

Agenda

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Per-plane or per-passenger tax? Economics of the aviation policy debate

The new UK government is considering replacing the existing Air Passenger Duty with a per-plane tax. What impact would such a change have on different types of flight, and particularly regional flights? What are the likely effects of a per-plane tax on regional economies?

Changes to Air Passenger Duty (APD) were a feature of the UK government parties' manifestos, and of the coalition agreement.¹ These documents indicated that the main policy objective of any reform of APD would be to reduce CO₂ emissions, with the option to generate additional tax revenue for the Exchequer. Changes to APD were anticipated in the coalition government's Emergency Budget of June 22nd, but the Chancellor of the Exchequer postponed any immediate change, stating that the government would instead 'explore changes to the aviation tax system, including switching from a per passenger to a per plane duty'.²

The basic rationale for a tax such as APD can be located in the economics of environmental taxation, which suggests that levying a tax on goods and services that have negative impacts on people other than the producer and consumer can provide a net benefit to society. By forcing the producer and/or consumer to bear the cost to society of CO₂ emissions and other externalities, such taxes can facilitate an outcome where the socially optimal amount of a good or service is produced and consumed. These taxes should be designed so that the cost (to the passengers) of the tax per unit of output (in this case, each flight) is equal to the societal per-unit cost of the external effects.

These types of consideration provide an important motivation for having a tax in the form of an air passenger duty. However, the precise structure of any such tax requires careful design and implementation, and its impacts on the aviation industry should also be considered. For example, a report published by Oxera in 2009 demonstrated that, by 2012, the combination of the APD, the EU Emissions Trading Scheme (EU ETS) and the Carbon Reduction Commitment (CRC) would outweigh the central estimate of environmental costs imposed by the aviation sector.³ Indeed, even in 2007, the tax contribution of the UK aviation sector amounted to 54.5% of the net wealth it generated (measured as

gross value added, GVA), compared with an average of 32.1% in the rest of the economy.

Moreover, in terms of generating additional tax revenue for the Exchequer, the same report estimated that—excluding APD as an environmental tax—UK aviation contributed approximately 32.5% of the net wealth it generated in tax. This is slightly higher than the average rate of tax in the economy as a whole, so any further increases in general taxation might be distortionary, reduce investment, have negative consequences for users, and more generally might not achieve desired policy objectives.

This article considers further the impacts of changes to APD on the aviation industry in this context.

Impact on the aviation industry of a uniform per-plane tax

The principle of moving towards a per-plane tax is economically sound: it is the flight of an aircraft that causes emissions, not the number of passengers travelling, and these emissions cause external costs that need to be reflected in taxation of the sector according to the 'polluter pays principle'. However, several practical issues need to be considered in the design of any APD replacement, not least the need to accurately reflect the relevant environmental costs and, in particular, the cost of carbon per flight.

A per-plane tax could be structured in a number of ways: it could be a uniform rate, where the same tax is charged regardless of aircraft size; or a graduated rate, where the tax charged is based on maximum take-off weight, emissions, number of seats, or some other factor.

Economic reasoning suggests that a *uniform* per-plane tax would fail to meet the policy objective of reducing emissions. Since this form of tax charges the same

This article is based on analysis carried out by Oxera for regional airline carrier, Flybe.

amount regardless of the route or aircraft type, it would have the greatest impact on passengers on short-distance routes for which smaller aircraft are used more intensively. Here, the tax would represent a higher proportion of the fare, load factors would typically be lower, and the smaller number of seats means that the cost of the tax would be borne by fewer passengers. This is especially pertinent to regional routes (to and from towns and cities outside London), where regional operators make the routes commercially viable by using smaller planes while maintaining a service frequency that supports demand.

Oxera has analysed the expected effects of a move to a uniform per-plane tax, as well as the Liberal Democrat manifesto proposals of a tax designed to create additional revenue and a surcharge on domestic flights where there is a rail alternative.

This analysis suggests that a uniform per-plane tax could cause fares to rise on some domestic routes by 5–11% (depending on the number of seats per aircraft), even if the tax were not expected to raise any more revenue for the Exchequer. This can be seen in Table 1.

Table 1 Estimated fare increases under a uniform per-plane tax and revenue neutrality

	Number of seats	Domestic routes operated 2009/10 ¹	Take-off and landing CO ₂ emissions (kg)	Current tax per full plane under APD (£) ²	Estimated required charge per flight (£)	Absolute fare increase per passenger (£)	Percentage fare increase (%) ³
BAe Jetstream 41	29	16	n/a	319	2,260	67	112
Dornier 328	34	4	n/a	374	2,260	55	73
De Havilland Dash Q300	50	9	763	550	2,260	34	57
Embraer RJ145	54	10	983	594	2,260	31	42
Bombardier Q400	78	62	817	858	2,260	18	28
Embraer 195	118	13	2,066	1,298	2,260	8	13
Airbus A319	124	30	2,167	1,364	2,260	7	11
Boeing 737	162	15	2,274	1,782	2,260	3	5

Table 2 Estimated fare increases under revenue generation and a proposed surcharge on domestic flights

	Number of seats	Domestic routes operated 2009/10 ¹	Take-off and landing CO ₂ emissions (kg)	Current tax per full plane under APD (£) ²	Estimated required charge per flight (£)	Absolute fare increase per passenger (£)	Percentage fare increase (%) ³
BAe Jetstream 41	29	16	n/a	319	5,141	166	277
Dornier 328	34	4	n/a	374	5,141	140	184
De Havilland Dash Q300	50	9	763	550	5,141	92	153
Embraer RJ145	54	10	983	594	5,141	84	115
Bombardier Q400	78	62	817	858	5,141	55	86
Embraer 195	118	13	2,066	1,298	5,141	33	51
Airbus A319	124	30	2,167	1,364	5,141	30	48
Boeing 737	162	15	2,274	1,782	5,141	21	33

Note: n/a, not available. This analysis assumes full pass-through of the tax into airfares. The assumption of a full plane load factor (100%) gives a conservative estimate of the total fare increase. ¹ Based on CAA (2010), 'Airport Statistics 09/10'. ² Assuming the current short-haul reduced rate of £11 per passenger. ³ Based on an estimated average yield for regional routes on which this type of aircraft is operated. Source: Oxera analysis.

The subsequent loss of demand arising from these price rises could make a substantial proportion of the regional routes in the UK unprofitable. One would expect fleet composition to change more slowly than the airlines' ability to remove services, which means that the likely short-run response to the change in tax policy would be to cut routes.

A tax designed to generate additional revenue of £3 billion, as proposed in the Liberal Democrat manifesto, together with the proposed surcharge on domestic flights, could have a more severe effect. Fares could more than double on some routes, and nearly twice as many regional routes might become unprofitable. Some potential impacts are shown in Table 2.

Tables 1 and 2 show significant potential price increases for all the aircraft considered. It is important to note that the larger the plane, the smaller the percentage price increase. This demonstrates that a uniform tax might provide adverse incentives given the (assumed) objectives of the policy, except in the case where the tax incentivises a smaller number of larger planes to carry the same number of passengers.

The fare increases for regional routes under a uniform per-plane tax might be expected to be balanced by fare reductions on long-haul routes. If this argument holds, the expected outcome would be a shift in the burden of aviation taxation from passengers departing from London towards passengers departing from the UK regions.

A surcharge on domestic flights with a rail alternative could have a disproportionate effect on outlying areas of the UK. Oxera's analysis suggests that, in the majority of cases, the city-to-city journey times offered by domestic rail exceed those of air travel.⁴ For example, a route from Aberdeen to Birmingham has a scheduled flight time of around one-and-a-half hours.⁵ Even when including check-in and security time at an airport, this is considerably quicker than the scheduled rail journey time of around seven hours.⁶

The switch from air to rail that this surcharge appears to envisage may therefore not be made in cases where the rail journey time is not competitive, particularly where rail is unable to support day-return trips. In other words, none of the routes which would become unprofitable under a uniform per-plane tax can be completed within a four-hour time window and hence may be unlikely to be made by train rather than plane.⁷ The ultimate outcome of this could be a reduction in the total number of journeys made, with the associated environmental benefits, but also an associated loss of social and economic welfare for passengers who no longer travel. A key consideration in the discussion of

this policy is therefore whether the reduction in emissions is worth the corresponding loss in accessibility and economic/social welfare arising from the reduced number of journeys.

Impact on regional economies

In light of the above evidence, Oxera considered the impact of a uniform per-plane tax on regional economies, looking in particular at what happens as a result of fare increases. This analysis suggests that the commercial decisions to reduce services that regional airlines are likely to have to make, in response to a move to a uniform per-plane tax, may have the following ramifications.⁸

- Employment could fall by 4,000 (3,000 outside London).
- Economic output (GVA) could fall by £350m per annum (£250m per annum outside London).⁹
- Overall economic productivity could decline, given that Oxera's earlier analysis demonstrated that employees in the aviation sector are more productive than the economy-wide average.¹⁰

If the tax were to be revenue-increasing to the Exchequer (ie, generating more revenue than the current APD), as per the Liberal Democrat plans, the ramifications would change to the following.

- Employment could fall by 10,000 (7,000 outside London).
- Economic output (GVA) could fall by £800m per annum (£550m per annum outside London).¹¹

As these are aggregate numbers, they should be considered indicative only. It may also be more useful to review the locational decisions of firms seeking to make investments in regional areas, which could be an area of decision-making affected by the reform. These decisions will be influenced both by the additional cost of flights to users and by any loss in the frequency of services available.

In addition to these direct effects, there will be wider impacts from changes to APD that affect regional economies and the transport connections that serve them. These transport connections provide numerous benefits that cannot be provided by other industries—ie, they would not be replicated if aviation's factors of production moved to another sector. These impacts include potentially negative impacts on competition, the development of transport hubs, the costs of holding inventory, labour supply flexibility, and investment and innovation.

Alternative taxation approaches

As noted earlier, the Conservative and Liberal Democrat manifestos, and the coalition's 'Programme for Government', suggest that the policy objective underlying the move to a per-plane tax is to promote environmental goals such as a reduction in CO₂ emissions. As shown above, a uniform approach may not provide the best incentives to achieve this objective. There appear to be two options that could differentiate between types of flight and plane more accurately: a graduated per-plane tax and an emissions-based tax.¹²

- As a variant of a per-plane tax, a graduated per-plane tax would involve graduating the tax by distance and plane type. This would preserve the incentive properties of moving to a per-flight approach and, if designed carefully, should also avoid some of the perverse incentives associated with a uniform scheme. Graduating by distance should remove some of the disproportionate impacts on shorter journeys that have few alternative modes for passengers to switch to. In addition, rewarding airlines for choosing the lowest-emission aircraft for a journey will reward past decisions made on environmental grounds, and may influence future buying behaviour. Graduating by distance could be introduced through the use of distance bands, or by having different rates for EEA and non-EEA destinations. A carefully designed alternative to the uniform per-plane tax would preserve many of the marginal routes that might otherwise be lost under the uniform approach, thereby preserving employment and business productivity in regional economies.
- An emissions-based tax would focus purely on the emissions associated with a flight (as opposed to using indicators of emissions, such as distance and plane type). It would therefore link the societal cost of

the flight more closely to the tax paid than a graduated per-plane tax would. An example of such an approach would be a tax linking CO₂ emissions per kilometre travelled by the plane, distance flown per month from each UK airport, and an appropriate carbon price. Again, a carefully designed version of such an approach would avoid many of the unintended consequences of a uniform per-plane tax, although care would be needed to ensure a reasonable alignment with the forthcoming inclusion of the UK aviation sector in the EU ETS in 2012.

Policy conclusions

The three main policy conclusions that can be drawn about the design and scope of a revised APD are as follows.

- A uniform per-plane tax would be expected to increase domestic air fares and reduce the number of domestic routes operated by regional airlines, as well as potentially having a substantial impact on the domestic aviation network.
- The loss of these regional aviation services would have a negative economic impact on UK regions, including a loss of jobs (potentially in the region of 4,000–10,000) and loss of economic output (potentially in the region of £350m–£800m), as well as wider economic and social impacts.
- A per-plane tax designed to differentiate by distance and aircraft—and particularly an emissions tax—would be more likely to achieve the policy objective of cutting emissions, while mitigating some of the negative effects on regional economies. More generally, there appears to be a need to review taxation of the aviation sector both with respect to its overall level and in light of the forthcoming inclusion of aviation in the EU ETS.

¹ HM Government (2010), 'The Coalition: Our Programme for Government', May, p. 16.

² George Osborne, Presentation of Emergency Budget to Parliament, June 22nd.

³ Oxera (2009), 'What is the Contribution of Aviation to the UK Economy?', November, prepared for the Airport Operators Association.

⁴ See the DfT's 'transport direct' service, available at <http://www.transportdirect.info/Web2/Home.aspx?cacheparam=0>.

⁵ Flybe (2010). See <http://www.flybe.com/>.

⁶ National Rail Enquiries (2010). See <http://www.nationalrail.co.uk/>.

⁷ A four-hour period is often used as the cut-off point after which day trips become unfeasible. See, for example, López, E., Gutiérrez, J. and Gómez, G. (2008), 'Measuring Regional Cohesion Effects of Large-Scale Transport Infrastructure Investments: An Accessibility Approach', *European Planning Studies*, 16:2, pp. 277–301.

⁸ In a market economy, the inputs used to produce outputs from the aviation sector (labour, machinery, etc) are eventually likely to be redeployed in other sectors of the economy. However, unemployment is likely to increase, at least in the short term, while this redistribution occurs. If the inputs cannot be redeployed, this might also result in a long-term effect. These economic impacts do not reflect the introduction of departure taxes on air freight services (which is likely to increase the figures presented here) or the expected balancing reduction in long-haul fares arising from a per-plane tax (which is also likely to reduce the figures presented here).

⁹ This figure includes the impact on the aviation supply chain.

¹⁰ Oxera (2009), op. cit.

¹¹ This figure includes the impact on the aviation supply chain.

¹² Oxera does not comment here on the compatibility or otherwise of these alternative approaches with international aviation agreements.

If you have any questions regarding the issues raised in this article, please contact the editor, Dr Gunnar Niels: tel +44 (0) 1865 253 000 or email g_niels@oxera.com

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