: Estimates of price elasticity of demand for domestic and international flights, by purpose and APD band

	Price elasticity of demand
Domestic (leisure) – Band A	-0.7
Domestic (business) – Band A	-0.3
International (leisure) - Band A	-0.7
International (business) - Band A	-0.3
International (leisure) - Band B,C,D	-0.3
International (business) - Band B,C,D	-0.2

Source: own estimates from DfT analysis

8. No regional breakdown of the UK aviation market is provided within the DfT analysis. The similarities between Scottish and UK travellers and the numbers of airlines that fly within and to UK destinations might strongly suggest however that the Scottish price elasticities of demand for the different journey types will be similar to those for the UK as a whole. Ticket prices to international destinations are also likely to be very similar from airports within the UK, with the possible exception of the more southerly European destinations where flying from Scotland takes considerably longer relative to the time taken from airports in southern England.

Ticket classification and travel purpose

9. The definition of ‘business’ differs between ticket category and trip purpose. A ‘business’ airline ticket is used to distinguish the on-board service rather than purpose of trip. Thus leisure travellers can and do fly on a ‘business class’ ticket. Equally, people travelling for business often qualify for the ‘reduced’ APD rate because there is only one class ticket on the flight (which attracts the reduced rate of APD) or their company chooses not to pay for a business or first class airline ticket. For this assessment the distinction made was by ticket class rather than the purpose of trip. This ticket class difference can be identified in the APD data published by HMRC.

UK passenger numbers and destinations

10. The Civil Aviation Authority (CAA) count of passengers arriving or departing the UK by airport and destination allows for a passenger breakdown for Scotland as well as for the UK as a whole, by APD Band. Table 2 sets out this disaggregated data.

Table 2 Breakdown of passenger destination by APD Band, UK and Scotland and total passenger numbers, 2013[1]

	UK	Scotland
	%	%
Band A – *domestic (UK)*	16.9	52.0
Band A - *international*	61.5	43.7
Band B	15.1	4.2
Band C	5.5	0.2
Band D	1.3	-
Total passengers (millions)	228	23.3

Source: CAA and own calculations

11. The most obvious difference between the UK and Scottish data sets is the proportion of domestic flights under each heading. For the UK as a whole they account for one sixth of trips whereas in Scotland domestic trips account for over half of all trips. Otherwise, Band C and D accounts for 6.8% of all UK flights but only 0.2% from Scotland, all of which are in Band C.

'Typical' airline ticket prices, currently and in 2009[2]

12. Due to the highly developed, competitive and atomised nature of the UK air market (multiple class of seats and prices, large number of airlines, airports and destinations along with seasonal variations in ticket prices) there is no readily available public information source providing 'average' current airline ticket prices by destination, or any equivalent price in previous years.

13. The ticket price estimates quoted in this analysis are therefore internal estimates based on popular destinations from the UK and Scotland using passenger destinations and numbers as a guide to this choice[3]. Prices were estimated using an available price comparison site that recorded average monthly prices to the destination in question. Each monthly estimate provided was a point price figure and the yearly average provided is likely a straight un-weighted mean. This simple approach will hide the variance in ticket prices between airlines, destinations and time of year (modern airline ticket pricing systems allow prices to vary by ticket within a single flight giving potentially millions of data points for each route). Clearly using the available data without access to the primary

[1] A return trip to London from Glasgow would count two passengers at Glasgow airport, once on departure and once on arrival.
[2] 2009 has been chosen as the earlier year as it marks the introduction of the 4-band APD approach to APD in the UK.
[3] CAA

information creates uncertainty in the analysis, but there are no readily available alternatives.

14. From these current price estimates an equivalent earlier estimate can be produced by deflating the current ticket prices using the UK sub category CPI index for air passenger transport. This is a single index so again it is necessary to apply a simplifying assumption that all ticket prices for all types of tickets and destinations have changed in line with this CPI estimate. According to the CPI series the cost of air travel has risen by just over 31% since 2009. The price estimates for both 2013 and 2009 are set out in the table below[4]. Annex C contains a link to the websites used along with the sources for other key data.

Table 3 Estimated average return air fare by APD band by destination, 2013 and 2009 (reduced APD rate)

	2013	2009
Band A domestic (London- Scotland)	£120	£91
Band A international (Malaga)	£150	£118
Band B (Newark, New York)	£400	£305
Band C (Mexico)	£600	£458
Band D (Australia)	£800	£611

Source: own estimates based on CAA destination data, CPI and available price information

15. Each of these data sources has been developed independently and for different purposes. As such there is not a common factor linking them all together to enable direct comparisons[5]. However APD financial returns to HMRC[6] show the overwhelming majority of all UK seats (90% plus) are charged the reduced rate of APD and surveys from the CAA show that, particularly for airports outside the London hubs the vast majority of trips are for leisure purposes – either holidays or visiting friends and family. The skewed nature of this distribution (and hence ticket prices) enables the main focus of the impact analysis to fall on one cabin class of prices and one purpose for travel.

Aviation Emissions

16. Aviation emissions are published as part of the UK emissions inventory. They are published in aggregate for the UK, and separately for Scotland. Aviation emissions can be disaggregated between domestic aviation (take off/landing, cruise and military) and international aviation (single category). This is a sufficient level of disaggregation for this analysis. Table 4 sets out the latest UK

[4] These are popular airport destinations for Scottish passengers with the exception of Australia where there are no direct flights from Scotland. Australia is though a popular UK Band D destination. Prices are estimates averaged across a recent 12 month period. These are generated internally using available month by month price data from the source quoted in Annex C, and are rounded to the nearest £5. They are weighted to account for a small proportion of tickets sold that attract the standard rate of APD on Band B and above.

[5] For example, business or first class tickets are available to both business and leisure passengers and while this category is differentiated in APD rates reason for travel is not separately identified as a sub category of ticket purchase. Band A APD covers both domestic and international destinations

[6] HMRC APD Returns 2014

and Scottish aviation emissions information having stripped out military aviation emissions.

Table 4: UK and Scottish Aviation Emissions $MtCO_2e$ and emissions per passenger

UK	2010	2011	2012	Emissions per passenger[7]
Domestic Cruise	1.171	1.118	1.077	0.08 tCO_2e
Domestic Take-off and Landing	0.455	0.434	0.407	
International	31.63	33.17	32.27	0.25 tCO_2e
Scotland				
Domestic Cruise	0.329	0.325	0.319	0.01 tCO_2e
Domestic Take-off and Landing	0.106	0.103	0.101	
International	0.984	1.074	1.050	0.10 tCO_2e

Source NAEI and own calculations

17. Splitting passenger numbers between domestic and international flights can then generate an emissions per passenger figure for domestic and international flights and this estimate is shown in the final column of Table 4. While this is a simple approximation of the impact on emissions following an incremental change in ticket prices[8] it is a reasonable methodology to use when exploring aggregate impacts.

Estimated impact of 50% reduction in APD on Scottish passenger numbers and emissions

18. With all of the data now expressed in some form of APD banding it is possible to carry out a static analysis of the impact of reducing APD across each passenger category to generate an estimate of the likely change in passenger numbers by travel purpose and APD band. Bands B, C and D have been combined in the analysis and the ticket prices weighted by the proportion of passengers travelling to each band.

Methodology and results

19. Table 5 shows that applying a 50% reduction in APD in Scotland cuts the return ticket price by between 3.7% and 8.8% and increases passenger numbers by an estimated 742,000 – a rise of over 3%. Of these additional passengers, 724,000 or 98% are travelling on the reduced APD rate band and when combined with the information on journey purpose suggests that the majority of these additional

[7] The emissions per passenger figures should be seen as indicative rather than exact due to the uncertainties surrounding the use and allocation of aviation fuel between different flights and UK countries. This figure is also an internal calculation.

[8] The marginal impact of an additional passenger on an already scheduled flight will be significantly less than the average emissions figure for the flight as a whole, plus a change in demand might lead to a new flight to a new destination. Where this happens emissions will be 'stepped', driven by increases or decreases the number of flights.

passengers are travelling for leisure purposes. Internal UK travel makes up 446,000 or 60% of this total increase in passenger numbers.

20. Assuming a linear average relationship between passengers and emissions (total domestic/international emissions divided by total number of domestic/international passengers) suggests the reduction in APD could increase aggregate emissions by 34 $KtCO_2e$ (0.034 $MtCO_2e$) over the course of a full year. This represents an increase in transport emissions of just over 0.25% over the current total. The vast majority of the increase in emissions comes from international passenger trips to or from Band A countries travelling at a reduced rate of APD.

Table 5: Estimated impact of a 50% reduction in APD from Scottish airports on ticket prices, passenger numbers and emissions.

	Return Ticket (est.)	APD (from 2015)	50% reduction in APD	Reduction in ticket price	Increase in passenger numbers	Increase in emissions ($MtCO_2e$)
Band A domestic (reduced)	£120	£13	£6.50	-5.4%	434,000	0.0035
Band A domestic (standard)	£200	£26	£13.00	-6.5%	12,000	0.0001
Band A international (reduced)	£150	£13	£6.50	-4.3%	266,000	0.0275
Band A international (standard)	£350	£13	£13.00	-3.7%	5,000	0.0005
Band B, C, D (reduced)	£410	£71	£35.50	-8.7%	23,000	0.0024
Band B, C, D (standard)	£810	£142	£71.00	-8.8%	1,000	0.0001
Total					742,000	0.0341

Ticket Price Sensitivities

21. With the large number of assumptions necessary to create this estimate it is appropriate to carry out some sensitivity analysis around the ticket price charged. If ticket prices are 10% lower than the above price estimates the forecast increase in emissions relative to the situation without the reduction in APD rises to 38 $KtCO_2e$. Ticket prices 10% above the levels suggested above reduces the forecast emissions increase relative to the base position to 31 $KtCO_2e$.

Discussion: alternative assessments of the impact of APD on emissions

UK 2009 APD Impact Assessment

22. While not undertaken on the same proposition as is being analysed here, an APD Impact Assessment (IA) carried out by DfT analysts in 2009 can be used to 'benchmark' this assessment of the impact of the 50% reduction in APD in Scotland.

23. The DfT work assessed the impact of the change to the APD scheme announced in the 2009 UK budget statement. This change was a complex one in that the assessment had to consider the impact of moving from two to four APD bands as well as raising the rate of tax for each band in the following year. The IA estimated that the changes to the scheme and the increase in APD would reduce UK annual aviation emissions by 0.6MtCO_{2e} in 2011-12, relative to where emissions would otherwise have been. No more detailed workings were published alongside this overall impact assessment, nor was the assessment broken down by the four countries of the UK.

24. A straight pro rata by population of this 2009 UK DfT estimate suggests the APD increase announced in 2009 reduced Scottish emissions by 0.05 MtCO_2e. Basing the impact instead on the split in aviation emissions between Scotland and the UK, and adjusting the ticket prices shown for 2009 in Table 3 for the APD change, increases domestic ticket prices by 2% international ticket prices by 6% and reduces Scottish emissions by 0.026 MtCO_2e.

25. The work in this paper suggests a 50% reduction in APD in Scotland *reduces* current domestic ticket price by 5%, international prices by 4% and together this generates an estimated *increase* in emissions of 0.034 MtCO_2e. A slightly larger percentage price reduction produces a slightly larger increase in emissions.

26. Applying the static methodology developed in this paper to the 2009 UK APD change generates an emissions reduction estimate for the UK as a whole of 0.61 MtCO_2e and a fall in passenger numbers of around 3.4 million or 1.7%. This result is very similar to the 0.6MtCO_2e reduction estimate from the DfT model. This provides some confidence that the estimated impact generated in this paper of a 50% cut in APD in Scotland is reasonable.

Passenger switching

27. On top of the increase in demand from Scottish residents in response to the fall in airline ticket prices there is also potential for passengers in the north of England who currently use Newcastle and Manchester (as well as some Scottish residents who do likewise) to switch to Scottish airports to take advantage of the lower air fares. This assumes of course that the airports provide the same routes and flight timings are similar.

28. Without a fully integrated passenger demand model it is not possible to completely account for the extent of passenger switching. An earlier HMRC paper did however look at the impact of an APD cut in Scotland and suggested that reducing APD in Scotland by 50% might lead to up to 300,000 passengers switching from airports in Northern England (principally Newcastle and Manchester) to Glasgow and Edinburgh.

29. Using this figure and a similar distribution of passenger destinations to the national Scottish picture suggests that this switching impact might add a further 0.017 MtCO_2e to the overall impact calculated above. In reality this estimate is likely to be an underestimate because passengers flying domestically from the north to the south of the UK (e.g. Newcastle to Gatwick or Manchester to

Heathrow) would be unlikely to travel too far in the opposite direction to a different airport to catch a cheaper flight as this increases their overall travel time. In reality proportionately more of the 'switchers' are likely to be travelling further afield than the Scottish average. As international aviation flights have a significantly higher per passenger emissions estimate than domestic travellers the emissions estimate from switching may be low. Using a split more in keeping with this outcome[9] generates a higher estimate of the increase in emissions of 0.025MtCO_2e.

30. This additional impact on Scottish emissions does of course rely on the price differential between the airports remaining. Were this price difference to erode (either through the cutting of ticket prices or a similar reduction in APD for northern English airports) then this additional emissions impact from switching would not materialise.

Additional destinations

31. One other consequence of a reduction in APD might be the start-up of additional destinations from Scottish airports. This analysis takes no account of this possibility. Should there be an extension of the route network to destinations in Band C and beyond, particularly for charter flights, then this would add to the total impact on emissions.

Conclusions

32. Reducing APD on flights departing from Scotland is likely to lead to relatively lower airline ticket prices and a particularly marked increase in demand for short haul leisure seats. The impact is estimated to lead to an additional 742,000 seats being sold, most of which attract the reduced rate of APD. These extra trips are forecast to generate an increase in emissions of around 0.034 MtCO_2e. While different air fares can and will affect passenger numbers and emissions, the sensitivity analysis carried out suggests the estimated impact on emissions will not change markedly either way from this point estimate.

33. Adding in the potential of passengers switching from northerly English airports to Scottish airports in response to lower air fares from Scottish airports, (estimated by HMRC to possibly be up to 300,000) raises the emissions impact estimate to between 0.05 MtCO_2e to 0.06 MtCO_2e.

34. The estimates generated in this paper should be seen in the context of the uncertainties within the available data. The data were produced for other purposes and adjustments and assumptions have had to be made. That said, benchmarking the results of this analysis against the earlier DfT analysis suggests that the estimate, including the switching effect, is of the right order of magnitude.

[9] Rather than the 50:50 split in Scottish passenger destinations the split used is 80:20 in favour of international travel

Table 6: Summary of estimated annual impact on Scottish passenger numbers and emissions following a 50% reduction in APD

	Passengers	$MtCO_2e$
Impact of 50% reduction in APD (central estimate)	742,000	0.034
Impact on central estimate if ticket price is 10% higher than central estimate	-67,000	-0.003
Impact on central estimate if ticket price is 10% lower than central estimate	+82,000	+0.004
Impact from switching	Up to 300,000	0.017 to 0.025
Total impact under central estimate and with switching	Up to 1,042,000	0.05 to 0.06

Transport Analytical Services
Transport Scotland
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Annex A

Evolution of and changes to UK Air Passenger Duty 1994 - 2015

Introduced in 1994 APD rates were initially differentiated by whether the destination was within or outside the then European Economic Area (EEA). At that time the EEA consisted of the European Community member states – 12 countries - and the 7 members of the European Free Trade Association. As the European Union expanded so member states were included in the EEA.

In 2001 the APD exemption applying to a return leg of a domestic flight was removed, the rates were increased for all destinations and new standard and reduced rates of duty were introduced as shown in Table A1 below. The standard rate was applied to any higher class of ticket than the lowest class on that flight. It took almost a further six years for the rates of APD to be increased again.

In 2009 a four destination band structure was introduced based on geographical distance from London to the capital of the destination country. The four bands are defined as follows:

Band A 0 – 2,000 miles
Band B 2,001 – 4,000 miles
Band C 4,001 – 6,000 miles
Band D over 6,000 miles

The complete history of APD charges is set out in table A1 below.

All domestic and European flights fall within Band A, along with some North African (e.g. Libya) and near Asian countries west of the Urals such as Belarus and Ukraine. Band B covers North America, stretches to Central Africa and to the Middle East. China, India and South Africa are in Band C. For a full country by country breakdown by APD band see the HMRC website.

APD Proposal and Banding

In considering the picture for Scotland, it has been assumed that the same 'capital to capital distance forms the basis of the banding and that the other details of the scheme remain as formulated under the current UK policy. Further, it is assumed that there is no change in banding for any destination when measured from Edinburgh rather than London.

Table A1: Rates of APD since 1994

Date of Change	Lower Rate	Higher Rate
01/11/1994	5.00	10.00
01/11/1997	10.00	20.00

The lower rate applied to domestic passengers and passengers travelling within the European Economic Area and closely connected destinations
All other destinations attracted the higher rate

	EEA		Non EEA	
	Reduced Rate	Standard Rate	Reduced Rate	Standard Rate
01/04/2001	5.00	10.00	20.00	40.00
01/02/2007	10.00	20.00	40.00	80.00

	Band A			Band B			Band C			Band D		
	Reduced Rate	Standard Rate	Higher Rate	Reduced Rate	Standard Rate	Higher Rate	Reduced Rate	Standard Rate	Higher Rate	Reduced Rate	Standard Rate	Higher Rate
01/11/2009	11.00	22.00		45.00	90.00		50.00	100.00		55.00	110.00	
01/11/2010	12.00	24.00		60.00	120.00		75.00	150.00		85.00	170.00	
01/04/2012	13.00	26.00		65.00	130.00		81.00	162.00		92.00	184.00	
01/04/2013	13.00	26.00	52.00	67.00	134.00	268.00	83.00	166.00	332.00	94.00	188.00	376.00
01/04/2014	13.00	26.00	52.00	69.00	138.00	276.00	85.00	170.00	340.00	97.00	194.00	388.00
01/04/2015	13.00	26.00	52.00	71.00	142.00	284.00	71.00	142.00	284.00	71.00	142.00	284.00

Annex B

Price Elasticity of Demand

The most disaggregated price elasticity of demand data found was at the UK level, and the latest available estimates were published in the January 2013 DfT publication of UK aviation forecasts[10].

Table B1: Long run price and income elasticities of UK air passenger demand

Sector	2008 share of passenger traffic	Sector PED	Market PED	Sector YED	Market YED
UBW	6%	-0.3	-0.2	1.3	1.2
UBO	1%	0.0		1.0	
UBN	0%	0.0		1.0	
UBL	1%	0.0		1.0	
ULW	33%	-0.7	-0.7	1.3	1.4
ULO	5%	-0.3		1.3	
ULN	1%	-0.6		1.6	
ULL	6%	-0.9		1.9	
FBW	5%	-0.2	-0.2	1.1	1.0
FBO	1%	-0.2		0.6	
FBN	0%	0.0		0.8	
FBL	1%	0.0		0.7	
FLW	10%	-0.8	-0.6	1.2	1.0
FLO	3%	-0.3		0.5	
FLN	0%	-0.2		0.5	
FLL	1%	-0.3		0.5	
DMB	7%	-0.3	-0.5	1.0	1.7
DML	8%	-0.7		1.5	
I to I	10%	-0.7	-0.7	0.5	0.5
Overall	100%		-0.6		1.3

This publication provides a breakdown of elasticities for both price and income, by different trip purpose and length. In this particular analysis the only concern is the price elasticity of demand (PED) and further still, only UK passenger demand. In the table above this demand is prefixed with a 'U' for international trips and 'DM' for domestic flights and these are highlighted in brown.

[10] UK Aviation forecasts

The other categories in the sectors are as follows:

‘B’ - business
‘L’ - leisure
‘W’ - Western Europe
‘O’ - OECD countries except those in Western Europe
‘N’ - newly industrialised countries
‘L’ - Less Developed Countries

UBO covers UK based passengers travelling on business to OECD countries, ULW UK passengers travelling on leisure to western European countries and DML are UK passengers flying within the UK for leisure purposes.

As the analysis required in this paper needs these categories mapped onto the UK APD bands several adjustments are needed.

For domestic flights, both leisure and business flights map directly across to Band A domestic leisure and Band A domestic business. For Band A international, the assumption made is that this category is made up of group UBW and ULW. All of these categories would fall into the short haul category. As most of the remaining flights from Scotland in bands B and C are to North America UBO and ULO are used for all bands beyond A.

Taking this approach leads to the following elasticities and categories for use in the analysis

Table B2: Elasticities based on trip purpose and APD banding

	Price Elasticity of demand
Domestic (leisure)	-0.7
Domestic (business)	-0.3
International (leisure) - Band A	-0.7
International (business) - Band A	-0.3
International (leisure) - Band B,C,D	-0.3
International (business) - Band B,C,D	-0.2

Annex C

Aviation data sources

Data	Source	Comments
Aviation Price Elasticity of Demand	Elasticities	UK aviation forecasts paper (January 2013). Categories used shown in the DfT paper Table A25
UK Passenger Numbers and Destination	CAA HMRC	CAA data is available, by destination. This can be mapped onto HMRC APD Bands
Scottish Passenger Numbers and Destination	STS	CAA data for Scotland is published in Scottish Transport Statistics
Ticket Prices 2009	CPI	There is no available 2009 price data so it has been deflated using the CPIH Table 25 Index L54F
Ticket Prices 2013	Prices	Estimate of average annual return price for 1 adult to popular destinations from the UK.
Aviation Emissions	GHG emissions	Taken from the National Inventory database

Price Elasticity of Demand

There are numerous ways to generate price elastic of demand values. Often these take a grouping approach such as European, North American, EU or OECD over a country specific set of estimates. Further disaggregation into leisure or business travel or domestic, short or long haul often doesn't get included at this regional level either. Instead the focus is on an overall price elasticity of demand.

At individual country level analysis this further disaggregation is often present and this is the case with the UK data. The most frequent and comprehensive assessments come from the DfT, with the latest estimates published in January 2013.

UK and Scottish Passenger Numbers

The Civil Aviation Authority provides annual data on passenger numbers broken down by UK airport and destination airport and country. As it is possible to directly map the HMRC APD banding directly across to the country level and airport level data from the CAA it is possible to bring the two datasets together and produce a passenger breakdown by APD band for both the UK and specifically for Scotland.

Airline Ticket Prices

There is no independent publicly available data source for airline ticket prices. That said, there are many price comparison sites so information is available and

collectable, albeit it is not possible to be certain about the accuracy and completeness of the data contained within these searches, or the validity of all of the prices quoted. The comparison site used in this analysis provides a monthly average price over a calendar year from which internal analysis has estimated an annual average and the price of a business class ticket relative to this average standard class ticket price. This average ticket price is likely to be un-weighted but the paper carries out some sensitivity analysis around the point average price for each destination in order test the importance of price to the overall outcome.

No data source could be found for 2009 prices so the only possibility available was to deflate the 2013 price. Rather than use the broad measure of CPI the analysis instead uses the sub category 7.3 Transport Services and within that *Passenger Transported by Air.* This shows that over the last four years prices have increased by 31%. The analysis assumes that this increase takes account of the change in APD as part of this overall change in price recorded in the CPI index.

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