The economic impact of Air Passenger Duty

A study by PwC

February 2013

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Executive summary

Overview

PricewaterhouseCoopers LLP (PwC) has been commissioned by a consortium of UK and Irish airline operators – British Airways Plc, Virgin Atlantic Airways Ltd, Ryanair Ltd, and easyJet Airline Company Limited – to provide an evidence-based assessment of the role of Air Passenger Duty (APD) in the UK economy, and its contribution to the public finances. Whilst the consortium commissioned and financed the work, and commented on our draft reports, the final reports represent the independent analysis of PwC.

Our findings are presented in two reports. This report is the main version and covers in more detail the methodology and background data underlying our findings. An abridged version, covering our key findings and a summary of the underlying analysis is available separately from the client.

This report has been prepared by PwC for the four airlines under the terms of our engagement letter dated 20th July 2012.

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Key findings

The main analysis in this report relates to the impact on the economy and Government tax revenues if APD were to be abolished. Our assessment has been carried out within a framework laid out by the UK Treasury Select Committee (TSC)1 in its 2010 review of the fundamental principles of tax policy making (in broad terms these principles relate to competitiveness, fairness and effective collection of taxes). Underpinning our approach consistent with this framework is a dynamic economic impact model known technically as a Computable General Equilibrium (CGE) model. This model was developed by PwC to assess the economic consequences of APD abolition. The detail behind the methodology and the TSC principles can be found in our full report.

Our key findings relate to a scenario where we consider the abolition of APD at the 2013 Budget:

1) Our modelling suggests that the abolition of APD could provide an initial short-term boost to the level of UK GDP of around 0.45 percent in the first 12 months, averaging at just under 0.3 percent per annum between 2013 and 2015. This GDP increase would raise the level of UK

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1 Treasury Committee, Eighth Report of Session 2010-12, Principles of Tax Policy, HC 753.
The economic impact of Air Passenger Duty

economic output permanently. On this basis, between 2013 and 2015 we might expect the economy to be around £16bn larger than it otherwise would have been under the current APD regime.

2) Underlying this increase in output, the model suggests an expansion in investment and exports. The results imply investment rising by around 6 percent in total between 2013 and 2015 and exports (including earnings from foreign tourism) rising by 5 percent over the same period.

3) While the abolition of APD would benefit UK consumers and foreign tourists visiting the UK, the biggest gain could be for British businesses which, given access to cheaper airfares, might be able to spend more time with key overseas customers. Our model suggests this could lead to business expansion and an increase in productivity.

4) Should the rise in output associated with APD abolition materialise as our modelling suggests, then it could be possible that almost 60,000 jobs could be created between now and 2020.

5) Based on published Government data, the direct costs to the Exchequer of APD abolition would be around £3-£4 billion per annum through lost APD revenues. Using a cautious set of assumptions, PwC’s analysis shows that receipts from other taxes would be expected to offsetting the direct Exchequer cost.

6) This leads to an average net positive gain of £0.25 bn per annum for the Government. Our modelling therefore suggests that abolishing APD could pay for itself. These additional sources of Government revenue primarily come from increased UK business growth achieved through better trade linkages and more employment in the UK economy.

This finding, whilst unusual, is not unprecedented – it is uncommon but not implausible for tax cuts to pay for themselves. The results in this report have been checked carefully and rationalised alongside wider economic studies of air travel and the airline industry. The properties of APD as a tax are also considered against those of other taxes in order to benchmark our analysis.

Our modelling finds that in the case of APD the nature of the tax itself and its context within the UK economy combine in a way which produces such a result. Our analysis suggests that APD is at least as damaging to the economy – and probably more so – than corporation tax and fuel duty. Key factors underlying this finding are as follows:

1) APD is the highest tax of its type in the world by some considerable margin and this is a key driver of our modelling results. This outcome is particularly true for long haul flights. Our analysis shows that by removing APD UK competitiveness as a whole benefits, not just that of the airline sector. Historic comparisons suggest that growth in the airline industry and GDP are strongly correlated, not just in the UK, but globally.

2) All passengers flying from the UK on UK airlines pay APD except where passengers transfer through the UK on the same ticket. Non-UK based airlines carry higher proportions of passengers on routes that are unaffected by APD and this means they gain a competitive advantage. In some instances, non-UK European airlines operating in the UK could be paying one quarter less in APD as a proportion of their total revenues than a UK airline. This gives non-UK European airlines more strategic pricing flexibility and a potential opportunity to price UK airlines off key routes.

3) Our estimates suggest that UK businesses in aggregate pay around £500m in APD each year. This is a substantial business cost. Leading academic evidence suggests that such a cost burden can distort production decisions leading to inefficiencies in business decision making. Abolishing APD has the potential to reduce the cost of flying, making it cheaper for businesses to maintain relationships with overseas customers. In this sense APD could be regarded as a tax on exports. Abolishing it could lead to increased trade and growth in demand for UK exports. This wider business benefit is critical to our modelled result. A broad range of evidence reviewed in our report suggests that growth in airline usage

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2 https://www.uktradeinfo.com/Statistics/Pages/TaxAndDutybulletins.aspx

3 An early and highly influential example of this type of literature can be found at: Auerbach, A.H. and L.H. Kotlikoff (1982) “Investment versus savings incentives: The size of the bang for buck and the potential for self-financing business tax cuts” NBER Working Papers No. 1027
by UK businesses has contributed significantly to UK GDP growth over the past 20 years which in turn can lead to higher tax revenues.

4) We have conducted extensive sensitivity analysis on our modelling. These tests suggest that the benefits associated with an APD cut could also occur through alternative sources other than the business productivity gains described above. For instance, additional benefits might be realised through increased foreign tourism, particularly in terms of high spending overseas visitors. Alternatively, if an APD cut were to lead to an expansion in either airline sector output or output from other sectors then this could lead to increased opportunities for job creation. In turn it may then be possible that its effect could be enhanced when considered alongside the current relatively high levels of unemployment. On balance we would expect the take-up of new employment vacancies offered in response to any economic expansion to be higher than if the economy was operating at full capacity. This range of outcomes is not comprehensive and the likely outcome is that the benefits of APD abolition would be realised through some combination of all of the channels listed above, or some others that have not been included in this report.

In considering the abolition of APD, it is important to acknowledge the fiscal environment at the time this report has been written. The issues relating to the UK public finances and the current UK economic outlook are well documented. Sensitivity testing on our analysis suggests that our central tax revenue neutral finding would likely occur regardless of economic circumstances or the fiscal outlook. However, some elements of the potential reaction to APD abolition are not captured in our economic modelling. Two key issues are:

- The perception of APD abolition by bond ratings agencies and its impact on the UK’s credit rating has not been included as it is not clear how the ratings agencies might perceive the cut in the context of the wider fiscal position.

- On balance we do find that a cut in APD would be expected to lead to an improvement in the UK tourism balance of payments (the amount of money spent in the UK by foreign tourists netted against the amount of money that UK residents spend on their foreign holidays). However, we also observe a net positive inflow of foreign tourists who have higher spending capacity than UK outbound tourists. In our central scenario, our modelling does not attempt to capture any increase in foreign tourism inflows that might occur due to new airline routes being established. Any foreign tourism inflows are augmented by tourism demand elasticities that have not been estimated based on evidence of major structural change in tourism taxation so may underestimate the consumer response to the abolition of APD. Analysis of potential foreign tourism increases has been restricted to sensitivity tests of the model and could provide a key channel through which the benefits of APD abolition might be realised, particularly as foreign tourists spend considerably more per night in the UK than domestic tourists. Airlines are increasingly linking to long-haul destinations with significant trade potential. These routes could also generate income for UK businesses through the tourists they bring to the UK.

Our analysis of APD is separate and distinct from that of the current UK debate on airport capacity. While we have not modelled airport capacity in the UK in detail, we have considered carefully whether the most constrained UK airports might be able to cope with the extra capacity associated with an increase in demand for flights. Our assessment is that this increased demand could be met within the UK’s current airport infrastructure, but airlines may need to invest in new, larger planes in the next 3 to 5 years.

As well as examining the economic impact of APD, in line with our approach of applying the framework set out by the TSC we also consider the issue of fairness of APD as a tax. We find that APD is a regressive tax and impacts disproportionately on poorer households. While there is an argument that APD is progressive in the sense that it taxes those that can afford foreign travel, this overlooks the sacrifices that many households make in order to save for an overseas holiday. While £52 in APD charges to take a family of four on a short-haul holiday in Europe may not appear expensive, £52 represents 28 percent of one week’s income for the poorest household groups.

We group the remainder of the tax principles raised by the TSC as procedural principles. These relate to issues such as stability, coherence, practicality and coherence. We also consider the role of APD in emissions abatement. Our assessment is that generally, APD is a relatively easy tax to operate and collect and performs well against these criteria. There is a looming compliance issue in the form of multi-ticketing. Our analysis suggests that as APD rises people flying from the UK may choose to multi-ticket to cut their APD bill. By splitting a journey into two legs – the first from a UK airport to a short distance non-UK hub, and then the second from the hub to the final destination – and purchasing two tickets and transferring physically through the hub, rather than staying on the plane, it is possible to avoid paying APD on the second leg of the flight. This
behaviour carries risks if connections are missed, but is nonetheless an increasing phenomenon in airline travel. If APD rates continue to rise there is potential for multi-ticketing to increase and threaten the tax base.

We also consider the role of APD in emissions abatement. Overall we find its effects on the environment to be secondary and that there are better targeted tools available to reduce airline emissions at much lower cost to the industry and consumers.
Introduction
Introduction

Background
PwC have been commissioned by a consortium of UK and Irish airline operators – British Airways Plc, Virgin Atlantic Airways Ltd, Ryanair Ltd, and easyJet Airline Company Limited – PwC to provide an evidence-based assessment of the role of Air Passenger Duty (APD) in the UK economy, and its contribution to the public finances. Whilst the consortium commissioned and financed the work, and commented on draft reports, the final reports represent the independent analysis of PwC.

This report has been prepared by PwC for the four airlines under the terms of our engagement letter dated 20 July 2012.

Approach
When considering the economic role of APD in the UK economy and internationally, it is important to be aware of stakeholder views. It is worth noting an apparent dichotomy between the Government and the aviation industry:

- As rates have risen, APD has increasingly become a source of contention. Airline operators argue that APD damages their competitiveness by limiting their ability to expand passenger routes both within and to and from the UK, and holds back growth in the tourism sector and, more generally, the UK economy. APD has been blamed by some airline operators for the closure of a number of cross-border routes from the UK in recent years.4

- Conversely, the Government sees APD as an important revenue-raising tool that replaces VAT in the airline sector. The Government reaffirmed this view in its 2011 Consultation into APD5.

However, as yet there has been no comprehensive public discussion of the economic consequences of APD. The objective of this report is to provide a detailed overview of the economic impact of APD in order to supplement the Governments current view of APD as a pure revenue raising tool. We consider not only its economic implications, but its distributional and practical/operational consequences as well. Figure 1 overleaf sets out our analytical framework.

4 For example; Virgin Atlantic’s closure of the London-Nairobi route in 2012 (Available at: http://www.reuters.com/article/2012/05/16/ozabs-virgin-atlantic-kenya-idAFJOE84F08A20120516); British Airway’s closure of several London-Caribbean routes in 2011 (available at: http://www.thetimes.co.uk/sto/travel/Your_Travel/Travel_News/article777400.ece) and Ryanair axing four European routes from Liverpool in 2012 (available at: http://www.airportwatch.org.uk/?p=1664).

**Figure 1: Analytical framework for estimating the economic impact of APD**

- **What is the economic impact of APD?**
  - Airlines perspectives
  - PwC Economic impact assessment
  - HM Treasury view

**Core treasury* tax principle framework**

<table>
<thead>
<tr>
<th>Economic principles</th>
<th>Procedural principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supporting growth and encouraging competition</td>
<td>Basic fairness</td>
</tr>
<tr>
<td>Stability</td>
<td>Certainty</td>
</tr>
<tr>
<td>Practicality</td>
<td>Coherence</td>
</tr>
</tbody>
</table>

**Question**

- How distortive is APD for growth in the economy?
- How competitive is APD against other country’s taxes?
- How progressive is APD?
- Is APD stable, certain, practical and coherent?

**Tools**

- Simulating an abolition of APD using a large-scale dynamic model of UK economy
- Comparison of global air passenger tax rates
- Range of qualitative and quantitative analysis

**Source: PwC approach**

**Six core tax policy principles: A basis for assessment**

Economists have long called for tax policy makers to raise revenue in a reasonably non-distorting, equitable, and sustainable manner. This line of argument can be traced back to the days of Adam Smith. The TSC recently echoed this call in March 2011 when it set out six fundamental principles for tax policy making. We assess APD against these six principles and break them down into two economic principles and four procedural principles (see Table 1 below, for an explanation). We also add an additional environmental principle, although this is not included in Table 1 as it is not a direct TSC principle.

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8 Treasury Committee, Eighth Report of Session 2010-12, Principles of Tax Policy, HC 753
Table 1: Explanation of core treasury tax principle

<table>
<thead>
<tr>
<th>Core treasury tax principle</th>
<th>Key Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic principles</strong></td>
<td></td>
</tr>
<tr>
<td>Supporting growth and encouraging competition</td>
<td>• Tax system should be internationally competitive and minimise distortions in the economy.</td>
</tr>
<tr>
<td><strong>Basic fairness</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No agreement what constitutes fairness but a tax system without it will not have legitimacy.</td>
</tr>
<tr>
<td><strong>Procedural principles</strong></td>
<td></td>
</tr>
<tr>
<td>Stability</td>
<td>• Unexpected changes to tax policy are harmful to business. The tax base should be stable over time.</td>
</tr>
<tr>
<td>Certainty</td>
<td>• Taxation should have; legal certainty, simplicity and be properly targeted.</td>
</tr>
<tr>
<td>Practicality</td>
<td>• Compliance and administration burdens should be minimised.</td>
</tr>
<tr>
<td>Coherence</td>
<td>• New provisions complement the existing system, not conflict with it.</td>
</tr>
</tbody>
</table>


Selecting the most appropriate analytical tools

The second step in our analytical process is to choose which tools are most appropriate to use in order to assess each principle. As highlighted in Table 5, above, the most appropriate tools differ for each principle.

Supporting growth and encouraging competition

This principle consists two parts. The first relates to the level of economic distortion created by a tax. The TSC notes that taxation in general is 'likely to reduce economic efficiency by distorting price signals'. However, some taxes are more distortive than others for growth. We will examine how distortive APD is compared to other taxes in the economy, and in doing so; quantify how far APD affects the level of GDP in the UK economy. To this degree, we will use a large-scale dynamic economic model, known formally as a Computable General Equilibrium (CGE) model, which we have built to capture the key features of the UK economy and the aviation and tourism sectors, to simulate the impact of a reduction in APD or its abolition on key economic and fiscal variables.

A separate element of this principle relates to the competitiveness of the UK tax system against other countries. Given the globalised nature of the market for capital and labour, the TSC conclude that; ‘a tax system which is not competitive by international standards will not support growth’. We conduct a detailed comparison of air passenger taxes globally on different types of route and fare class to examine the competitiveness of APD.

Basic fairness

To estimate APD’s impact on basic fairness (second core Treasury principle) we compare the costs of APD relative to household incomes. The Office of National Statistics (ONS) publishes data on household incomes by

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decline and we consider the cost of taking a family of 2 adults and 2 children on holiday in terms of proportions of weekly income.

**Procedural principles**

To assess the procedural aspects of the tax system (latter four principles of the tax system), we use a mix of quantitative and qualitative analysis and factor in relevant published studies:

- **Stability:** We assess the volatility of historical receipts from APD and compare these against policy maker’s projections at the time. We comment on the validity on the assumptions underlying future APD receipt projections.

- **Certainty:** We assess the legal certainty, simplicity and targeted nature of APD against the definitions used by the TSC using a range of evidence sources.

- **Practicality:** We identify existing quantitative estimates for the compliance and administration burden associated with APD and assess qualitative evidence surrounding airlines’ recent experiences with the APD regime.

- **Coherence:** We assess the extent of the overlap, if any, of APD and other tax heads acting in the tax system.

- **Environment:** To assess the environmental consequences we survey a range of published studies in this area.

**Our report in the context of other economic impact studies on aviation and APD**

Our report has been prepared against a background of several economic impact assessments of the aviation sector that have been undertaken in recent years:

- Oxford Economics has published a series of papers that outline the economic contribution of the aviation industry in the UK. These papers have focussed on quantifying aviation’s direct, indirect, induced and wider ‘catalytic’ economic benefits in terms of jobs and value-added, as well as providing a broader consideration of the industry’s contribution to UK investment and productivity.

- In 2009, Oxera carried out a similar study. This study also highlighted the substantial contribution the industry makes to the wider economy in terms of income, investment and employment. It further considered the wider benefits, including the impact on UK suppliers, receipts to the Exchequer and the benefits of connectivity in augmenting the UK’s productive potential.

The International Air Transport Association (IATA) also produces regular economic analysis of key themes in the sector. These include quantifying the impact of the latest market and economic developments on short-term industry profitability and analysis into the public policy, fuel price and other market and economic trends that influence the long-term outlook for the industry.

APD’s role within this industry is less well covered. There are only two previous reports that have looked at the economic impact of APD.


12 Direct economic impacts refer to the value-added produced and the number of those employed by firms in the aviation industry. Indirect economic impacts refer to the value-added produced and the number of those employed by firms in the aviation industry’s supply-chain. Induced benefits refer to the value-added produced and the number of those employed by firms who are supported by the spending undertaken by the employees of the aviation sector and those in its supply chain. Wider ‘catalytic’ impacts refer to the value-added produced and the number of those employed by firms in the tourism sector who benefit from the facilitating role aviation plays in their industry.

13 ‘What is the contribution of aviation to the UK economy?’, Oxera, November 2009.
• In 2011, Frontier Economics evaluated the economic impact of each of the Government’s proposed changes to APD as outlined in the 2011 Consultation. They used assumptions on elasticities and multipliers to translate the change in APD rates to passenger volumes, employment, GDP and CO2 emissions.

• In their 2009 economic impact assessment, Oxera used input-output tables to stimulate the impact of three potential scenarios for APD on passenger demand, fares, output and tax receipts.

This assessment differs from previous analysis as it uses a CGE model to undertake scenario analysis of a change in the rate of APD on the UK economy. This approach has been chosen because we believe a sophisticated bespoke dynamic economic model is needed to represent the detailed sectoral interactions and price responses that occur in response to a cut in APD. A CGE model also allows us to quantify the impact of a cut in APD on economic and fiscal variables over both short-term and long-term horizons. The UK Government, IMF, World Bank, EC, OECD and many other national Governments use similar models (US, Canadian and Australian Governments are prime examples). We consider that the use of a CGE model in analysing the economic impact of APD is our key addition to the existing studies already undertaken in the subject area, particularly as it ties in with the UK Governments own methodology for carrying out assessments of the economic consequences of a change in taxation.

The current APD regime
The current APD regime

Section overview
In this Section, we provide a brief overview of the current APD regime. We outline the ‘revenue raising’ rationale for APD in the tax system, explain how the tax works and discuss recent policy changes and proposals to the APD structure. We conclude by considering APD in the context of the wider issues affecting the aviation industry.

APD: Rationale, rates and recent policy changes

History of APD
APD was first introduced as a two-tier, per-passenger tax in 1994 by the then Chancellor, Kenneth Clarke, on the basis that the aviation industry was ‘undertaxed compared to other sectors of the economy’\(^\text{15}\). Since then, several Governments have overseen a period where APD has increased from a flat rate of £5 to most European countries and £10 to other countries in 1994 to its current four-banded structure with rates between £13 and £184. Figure 2: History of APD rates (£’s, actual rates) shows that both the upper and lower limits of APD rates have increased at a rate faster than inflation since 1994.

\(\text{Figure 2: History of APD rates (£’s, actual rates)}\)

\[\text{Source: HMRC, ONS and PwC Analysis}\]

In 2001, the Chancellor of the Exchequer split APD into four different rates. For the first time, the rate applicable depended on the class of seating, alongside whether the final destination was inside or outside the EEA. The rate applied ranged from £5 for economy-class tickets within the EEA, to £40 for standard-class tickets outside the EEA. These rates were doubled in 2007.

\[\text{15 Kenneth Clarke, Chancellor of the Exchequer in 1993. Quoted in column 934, ‘Hansard’, 30th November 1993.}\]
The first public Consultation on APD occurred in 2008, where the Government considered moving to a per-plane tax. This Consultation concluded against the per-plane duty as it would likely be found contrary to international agreements on aviation but resulted in a further change to the structure of APD, where four distance bands were included for the first time. The rate of APD was further increased in 2009 and 2010. In 2011, after a second Consultation, the Government decided to link further increases in APD to the retail price measure of inflation (RPI).

**How APD is currently applied**
APD is applicable to airlines that operate a chargeable aircraft carrying chargeable passengers:

- **A chargeable aircraft** includes any carrying paying passengers with more than 20 seats (or weighs more than 10 tonnes)\(^{16}\).

- **A chargeable passenger** is any outbound passenger departing from a UK airport, with the exception of any passenger that is in transit when the aircraft lands in the UK or changing to a connecting flight at a UK airport.

The rate of APD applied to each passenger is calculated by the distance travelled from London to the capital city of the destination country, structured into four bands within two classes of travel (see Table 2 below).

**Table 2: Current APD rates (£)**

<table>
<thead>
<tr>
<th>Band</th>
<th>Reduced Rate*</th>
<th>Standard Rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current rate</td>
<td>Rate from 1 April 2013</td>
</tr>
<tr>
<td>Band A (0–2000 miles)</td>
<td>£13</td>
<td>£13</td>
</tr>
<tr>
<td>Band B (2000–4000 miles)</td>
<td>£65</td>
<td>£67</td>
</tr>
<tr>
<td>Band C (4000–6000 miles)</td>
<td>£81</td>
<td>£83</td>
</tr>
<tr>
<td>Band D (over 6000 miles)</td>
<td>£92</td>
<td>£94</td>
</tr>
</tbody>
</table>

* Passengers in the lowest class of travel pay the ‘reduced rate’ of APD. The ‘standard rate’ applies to all higher classes of travel (i.e. Premium economy, business, first etc) or if the seat pitch exceeds 40 inches.

Source: HM Revenue and Customs

In the financial year, 2010/11, there were 93.6million chargeable passengers departing UK airports who paid APD. The vast majority (78%) of these passengers travel to Band A destinations with a relatively low proportion travelling to Band B (13%), Band C (7%) and Band D (2%) destinations. Data from HMRC confirms that the largest slice of APD revenues are indeed collected from Band A passengers (see Figure 3 below). However, there is a smaller gap between Band A and other Bands in terms of revenue than in terms of passenger volumes. This is due to the significantly higher tax rates that apply to longer-haul routes than short-haul routes. The reduced rate for a Band D destination is 7 times higher than for a Band A destination.

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\(^{16}\) In its 2011 Consultation, the Government extended its definition of chargeable passengers to include business aviation passengers travelling on light aircraft. From April 2013, APD will also apply to aircraft weighing less than 20 tonnes or holding fewer than 19 seats.
The economic impact of Air Passenger Duty

**Recent policy debate on APD**

The current banding structure on APD sits within a wider policy debate on the role of taxation within the aviation industry. Under international agreements, aviation kerosene and a range of aviation-related goods are exempt from taxation. This treatment of aircraft fuel has been used by policymakers to justify the application of air passenger taxes in many countries around the world, including the UK. Other industry stakeholders, such as environmental groups, have suggested that the application of higher aviation taxes is needed to limit CO2 emissions and improve environmental outcomes, not just to raise revenue.

Whilst the tax exemptions applied in aviation have attracted criticism, by providing simplicity and legal clarity, these rules were initially designed to encourage Air Service Agreements (ASAs) between countries – allowing bilateral civil aviation links to be established. They also seek to preserve the incentives for airlines to carry a safe amount of fuel aboard aircraft. With international tax arbitrage on jet fuel, airlines could engage in ‘tankering’; filling aircrafts as full as possible with fuel in low-tax jurisdictions.

Another key debate surrounding aviation taxes is whether they should be applied on a per-passenger or per-plane basis. The proponents of a per-plane tax claim that it helps to further curb emissions by providing incentives to airlines to fly a lower volume of planes. In their 2010 manifesto, the Liberal Democrat party calculated that the imposition of a per-plane tax to passenger and freight travel and an increase in the domestic flying tax rate could raise £3.3 billion by 2011/12. Proponents of the current per-passenger tax suggest the alternative might unfairly distribute taxes across passengers, as different tax rates could potentially apply to passengers for flying the same route in the same class of seating. They conclude that an overall higher tax burden could price some segments of the population out of flying all together.

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17 Note: Aggregate receipt figure may not exactly match HMRC calculation of total tax take in 2010/11 as 2 different rate structures were in place in FY2010/11, which we have applied using a liner monthly profile for air passengers.

18 This is consistent with the Chicago Convention, the fundamental treaty on international civil aviation. For more details see: ‘Air passenger duty: recent debates and reform’, House of Commons Library, SN05094, Antony Seely (September 2012).


2011 Consultation

In the Budget 2011, the Government postponed the annual inflation in APD until April 2012–13\(^{21}\) and launched a consultation on APD\(^{22}\) to explore the scope for improving the fairness and efficiency of the current system. The Consultation sought views on:

- The potential extension of APD to ‘business jets’;
- Review of the current banding and class structure of APD;
- Review of the impact of APD at regional airports on the local economies; and
- Potential devolution of legislating APD in Scotland, Northern Ireland and Wales

As a result of the Consultation, the Government announced that it would extend APD to business aviation, to be implemented in April 2013\(^{23}\). No changes were made to either the banding or the class structure of the current APD regime. The Government confirmed in its March 2012 Budget that APD would continue to rise by RPI inflation from 2013 onwards.

However, a reduction in APD was announced for long-haul routes (Bands B, C and D) in Northern Ireland which would instead be set at the short-haul APD rate. The Government states that this policy move recognised the ‘unique circumstances’ that Northern Ireland operates in within the UK, ‘given that it shares a land border with the Republic of Ireland where the rate of aviation duty is substantially lower’. This measure devolves air passenger duty (APD) rates to the Northern Ireland Assembly. In February 2012, the Government took the further step of devolving the long-haul APD rate to Northern Ireland, giving the Northern Ireland Assembly complete fiscal autonomy to set APD rates for all direct long haul flights departing from airports in Northern Ireland. At the same time, Northern Ireland will also bear the full cost of collecting and administering APD in respect of all direct long haul flights departing from airports in Northern Ireland. The Government justifies this further step as providing a ‘lasting solution’ to the need to deal with Northern Ireland’s unique circumstances and contributing towards the ‘Government’s objective of stimulating and rebalancing the Northern Ireland economy’\(^{24}\).

APD in the context of wider issues in the aviation industry

Airlines have struggled to recover from the global recession in 2009 – a year in which they suffered their worst operating period in over 50 years and collectively made a loss of £6.8billion\(^{25}\). Whilst airline operators returned to profitability in 2010, margins remain weak – the industry is expected to post a net profit margin of just 1.1% in 2012\(^{26}\). Passenger taxes are just one of several forces that have brought about the current challenging operating environment:

- Volatile oil prices have put upward pressure on airline’s cost base;
- Cargo growth is weak – as low business confidence and an uncertain economic environment reduce trade flows; and,
- Whilst passenger volumes have improved over 2012, slower growth in disposable incomes across the developed world have contributed to tighter demand conditions compared to pre-crisis norms.

The global nature of these factors that influence airline’s costs and revenues make reliable returns from aviation particularly difficult to achieve. The impact of longer-term pressures is equally as difficult to predict – capacity

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\(^{22}\) ‘Reform of Air Passenger Duty: A Consultation, HM Treasury (March 2011).

\(^{23}\) ‘Reform of Air Passenger Duty: Response to Consultation, HM Treasury (December 2011).

\(^{24}\) ‘Air Passenger Duty (APD): Devolution of rates to Northern Ireland, HMRC (20 February 2012).


\(^{26}\) IATA Press Release (October 2012). Available at: http://www.iata.org/pressroom/pr/Pages/2012-10-01-01.aspx.
constraints and environmental legislation, in particular, have the potential to limit long-run returns. However, there are good reasons for a supportive policy and regulatory environment to promote stability in the sector. As we discussed in our previous Section, a number of studies have looked at the wide-ranging benefits the aviation sector brings to the economy, such as in facilitating tourism. In their latest study, Oxford Economics estimate that the aviation sector contributes £46.9 billion (4%) to UK GDP, supports 921,000 jobs in the UK and pays £7.9 billion in tax.27

A well-designed tax, regulatory, policy and infrastructure system is important for maintaining and growing the sector’s contribution to the economy. Whilst the Government can do little to influence a host of global factors that influence the industry’s growth, tax policy is one important lever it can control. In this context, the implications of the future rate of APD for the industry itself, and the economic outcomes it supports, are particularly important.

**Impact of APD on the UK’s long-term aviation competitiveness**

A range of factors influences how passenger volume trends develop across countries over a long-term horizon. Important factors include; the economic and political climate, the attractiveness of the tax regime, capacity and infrastructure capabilities and the yield environment. The relative levels of passenger taxes are important as they influence the yields airlines can expect to attain from flying different routes by feeding directly into their cost base. Indeed, several academic studies have proved an empirical link between higher taxes on business and lower investment flows.28 The TSC also highlights the damage that can be done to the economy from uncompetitive taxation: ‘a tax system which is not competitive by international standards will not support growth’29. Furthermore, they note that the current economic climate and the continued trend of globalisation have ‘increase (d) the scope for tax arbitrage’, meaning the importance of a competitive tax system is greater than ever.

To evaluate the competitiveness of the UK’s air passenger taxes, we have benchmarked the tax rates paid by carriers operating from UK airports against their European and international competitors. At a regional level, we found that the majority of EU nations apply no air passenger taxes at all. For those that do apply air passenger taxes, the UK has the highest rate in the EU for three out of the four types of route analysed (see Figure 4 below).

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28 For example, **Corporate Tax Elasticities: A Reader’s Guide to Empirical Findings**, Oxford University Centre for Business Taxation, De Mooij and Ederveen (2008). This study found that a 1% increase in the tax measure in the location reduces foreign capital by 2.9%.

A part of this analysis the long-haul passenger taxes applied in the UK have been compared with those levied by other countries around the world. Summary results are presented in Figure 5, overall this comparison reveals that the UK applies the highest air passenger tax on these types of route globally (see below).

Source: IATA Charges Monitor, PwC analysis
The economic impact of Air Passenger Duty

Figure 5: Benchmarking of air passenger taxes (GBP per passenger) on long-haul routes

Source: IATA Charges Monitor – current as at September 2012, Loanda exchange rates (based on average for January – September 2012)

Another potential source of cost differences that are evident across countries that influence route yields and therefore competitiveness are airport charges. In addition to high levels of taxes, UK airports levy amongst the highest airport charges globally. London Heathrow, City and Gatwick airports are all in the top 5 highest charging airports in the world (see Figure 6 below).

Figure 6: Airport Charges per passenger (GBP, excluding passenger tax) based on A320

Source: IATA Charges Monitor – Current as at September 2012, Loanda exchange rates (based on average for January – September 2012)

31 Note: In South Korea, charges on international departing passengers are only levied at Seoul Incheon Airport, Honduras charges are 12% on an economy fare and 18% on a business/first fare, these figures are based on the one way average fare by cabin class departing from Honduras for 2011. US charges are doubled as taxes are levied on both arriving and departing passengers whereas other taxes are only on departure. Includes per passenger taxes similar to APD for international long haul flights.

32 Airport charges are based on A320 with 122 passengers operating during peak times to international destinations with 1-hour turnaround time. Includes landing fees and departing passenger fees. Excludes Government taxes. Source: IATA Charges Monitor – current as at September 2012, Oanda exchange rates (based on average for January – September 2012).
A combination of high passenger taxes and high airport charges has eroded the yields attainable by flying routes via UK airports. UK-based airlines are particularly disadvantaged by this trend. Figure 7 below, shows that the UK carriers, easyJet and BA, have a greater burden of tax than European rivals.

**Figure 7: Air travel taxes as a % of Total Revenue (2011).**

Note: Includes APD and similar taxes. Source: Airline Financial Statements and PwC analysis.

A lower burden of tax, all else being equal, allows European carriers to offer more competitive fares across their entire route network than UK-airlines can. An analysis of the air passenger taxes paid to fly into New York (JFK) shows that an airline departing from Amsterdam can pay £65 less on a reduced-class ticket and £130 less on a premium-class ticket than an airline departing from the UK (see Table 3 below).

**Table 3: Air Passenger Taxes applied on a representative flight from EU to US (GBP)**

<table>
<thead>
<tr>
<th>Airline/s</th>
<th>Route</th>
<th>Lowest class</th>
<th>Premium classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA/VS</td>
<td>LHR – JFK</td>
<td>65</td>
<td>130</td>
</tr>
<tr>
<td>AF</td>
<td>CDG – JFK</td>
<td>19</td>
<td>48</td>
</tr>
<tr>
<td>LH</td>
<td>FRA – JFK</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>KL</td>
<td>AMS – JFK</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Excludes airport charges and airline surcharges, includes APD and similar taxes and CDG’s airport tax. Source: IATA Charges Monitor – current as at September 2012, Oanda exchange rates (based on average for January – September 2012)

Whilst the differences in tax rates between UK and foreign-based airlines are largest on longer-haul routes, the effect on the price competitiveness in short-haul markets should also not be ignored. As UK airlines incur higher air passenger taxes more frequently, this increases their fixed cost base compared to their European-based rivals. For these airlines, a lower fixed cost base benefits the whole group, not just on the long-haul routes where tax rate differences are greatest (as shown by Figure 7: Air travel taxes as a % of Total Revenue (2011) for five representative airlines, above). European airlines can spread these relatively lower costs across their whole route portfolio, enabling them the flexibility to charge lower prices for short-haul flights. This further undermines the competitiveness of the UK’s short-haul aviation market.
Over the long-term, the lack of competitiveness of the UK aviation sector in a global context is damaging for the UK economy. As discussed earlier, studies have shown that improvements in connectivity have a positive impact on GDP through increasing productivity. Therefore, the failure to develop UK passenger routes will inhibit UK economic growth over a long-term horizon. Whilst the UK’s biggest trading partner is currently Europe, it is envisaged that a failure to foster long-haul links could be the most damaging aspect for the UK economy. Figure 8 below, shows that it tends to be these long-haul destinations that are expected to grow the quickest this year, and beyond. Future connections to these destinations will be an important factor if the UK is to tap into the growing activity, investment and employment that these economies will experience over the long-term.

**Figure 8: PwC forecast for economic growth in 2013 (% change on 2012)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Band</th>
<th>GDP Growth 2013 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA (Band B)</td>
<td></td>
<td>2.2</td>
</tr>
<tr>
<td>Mexico (Band C)</td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>Germany (Band A)</td>
<td></td>
<td>0.7</td>
</tr>
<tr>
<td>UK (Band A)</td>
<td></td>
<td>1.1</td>
</tr>
<tr>
<td>US (Band B)</td>
<td></td>
<td>2.2</td>
</tr>
<tr>
<td>Spain (Band A)</td>
<td></td>
<td>-0.1</td>
</tr>
<tr>
<td>Brazil (Band C)</td>
<td></td>
<td>2.6</td>
</tr>
<tr>
<td>India (Band C)</td>
<td></td>
<td>6.6</td>
</tr>
<tr>
<td>South Africa (Band C)</td>
<td></td>
<td>6.0</td>
</tr>
<tr>
<td>Russia (Band A)</td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>China (Band C)</td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td>Australia (Band D)</td>
<td></td>
<td>2.6</td>
</tr>
</tbody>
</table>

Source: **PwC main scenario for 2013**

**The concept of multi-ticketing**

With lower fares available from abroad, many UK travellers have opted to ‘multi-ticket’. Instead of purchasing one long-haul ticket (either direct or indirect) from a UK-point of origin, passengers are increasingly purchasing separate tickets to reach their end destination. This involves buying one short-haul ticket to a European hub (in doing so attracting only a Band-A APD charge) and a separate long-haul ticket which the consumer can connect to at the European destination (and hence avoiding the long-haul APD charge). The cost savings, in terms of air passenger taxes, are illustrated for Beijing, in Figure 9 below. This shows that a passenger could save £68 on taxes in economy seating (potentially around 10% of the overall ticket cost) from multi-ticketing for a Band C destination via Schiphol, Amsterdam.

This strategy does entail the risk of a delay occurring on the initial leg, which could cause the passenger to miss the subsequent flight to their end destination. Despite such risks, the initial evidence shows that the occurrence of multi-ticketing is increasing. Over the last five years, there has been a general increase in the number of UK passengers using foreign hubs, particularly Amsterdam Schiphol, to begin their onward journeys (see Figure 10 below).
Multi-ticketing and other impacts to consumer behaviour have also been evident in recent international examples of where high air passenger taxes have been applied. Box 1 below highlights the example of the Netherlands, which moved quickly to abolish its air passenger taxes after observing the damaging effects on passenger volumes.
Box 1: Case study of application of air passenger taxes in the Netherlands

About the Tax: The air passenger tax was introduced on 1 July 2008 and was applied to departing passengers. The tax did not apply to transfer passengers or freight shipments.

Rates: EU and destinations up to 2,500km, €11.25, all other destinations €45.

Reason for tax: 2008 national tax plan – aimed at ‘greening’ the tax system. The objective was to transfer part of the taxes imposed on labour and profit to taxes on environmental pollution (Ministry of Finance 2007).

Pre-tax estimated impacts:
Prior to the tax being introduced, the impacts were estimated. For Amsterdam Schiphol airport, the tax was estimated to dampen passenger demand by 8-10% and flight movements by 7-8%. For regional airports, the impact of the tax on passengers was estimated to be 11-13%.

Measurable impacts:
In early October 2008, KLM estimated 230,000 fewer passenger since the introduction of the tax, this number increasing to 400,000 by the end of November 2008. In late October 2008, easyJet estimated that the tax had cost them 200,000 passengers. A conservative estimate for the period of tax is 2 million passengers – half of which did not fly (either did not travel or alternative mode) and half of which defected to foreign airports. The income generated from the tax was lower than expected. €88m in 2008 and €179m in 2009 (total of €267m over the 12 months). The cost to the industry was estimated at €1.2 to €1.3bn.

Observations:
There were a number of factors influencing air passenger traffic following the introduction of the tax on 1 July 2008, namely the economic downturn, the increased prevalence of low cost carriers and increased use of regional airports as well as foreign exchange rate and oil price fluctuations. It is difficult to estimate exactly how much of the decline in the market was attributable to the tax, however the drop in passenger traffic at Amsterdam Schiphol airport was above what may be expected given other conditions. The number of OD passengers declined, whilst transfer passengers, who were not subject to the tax, continued to grow.

Key observations included:
- Decline in passenger demand at Netherlands airports (beyond what would be expected given economic climate and other conditions).
- Increase of Dutch nationals using foreign airports accessible by land transport (namely Dusseldorf, Brussels airports and Weeze Airports). This has led to a permanent shift of usage of foreign airports – attributable both to LCC and the tax which has essentially increased overlap in airport catchments based on generalised cost of travel. The tax impacted people’s habits and causing a permanent shift in travel behaviours.

Outcome
The tax was seen to have a detrimental impact on the industry and as part of the Dutch Government’s ‘Economic Crisis and Recovery Plan’; the tax was set to zero as at 1 July 2009, and abolished as of 1 January 2010.

Quarterly Passenger Growth at Amsterdam Schiphol Airport and NL Real GDP Growth (compared to same quarter previous year)

Source: Schiphol Group, Global Insight, KiM, PwC analysis
Supporting growth and encouraging competition
**Supporting growth and encouraging competition**

**The role of competitiveness and economic efficiency**

Given the globalised nature of the market for capital and labour, the TSC concluded that; “a tax system which is not competitive by international standards will not support growth”.

The data presented in Figure 4 and Figure 5 suggests the UK levies the highest air passenger taxes in the world. If taxes are disproportionately high by international standards this can affect competitiveness and hence the level of GDP. Economic growth is not the only priority for tax policy makers, who may want to use the tax system to fulfil other objectives, for example, to disincentivise certain types of behaviour or redistribute income and wealth. These alternative objectives are considered in later sections of this report.

Competitiveness can be viewed from two perspectives:

1) **Intra-airline competitiveness**: APD is driven by airport usage and applies to both UK and non-UK airlines operating out of UK airports. The routes that different airlines offer will affect their overall competitiveness i.e. a non-UK airline will benefit from cost savings in its wider network where APD is not charged.

2) **Whole of UK competitiveness**: APD can affect the viability of airline routes and hence the extent of connections that between businesses both within the UK and between the UK and globally.

In this section the relationships between APD, the airline sector and UK competitiveness are explored. A key factor that augments competitiveness is the economic efficiency of APD as a tax i.e. how does the design of APD and the rate set affects the level of GDP? This concept of tax efficiency is well established in both Government and academic circles and is found to be a key driver of our modelling results.

**The relationship between the airline industry and productivity**

There is a range of evidence produced by the airline industry authorities and academics which suggests that as business connectivity and trade routes expand; productivity and hence GDP increase. A key finding emerging from these studies is the strong linkage that has been observed over the last 20 years between airline industry growth and GDP growth.

In the context of the airline sector, if the cost of purchasing an airline ticket falls in response to an APD cut, companies could accommodate more trips to visit customers and gain access to larger marketplaces. Furthermore, a cut in APD might be expected to make more international routes from the UK viable, boosting connectivity and facilitating increased overseas trade. Higher business air usage can also improve the efficiency of existing production and supplier relationships and facilitate cross-border investment, again leading to more productive business outcomes.

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36 We would not expect a reduction in ticket costs to translate directly into an increase in demand as cost is not the only driver of the decision to fly, factors such as timing, business opportunities, communications networks and carbon footprints will also be important. This factor is reflected in later modelling.
Hong, Chu and Wang (2011) expand on this story and outline three separate elements of how improved transport sector connectivity boosts productivity through its impact on businesses:

- **Travel times fall and businesses gain access a wider marketplace.** This improves productivity in a number of ways. Firstly, falling travel time reduce business costs. Secondly, by raising the potential volume of sales, transport links give businesses a greater ability to exploit economies of scale. Incentives to invest in projects with high fixed costs (such as R&D) are also higher as the costs of doing so can be spread over a greater sales base. Finally, an exposure to global competitive forces provides incentives to reduce costs, improve quality or differentiate product or service offerings, ultimately resulting in higher levels of innovation.

- **Businesses can improve the efficiency of existing production and supplier relationships.** Transport links allows businesses to be managed more effectively by making it easier for managers and executives to oversee non-local operations. Transport links can also help to build future business relationships by providing the opportunity for businesses to network with potential clients and collaborators, which can eventually boost the scale of existing operations.

- **Businesses can undertake cross border investment more easily.** Investing is also made easier by transport for a number of reasons. The time taken to transfer of intellectual capital involved in such investments can be reduced. Better transport links may also increase the available returns from some projects (by allowing access to a greater marketplace, for instance). Lastly, better infrastructure attracts foreign direct investment and companies moving operations to the UK. More local competition helps to drive down costs, whilst outside technology and business practices help companies to improve existing products and hone management techniques.

Against this backdrop, business usage of air transport can be thought of as particularly important for these linkages in a global setting. Flying is often the only way for firm’s employees and owners to travel long distances. Whilst video conferencing and similar technologies offer an alternative to travel, independent studies have shown the scope for such alternatives to replace face-to-face meetings is limited. The Committee for Climate Change report into the feasibility of aviation emission targets found that a modal shift to videoconferencing alone may only reduce aviation passenger numbers by 1% by 2050 under their ‘likely’ scenario. This is consistent with academic studies have suggested that videoconferencing could actually be complementary to air travel, rather that acting as a substitute (see Wang and Law (2007) and Choo and Mokhtarian (2007)).

Business air usage may have additional benefits for firms in certain sectors in the economy. Keller and Hovhannisyan (2012) found that business travel improves innovation between firms in high-tech industries, as technology is ‘best explained and demonstrated in person’. Their study found a statistically significant link between business air travel and patenting activity (a proxy for innovation). Specifically, a 10% increase in business travel leads to a 0.2% increase in patenting.

A summary of these studies is given in Table 4 overleaf.

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38 Note: in ‘optimistic’ and ‘speculative’ scenarios this impact on aviation volumes rises to 7% and 16% respectively. Source: ‘Meeting the UK aviation target – options for reducing emissions to 2050’, Committee on Climate Change, December 2009.


Table 4: Studies showing a positive productivity gain from increase in transport infrastructure

<table>
<thead>
<tr>
<th>Source</th>
<th>Scope of report</th>
<th>Mechanism for productivity gain</th>
<th>Other key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hong, Chu and Wang (2011)</strong></td>
<td>Examines the linkage between transport infrastructure and regional economic growth in China using a sample of 31 Chinese provinces from 1998 to 2007.</td>
<td>Transport infrastructure reduces travel time, with consumers and businesses gaining directly from the time and cost saving. Businesses can also realise additional gains; through lowering minimum inventory levels and gaining access to longer-distance domestic and export markets.</td>
<td>The results provide ‘strong evidence that transport infrastructure plays an important role in economic growth’</td>
</tr>
<tr>
<td><strong>Button and Reggiani (2011)</strong></td>
<td>Provides a theoretical and empirical overview of transportation’s role in economic development.</td>
<td>Transport infrastructure reduces costs to production inputs. It can also attract private capital investment which has further productivity effects.</td>
<td>The authors summarise their findings as providing a ‘relatively strong theoretical and empirical support for the positive economic benefits from transport infrastructure investment.’</td>
</tr>
<tr>
<td><strong>Keller and Hovhannisyan (2010)</strong></td>
<td>Assesses the role that international business travel plays for innovation. Quantifies the impact by analysing the impact of US business travel on 36 countries’ patenting activity in the period 1993-2003.</td>
<td>The paper argues that developed economies such as the US hold significant levels of technical knowledge. Business travel helps to improve the transfer of this technology knowledge between international firms in high-tech industries, as technology is ‘best explained and demonstrated in person’.</td>
<td>Their study found a statistically significant link between business air travel and patenting activity. Specifically, a 10% increase in business travel leads to a 0.2% increase in patenting.</td>
</tr>
</tbody>
</table>

Sources: See footer

In the context of the airline sector, if the cost of purchasing an airline ticket falls in response to an APD cut, companies could accommodate more trips to visit customers and gain access to larger marketplaces. Furthermore, a cut in APD might be expected to make more international routes from the UK viable, boosting connectivity and facilitating increased overseas trade. Higher business air usage can also improve the efficiency of existing production and supplier relationships and facilitate cross-border investment, again leading to more productive business outcomes.

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43 We would not expect a reduction in ticket costs to translate directly into an increase in demand as cost is not the only driver of the decision to fly, factors such as timing, business opportunities, communications networks and carbon footprints will also be important. This factor is reflected in later modelling.
Several studies have quantified the scale of the productivity gain resulting from an increase in business air usage. The exact definition and the size of this relationship differs slightly across study specification (which are described in more detail in Table 5, below). However, each study concludes the common finding of a significant relationship between expansion in airline activity and GDP – driven by an increase in productivity.

Table 5: Studies showing a positive productivity gain from increase in business air usage

<table>
<thead>
<tr>
<th>Source</th>
<th>Scope of report</th>
<th>Modelled variables</th>
<th>Scale of impact</th>
<th>Other key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxford Economics (2006)</td>
<td>Estimates a statistical relationship between UK business air usage and total factor productivity based on panel data for 31 UK industries over 27 years.</td>
<td>Business air usage variable is constructed by combining the number of business passengers at UK airports with the volume of airfreight.</td>
<td>A 10% increase in business air usage raises total factor productivity and UK GDP by 0.6%.</td>
<td>Results imply that rapid growth in air transport usage over the last decade has boosted long-run underlying productivity by 2% across the EU-25.</td>
</tr>
<tr>
<td>IATA (2006)</td>
<td>Estimates a statistical relationship between connectivity and GDP using panel data for major airports across the EU.</td>
<td>Defines connectivity as the number of flights from a given airport weighted by the importance of each of the destinations served</td>
<td>A 10% increase in connectivity (relative to GDP) increases both long-run productivity and GDP by 0.9%.</td>
<td></td>
</tr>
<tr>
<td>IATA/Inter VISTAS (2010)</td>
<td>Estimates a relationship between a number of aviation-specific variables (including connectivity) and labour productivity based on panel data for 48 countries over 9 years.</td>
<td>Defines connectivity as the Aviation Connectivity Index, which is produced by IATA.</td>
<td>A 10% increase in connectivity would increase long-run productivity and GDP by 0.07%</td>
<td>‘Small’ estimate may be driven by outliers (i.e. Poland). Aviation impact is strong and cumulative over time, driving higher exports, higher tourism and potentially higher export prices.</td>
</tr>
</tbody>
</table>

Sources: See footer


45 Sources include:


Tam, R. and Hansman, R.J. (2002) “Impact of air transportation on regional economic and social connectivity in the United States” International Center for Air Transportation Department of Aeronautics and Astronautics Massachusetts Institute of Technology Cambridge, Massachusetts, USA.

http://dspace.mit.edu/bitstream/handle/1721.1/35884/ATIO_tamhansman.pdf

Other econometric studies have focussed on quantifying a relationship between air transport connectivity (a slightly different measure to business air usage used by Oxford Economics) and GDP growth. They show that a 10 percent increase in business air usage, or air travel connectivity, leads to an increase in whole economy productivity of between 0.07 percent and 0.9 percent.\(^46\)

In 2006, IATA conducted a study using data from major airports across the EU and that found a significant relationship between connectivity and GDP\(^47\). The authors constructed their proxy for connectivity based on the number of flights from a given airport weighted by the importance of each of the destinations served. They found that a 10% increase in connectivity (relative to GDP) increases both long-run productivity and GDP by 0.9%.

A key result comes from a 2006 Oxford Economics study that highlights the statistical linkage between business air usage and the level of GDP – technical terms the study finds that business air usage and Total Factor Productivity are cointegrating relationships. This is a relatively basic, but robust economic test. Their statistical analysis implies that “that, other things equal, a 10% increase in business air usage could raise GDP by 0.6% in the long run”\(^48\).

The Oxford Economics approach is a top-down macro analysis that captures the wider benefits of aviation usage. A joint study by IATA/InterVISTAS (2010) looks at the issue from a bottom up perspective and focuses on the separate issue of “connectivity”. The term connectivity refers to an index of connections that a country has to the global air transport network.

The hypothesis behind the study is that “greater connections to the global air transport network can boost the productivity and growth of economies by providing better access to markets, enhancing links within and between businesses and providing greater access to resources and to international capital markets”. Their report finds that “there is a statistically significant and positive link between connectivity and productivity. A 10% increase in connectivity, relative to GDP, can increase long-term productivity levels by 0.07%”. The results from this study are less clear cut than those in the Oxford Economics study. The same style of cointegration test was applied but it was not possible to determine whether air transport caused growth in productivity or productivity caused growth in air transport.\(^49\) Whereas in the Oxford Economics study suggests that growth in business passengers causes growth in GDP.

The range of studies reviewed all point to a link between whole economy productivity and airline sector output. In later Sections, we describe how we use this evidence to define this relationship in our economic modelling of APD, more generally, our approach for making a quantitative estimate of the deadweight loss for APD.

**Taxation’s impact on the economy**

The tax system plays a crucial role in influencing the rate of short and long-term economic growth in the UK economy. In aggregate, the amount of tax raised, the type of tax raised and its interaction with public spending will affect the long-term growth rate of the economy. However, individual tax policy measures are less likely to augment the rate of economic growth for any sustained period as they are smaller in scale, but they can affect the level of GDP. In the following Section, we start by explaining the underlying economic principles for how

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\(^{46}\) The exact definition of this relationship differs slightly across the study specifications. For example, the Oxford Economics (2006) study estimates a relationship between business air usage and total factor productivity. Alternatively, IATA (2006) estimate a relationship between a proxy for connectivity (the number of flights from a given airport weighted by the importance of each of the destinations served) and GDP. However, each study has in common the finding of a significant relationship between expansion in airline activity and GDP – driven by an increase in productivity.


\(^{48}\) In this study Oxford Economics also note that from a separate data source the following trend is also apparent: “The long-run relationship identified in that modelling implies that a 10% increase in output of air services would lift productivity and potential output by 0.56% in the long run – in line with our estimates for the UK. In terms of historical performance, the results imply that the rapid growth in air transport usage over the last decade has boosted long-run underlying productivity (i.e. TFP) by 2.0% across the EU25”.

\(^{49}\) As the authors note, this finding is unsurprising as when the economy grows there will be improvements in air transport connectivity and seemingly vice versa.
taxation in effects economic incentives. We go on to discuss the additional economic considerations that may govern how far an individual policy measure on APD may affect growth or the level of GDP.

**The distortive nature of taxation: A return to first principles**

The TSC noted that taxation in general is “likely to reduce economic efficiency by distorting price signals”. In economic theory, this is represented by the concept of a “deadweight loss” to society: an unrecoverable loss in consumer and producer welfare that results from an application of a tax on a product. However, some taxes are more distortive than others in terms of their effect on the level of GDP.

For direct taxes, these distortions are created by reducing wages or profits, leading to households reducing their spending and firms reducing their investments. For indirect taxes (including, APD) these distortions are created by increasing the price of the good or service to which the tax is charged (in this case, an international or domestic flight), leading businesses and households to adjust their behaviour to avoid paying the tax which results in a lower amount of quantity sold. By reducing the amount purchased, consumers are worse off – the extent to which they are worse off is defined as a deadweight loss of taxation. This concept can be explained using a supply and demand curve framework (see Figure 11 below).

The equilibrium price and quantity that prevails in the market for the product or service in question (i.e. a flight ticket) is determined by the intersection of the market demand and supply curves. Before the application of the indirect tax (i.e. APD), the quantity consumed in the market is represented by point Q0 in Figure 11. Once the tax is applied, the market supply curve shifts upwards by the amount of the tax. The equilibrium price for consumers is now higher (P1), so they demand less of the product. As a result, consumer surplus (a measure of consumer welfare) falls from Areas 1, 2 and 3 to Area 1. At the same time, the price received from the producer falls to P1-tax and therefore, producer surplus (a measure of producer welfare) falls from Areas 4, 5 and 6 to Area 6. The Government captures a portion of the consumer and producer surplus through tax receipts (Areas 2 and 3). However, some of the original surplus in the market is lost forever – represented by Areas 3 and 5.

**Figure 11: Deadweight loss caused through application of indirect tax**

Source: Adapted from Varian (2010), PwC analysis

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51 See our main report for a fuller description – findings based on Varian (2010), Microeconomic Analysis,

A common measure of the deadweight loss is the amount of GDP forgone per unit of revenue raised. A deadweight loss of 0.5 should be interpreted as 50 pence of GDP lost per £1 of tax revenue raised. Governments set tax policy to balance the need to minimize the deadweight loss to society with the imperative to use the proceeds of taxation to provide goods that might otherwise be underprovided by a free market and to correct other market failures.

**Static factors driving the deadweight loss of APD**

Using the static framework laid out in Figure 11, above, the extent of the deadweight loss associated with an indirect tax is influenced by both the absolute level of the tax imposed and the steepness of the demand and supply curves (otherwise known as their elasticity). In this Section, we will discuss how the absolute level of APD and the elasticities recorded in the aviation sector may influence the extent of its deadweight loss.

- **The absolute level of air passenger tax imposed**

  The higher the tax rate applied in Figure 11, the further the supply curve shifts up in response and the associated deadweight loss becomes larger. Countries with higher indirect tax rates therefore suffer the most deadweight loss. Figures 4 and 5 illustrate the finding that the UK levies the highest air passenger taxes in the world. As the deadweight loss in the UK associated with APD is likely to be higher than in other countries, it can reasonably be expected that the abolition of APD might have a disproportionally large beneficial effect on consumer and producer welfare in the UK.

- **Elasticity of supply and demand conditions in the aviation industry**

  Steeper demand and supply curves in Figure 11 reflect more inelastic supply and demand conditions in the market. This means that supply or demand is relatively insensitive to changes in price.

  Whilst APD is partly a tax on business inputs, it is also a tax on consumption (also known as an indirect tax). Figure 2 shows that consumers pay around three quarters of the total APD tax take. Ramsey was one of the first economists to consider how indirect taxes could be structured to reduce the distortions associated with the tax system (the ‘excess burden’ that was described above). He concluded that the optimal indirect tax rate varies between goods and, more specifically, showed that the excess burden of the tax system is minimised when tax rates for individual goods are proportional to the inverse of its price elasticity of demand. In other words, to reduce demand for each good by the same proportion (and thereby, avoid distorting behaviour), higher tax rates should be applied to more inelastic goods (and vice-versa for elastic goods). More recent studies have also contributed to our understanding of the most efficient types of indirect tax. Auerbach and Hines (2002) conclude that ad valorem-type consumption taxes (such as VAT) are associated with a lower welfare loss than specific-type consumption taxes (such as APD).

  Whilst the administration costs associated with applying the Ramsey Rule exactly would be prohibitive and there are several good reasons why modern tax systems stray from its prescriptions (for instance, to apply higher taxes to goods with strong negative externalities), this general rationale for taxing inelastic goods at higher rates still holds today. This provides the basis for our evaluation of the price elasticity of demand for undertaking international air travel, which will also be an important input assumption into our CGE model.

  The price elasticity of demand measures the sensitivity of consumers to a change in the price of an underlying product or service. Appendix A provides a survey of the main components of the academic literature and studies that are relevant to the UK. A key conclusion from this survey is that the sensitivity to air travel prices differs between market segments and at different points of the decision-making process. On this latter point, our survey suggests two important types of elasticity which are influenced by the price of an international flight ticket, and hence, the rate of APD.

  1. The own-price elasticity of demand for international air travel measures the sensitivity of consumers to a change in the flight ticket price exclusively.


2. The tourism demand elasticity measures the sensitivity of consumers to a change in the overall tourism product, a portion of which is influenced by the price of an air ticket.

A number of academic studies show that consumer behaviour reflects different elasticities across the decision-making process for taking a flight. In Figure 12, below, a framework is set out to help analyse how the demand elasticity estimates vary across this decision-making process for different underlying purposes of travel. This is based on the multi-stage budgeting process set out by De Mello and Fortuna (2005) in their application of the Deaton and Muellbauer’s (1980) Almost Ideal Demand System (AIDS) for UK tourism demand and involves three key steps:

1. **Examine individual budget constraint:** Once the underlying need to travel is established, the individual decides an overall budget for the trip.

2. **Location decision:** The individual then decides which location to choose within this set budget.

3. **Allocation of the budget:** Given the location choice, the individual decides how to allocate the budget amongst the major expenditure items of the trip (including flights, accommodation, activities etc).

*Figure 12: Motives behind decision to travel*

<table>
<thead>
<tr>
<th>Underlying reason to travel</th>
<th>Examine individual budget constraint</th>
<th>Location choice</th>
<th>Allocation of the budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why do I need to travel?</td>
<td>What is my budget for the trip?</td>
<td>Where can I afford to go on this budget?</td>
<td>How do I allocate the budget between accommodation and flights?</td>
</tr>
<tr>
<td>Holiday</td>
<td>Very elastic</td>
<td>Very elastic</td>
<td>Moderately elastic/inelastic</td>
</tr>
<tr>
<td>Visit friends and family</td>
<td>Very elastic</td>
<td>Moderately elastic/inelastic</td>
<td>Moderately elastic/inelastic</td>
</tr>
<tr>
<td>Business</td>
<td>Moderately elastic/inelastic</td>
<td>Very inelastic</td>
<td>Very inelastic</td>
</tr>
</tbody>
</table>

**Elasticities**

At each of these steps, the consumer is sensitive to the price of the final product (i.e. the holiday or the business trip) and reacts according to an own-price elasticity of demand. For example, at the first stage if the cost a foreign holiday is greater than what an individual can afford, they will decide not to go. Our survey suggests that the purchase decision is at its most sensitive to the price of the trip at the start of the decision-making process, where the consumer decision may be more aligned to tourism demand elasticities. It is only at the last stage when the flight is purchased and the consumer’s decision is at its most inelastic. This implies that it is not sufficient to use solely the pure own-price elasticity of air travel to estimate the behavioural impact of APD, a broader appreciation of the elasticity to undertake tourism, business trips and visiting family and friends is also required. Indeed, this result is intuitive – the rise of the package holiday (where the ‘tourism product’ and the flight are sold together) would theoretically lead to a greater alignment between tourism and air travel elasticities.

Source: PwC analysis

At each of these steps, the consumer is sensitive to the price of the final product (i.e. the holiday or the business trip) and reacts according to an own-price elasticity of demand. For example, at the first stage if the cost a foreign holiday is greater than what an individual can afford, they will decide not to go. Our survey suggests that the purchase decision is at its most sensitive to the price of the trip at the start of the decision-making process, where the consumer decision may be more aligned to tourism demand elasticities. It is only at the last stage when the flight is purchased and the consumer’s decision is at its most inelastic. This implies that it is not sufficient to use solely the pure own-price elasticity of air travel to estimate the behavioural impact of APD, a broader appreciation of the elasticity to undertake tourism, business trips and visiting family and friends is also required. Indeed, this result is intuitive – the rise of the package holiday (where the ‘tourism product’ and the flight are sold together) would theoretically lead to a greater alignment between tourism and air travel elasticities.

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55 We have split the underlying reasons to travel into the three main groups cited by the ONS; holiday, business and visiting friends and family.

Whilst our findings show that tourism elasticities may better reflect consumer’s sensitivity to elements of the flight purchase decision, policymakers often only apply air ticket elasticities in the revenue forecasting process. For example, in the Department for Transport’s latest air passenger forecasts, relatively low estimates for the air fare elasticity of demand were used. An elasticities of -0.7 was used for the UK leisure sector, with -0.6 used for the foreign leisure market. Lower air fare elasticities of -0.2 are used for both the UK and foreign business markets.

The recent academic literature which provides estimates for demand elasticities on UK inbound and outbound tourism markets has also been surveyed. In general, the median elasticities from these studies were higher than the air fare elasticities used by the Department for Transport (see Figure 13, below). This result is important – if the choice of air travel is measured by evaluating the flight elasticity only, this artificially lowers the overall demand elasticity. When policymakers rely on such estimates to set the rate of APD, they risk underestimating the magnitude of the elasticity and therefore conclude that the airline sector could tolerate a higher tax rate than the underlying elasticity might suggest.

Figure 13: Tourism demand elasticity estimates for UK inbound and outbound passengers

Sources: Multiple sources (see Appendix A for details)

The above findings are important for the impact assessment resulting from our CGE model. If more elastic assumptions are applied, the behavioural response to a change in the APD rate will be greater, increasing the number of outbound and inbound passengers in the UK. The extent of this increase in passengers will depend upon the total volumes of passengers making up each group. Our analysis shows that there is a relatively even balance between air passengers arriving in the UK and leaving the UK (see Table 6, overleaf).

57 ‘UK aviation forecasts’, Department for Transport, August 2011.
Table 6: Total number of passengers arriving and departing the UK (2011)

<table>
<thead>
<tr>
<th></th>
<th>Outbound (UK) (one way)</th>
<th>Inbound (Foreign) (one way)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Passengers</td>
<td>80,012,996</td>
<td>81,217,624</td>
</tr>
</tbody>
</table>

(Point of Sale UK) and inbound passengers visiting the UK (Point of Sale outside UK).

Source: Sabre Airport Data Intelligence Database

However, how this increase in the number of passengers resulting from a cut in APD impacts economic activity (and growth) will depend not only on the level of the elasticity estimates of UK inbound and outbound passengers and their respective volumes but on the relative strength of the multipliers that results from both groups’ consumption habits. These concepts are discussed in more detail when considering the results of the CGE model.

Wider factors driving the deadweight loss of APD

Our research suggests that there are further considerations that may influence the deadweight loss associated with APD but are not captured by the static framework above. Based on a review of the associated published economic evidence, recurrent themes are:

- The extent to which APD acts as a tax on business inputs (which is considered to one of the most distortive ways to raise tax revenues.
- The extent to which improving business air usage has a positive impact on GDP by boosting productivity – relating directly to the discussion above.

We consider the concept of business input taxation below:

The extent to which APD acts as a tax on business inputs

The have surveyed academic evidence surrounding the economic effects of indirect taxes focuses on their role changing consumer incentives. However, APD is not only a tax on household consumption – businesses will also pay APD. Where businesses have a large international client base and contribute substantially to UK exports, the costs of air transport will be significant - APD will represent a proportion of this cost\(^5\).

At this juncture it is worth making a critical point that will frame our findings throughout this section. As described, APD feeds directly into the firm’s cost base. In a world with no cash constraints businesses would likely spend more time with their overseas clients. However, they will have other spending priorities. We do not infer that if APD was abolished all additional costs savings realised by firms would be transferred into extra flights. However, we do suggest that the multiplier benefit to the UK economy from the business generated through an additional flight is substantive and carries a direct link to the amount of APD paid. This point is developed through the remainder of this section.

It is not clear from published HMRC revenue data how much APD is paid by households and how much by businesses. Data supplied to PwC from the Civil Aviation Authority (CAA) suggests that businesses paid around £500 million worth of APD in the 2010/11 tax year (see Figure 14 below).

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\(^5\) We have acquired flight purchasing data for a UK division of a large multinational firm in the service sector. The firm spent £24.2 million on 50,622 flights for its employees between October 2011 and September 2012. The firm paid £1.1 million in APD over the same period, around 5% of the total expenditure.
The economic impact of Air Passenger Duty

Figure 14: Estimated APD raised by travel type and by band in 2010/11 (£, billions)

Source: PwC analysis based on CAA and HMRC data. HMRC data provided the APD revenue split between different bands. CAA Passenger Survey data used to estimate the business/leisure split within each band. Note only routes with estimated annual passenger numbers above 30,000 were used due to low sample size for other data.

In their seminal 1971 article, Diamond and Mirrlees illustrate that taxes on business are a particularly distortive type of tax as they affect both the production and the consumption decision.\(^59\) Taxes on business inputs change the relative price of production components, which may lead to less usage of one of those components.\(^60\) If their input prices change, firms might adjust their behaviour by using less or none of the taxed input. As inputs are not used in their most productive way (they are either re-allocated to other less productive firms or not used at all), productivity falls, which then feeds through into lower levels of output.

Price increases in the early stages of the production process may cascade through the supply chain, and ultimately affect final prices for consumers. Consumers react by purchasing less of the good or not purchasing it at all, which creates an additional distortion. This finding is corroborated by recent studies by the OECD\(^61\) and wider academic evidence (Mirlees Review, 2011\(^62\); Gordon and Lee, 2004\(^63\); Kneller, Bleaney and Gemmell 1999\(^64\); Arnold et al., 2011\(^65\)) which all suggest in some form or other that corporate taxes and taxes that are levied on business inputs are the most economically distortive.

Overall, these distortions manifest themselves in a lower level of economic output. Figure 15 presents high level results from a study by the OECD that ranked the harmfulness of different tax types on GDP. The OECD concludes that the distortions associated with company taxes provide the basis for revenue neutral growth-

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orientated tax reform that would shift the revenue base away from more distortive taxes and towards less distortive taxes.

*Figure 15: Based on OECD (2008)*\(^{66}\) analysis of 21 countries during the period 1971-2004

<table>
<thead>
<tr>
<th>Least harmful</th>
<th>Impact on GDP</th>
<th>Most harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Property tax</strong></td>
<td>Consumption tax</td>
<td>Personal income tax</td>
</tr>
</tbody>
</table>

Source: OECD (2008)

On this spectrum, APD can be redefined as two different types of taxes:

- Firstly, it is a tax on the consumption of airline tickets paid for by UK households. Discounting the rate of tax and the elasticity of demand, this would imply that APD is an economically efficient tax. However, the tax rate and the elasticity are critical components and will affect the overall tax ranking.

- Secondly, whilst APD is not a tax on corporate income, the element that lands on businesses has a similar effect of reducing profits as it will be part of a firm's cost base. As a tax on business inputs, APD feeds into other measures of the tax burden, including the Effective Marginal Tax Rate (EMTR) and the Average Effective Tax Rate (AETR).

The distortions generated from APD’s role as a tax on business manifest in two distinct ways:

- Businesses reduce the number of flights they undertake to and from the UK; and

- The UK becomes a less attractive destination for business location.

Davies and Armsworth (2010) show that increasing APD could significantly reduce the number of flights company employees and owners make. The impact on business flight costs and number of flights taken for a representative company within three industries is shown in Figure 16, below. The context of the Davies and Armsworth (2010) paper is important – its main objective is to examine the impact of different taxation policies on environmental outcomes. The authors comment positively that a fall in demand for flights from business reduce CO2 emissions in the UK. A full description of this study within the wider context of the literature on the impact of APD on the environment is discussed in later sections.

The economic impact of Air Passenger Duty

Figure 16: Increase in business flight costs (%)* from a rise of APD under four scenarios

<table>
<thead>
<tr>
<th>Short-haul economy rate increases by £10</th>
<th>Short-haul premium rate increases by £20</th>
<th>Long-haul economy rate increases by £40</th>
<th>Long-haul premium rate increases by £80</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Short-haul” economy rate increases by £10</td>
<td>34</td>
<td>414</td>
<td>316</td>
</tr>
<tr>
<td>“Short-haul” premium rate increases by £20</td>
<td>85</td>
<td>138</td>
<td>4</td>
</tr>
<tr>
<td>“Long-haul” economy rate increases by £40</td>
<td>372</td>
<td>34</td>
<td>5</td>
</tr>
<tr>
<td>“Long-haul” premium rate increases by £80</td>
<td>1</td>
<td>26</td>
<td>92</td>
</tr>
</tbody>
</table>

*x Note: A business flight cost is defined as: the annual cost implication to travel within each ticket class before a reduction in travel as a result of the tax.


As well as the decision to fly, APD has the potential to impact on the decision of multinational firms as to where they locate their activity. This decision can take several different forms: from an SME deciding whether to locate an individual in the UK to be closer to a supplier, or a multinational firm deciding where to locate its European headquarters or a manufacturing plant. Transport linkages and costs will both be components of the location decision.

There is a large body of economic literature discussing the link between taxation, foreign capital flows and firms’ location decisions. Generally, these studies highlight the sensitivity of location decisions to the costs associated with doing business; including taxation (see de Mooij and Ederven, 2008 for an extensive review). De Mooij and Ederven note that in the setting of discrete location choices, investment processes that have both large upfront costs and economic rents that are mobile across borders, the tax burden becomes an important decision factor. In their detailed meta-analysis of some 371 FDI elasticities, they find a median estimate of -2.9 (otherwise interpreted as; a 1% increase in the tax measure in the location reduces foreign capital by 2.9%).

Despite this price sensitive relationship, when the difference in passenger taxes between potential locations in minimal, the tax rate may be, at most, a marginal component of the location decision. However, when there are larger passenger tax differences between potential destinations, the location decision may entail substantive differences for the cost base of the firm, and so becomes a more significant factor. It has already been shown that the UK has the highest long-haul passenger tax rate in the world, applying a tax level double that of the second most highly-taxed country. This differential means the location decision could make a substantial difference to company’s cost base.

*Note: This paper evaluated the impact of a number of measures of the tax burden – not just the headline corporate income tax rate. Whilst APD is not a direct tax on income, a noted above it has a similar effect of reducing profits. As a tax on business inputs, APD feeds into other measures of the tax burden.

The PwC Computable general equilibrium model

The dynamic economic model used to assess the economic impact of APD in this study is known formally as a Computable General Equilibrium (CGE) model. The model captures the key features of the UK economy and


68 ‘Corporate Tax Elasticities: A Reader’s Guide to Empirical Findings’, Oxford University Centre for Business Taxation, De Mooij and Ederven (2008). Note: This paper evaluated the impact of a number of measures of the tax burden – not just the headline corporate income tax rate. Whilst APD is not a direct tax on income, a noted above it has a similar effect of reducing profits. As a tax on business inputs, APD feeds into other measures of the tax burden.
The economic impact of Air Passenger Duty

the aviation and tourism sectors. It is a scenario based model and projects the impact of a reduction in APD or its abolition on key economic and fiscal variables over a 30 year time horizon.

What are CGE models?

Over the past 25 years, CGE models have become a standard tool of empirical economic analysis. CGE models capture a detailed range of commodities, sectors and production factors in the economy and assume that demand and supply of each commodity and factor are balanced. A CGE model is a set of equations that numerically simulates the interactions of differing agents in the economy. In essence, a CGE model captures the economic behaviours of all agents (consumers, producers, Government, investors, etc.) in the economy using equations; Figure 17 below provides such an illustration. All equations are simultaneously linked between markets, institutions and factor resources such that all markets are in equilibrium and interrelated. After a policy shock, agents adjust to price changes until equilibrium is restored. A CGE model then compares the differences between the baseline and policy shock scenarios to evaluate the economic impact. CGE Modelling is built on the Walrasian General Equilibrium Structure which was developed and refined by inter alia, Arrow and Debreu (1954),69 Debreu (1959)70 and Arrow and Hahn (1971).71 The IMF, World Bank, OECD and several national Governments (including the UK) use similar models to quantify the impact of policy changes.

Figure 17 below shows the economic interactions between households, businesses and the Government captured in the CGE model. Each of these institutions is interlinked through either labour market or capital market flows, intermediate product demand, taxes or Government transfers.

Figure 17: Relationships captured in a CGE model

PwC UK CGE model: overview of key features

The model used in this report is a single-country dynamic model, based on 2010 UK data. This particular version of the model has 11 industries, 11 product markets, 1 household type, 3 types of labour (professional, skilled and unskilled) and differentiates capital provisions between debt and equity. The aggregation of the CGE model is flexible, the 15 industries chosen can be augmented to change the focus of the model to more than 80 different industries.


Since the model is dynamic, it tracks the evolution of the economy over time as it reacts to changes. There are also a number of assumptions, grounded in economic theory, about various other interactions in the economy, such as how the Government behaves when it receives additional, or reduced, income. This dynamic approach has the distinct advantage that it captures the inter-temporal aspect of agents’ decision making. For example, if an airline knows it will have to pay higher taxes on profits in three years, this will influence its decisions about investment today. Given the inherent uncertainties with such long-term projections we place more emphasis on the model’s results projected to the year 2020.

A key feature of our modelling approach is that it measures the ‘net’ effect on key economic and fiscal variables. This differs from the approaches that measure the gross effects described in the earlier sections. Our approach also takes account of feedback mechanisms and dynamic linkages in the economy that may work to counteract or augment the gross effects from a cut in APD.

The CGE model is based on a group of industrial sectors. The primary data source for these sectors is the 2010 Supply and Use Tables (SUTs) for the UK economy. The UK SUTs split UK GDP down to 110 sectors ranging from different agricultural, manufacturing, utilities, construction, retailing, transport, financials, Government and services sectors. This broad sector grouping gives the CGE model flexibility in the sectors it can model and allows detailed analysis of market interactions, demand, tax issues and competitiveness. The 110 sectors are aggregated to a choice of 10-20 sectors (depending on model specification).

The model also provides a detailed overview of the UK tax system, approximately 95% of all tax receipts and welfare payments in the UK economy are captured in the model. The model does not account for taxes that are paid on a ‘realisation basis’, by this we mean taxes such as stamp duties or inheritance taxes where it is difficult to predict when such transactions will occur. Not all UK tax system data is published at the sectoral level, so on this basis we do not fully model fiscal results at the sector level. All welfare payments accrue to the representative household, so are only reported in aggregate.

**Adapting the CGE model to the tourism sector**

The CGE model is bespoke – several additions have been made to a standard version of a large-scale more generalised CGE model to reflect the underlying economic characteristics of the tourism and aviation sectors (see Figure 18, below).

**Figure 18: Our application of a standard PwC dynamic model for analysing APD**

A key feature of the CGE model is its specific sectoral representation of the airline and tourism sectors. As described above, the sector data is taken from 2010 UK Supply Use Tables (SUTs) published annually by the Office of National Statistics. The SUTs cover 110 sectors of the UK economy and are aggregated into the sector listing in Table 7 overleaf. At the sector level we differentiate between air transport and elements of the UK tourism sector: accommodation, restaurants, tour operators and the recreation sector.

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The SUTs are supplemented with separate tourism data published by the ONS on tourism passenger arrivals and spending patterns. The most important piece of additional tourism data is the UK Tourism Satellite Account (UK-TSA) which provides information about the demand for goods and services associated with the activity of tourists and the relationship of this demand to the supply of such goods and services within the UK economy. The UK-TSA shows expenditure by product type for both UK inbound and outbound tourists for 2009. The CGE model projects this data forward to 2010 and beyond based on passenger volume data and consumer income data.

The UK-TSA data is important for the model as it maps the consumption patterns of foreign inbound, UK outbound and UK domestic tourists. A summary of the data is presented in Table 8 below in terms of expenditure per night by inbound and outbound tourists. The table shows that foreign inbound tourists spending considerably more per night in the UK (£84.37p) versus UK residents spending overseas (£51.59p) overseas. The largest component of tourist’s expenditure is on accommodation. Flight purchases are not included in this data, the data on flight purchases represents secondary internal flights that are purchased on arrival or prior to making the journey to the UK.
Table 8: Spending by UK residents travelling overseas and foreign inbound tourists in the UK per night (2009)

<table>
<thead>
<tr>
<th></th>
<th>Outbound tourism expenditure (per night)</th>
<th>Inbound tourism expenditure (per night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation services for visitors</td>
<td>£11.50</td>
<td>£19.04</td>
</tr>
<tr>
<td>Food and beverage serving services</td>
<td>£7.70</td>
<td>£13.00</td>
</tr>
<tr>
<td>Railway passenger transport services</td>
<td>£0.60</td>
<td>£1.89</td>
</tr>
<tr>
<td>Road passenger transport services</td>
<td>£1.69</td>
<td>£1.85</td>
</tr>
<tr>
<td>Water passenger transport services</td>
<td>£0.35</td>
<td>£0.84</td>
</tr>
<tr>
<td>Air passenger transport services</td>
<td>£1.71</td>
<td>£10.98</td>
</tr>
<tr>
<td>Transport equipment rental services</td>
<td>£0.15</td>
<td>£0.45</td>
</tr>
<tr>
<td>Travel agencies and other reservation services</td>
<td>£0.20</td>
<td>£0.37</td>
</tr>
<tr>
<td>Cultural activities</td>
<td>£2.33</td>
<td>£0.77</td>
</tr>
<tr>
<td>Sport and recreation activities</td>
<td>£1.68</td>
<td>£0.64</td>
</tr>
<tr>
<td>Exhibitions and Conferences etc.</td>
<td>£0.31</td>
<td>£0.45</td>
</tr>
<tr>
<td>Other consumption products</td>
<td>£23.37</td>
<td>£34.08</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£51.58</strong></td>
<td><strong>£84.37</strong></td>
</tr>
</tbody>
</table>

Source: ONS, PwC Analysis

Conventional CGE models do not specify a relationship between an increase in air travel connectivity and productivity. It is possible to build this linkage into the model directly or specify any link separately, outside of the model. Due to reasons of technical complexity we have chosen to specify this linkage outside of the model and the precise scale of this linkage is discussed in the section below. The reason for specifying the linkage externally is that it allows the scale of the linkages to be explored in much more detail in sensitivity analysis in later sections of this report.

**Scenario design**

The model was specifically designed to enable us to examine the impact of the abolition of APD on the UK economy, using credible assumptions in order to present a balanced view. Scenarios we considered were defined by: (i) the chosen policy option for APD and (ii) other variables included in the model that could be affected by a cut in APD. For the purposes of this report we consider a scenario where APD is abolished in Budget 2013.

In addition, we add to our scenario a **positive productivity gain associated with an increase in business air usage**. Based on the evidence of a causal relationship for the impact of aviation expansion on productivity we make an explicit link in our modelling to account for this relationship. Given the range of quantitative estimates we were able to obtain we have chosen a reasonably conservative point estimate. The assumption we impose on the model is that a 10 percent increase in business air usage would lead to an increase in whole economy productivity of 0.2 percent.\(^\text{73}\)

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\(^\text{73}\) This choice is governed by the range of quantitative estimates discussed above. The lower end of the range is the IATA/InterVISTAS study which deals explicitly with connectivity and concludes that "a 10% increase in connectivity,
In what follows, the baseline scenario is explained, data sources used are outlined (along with manipulations made to the raw data), the limitations of the model considered, and the results of stress testing referred to. The full model specification (i.e., model equations) are available on request from PwC.

**What is the impact on GDP from a reduction in APD?**

**Impact on the level of GDP**

In our scenario we model the complete abolition of APD and examine its direct and indirect economic consequences. Our analysis found that this could have a positive impact on the level of UK GDP, compared to a baseline case of no policy change (see Figure 19 below). In 2013, the policy could produce a positive stimulus to the economy of just under 0.5 percent of GDP. Over time, this effect would be expected to dissipate but the economy would still experience a small but positive longer-term gain of around 0.1 percent on the level of GDP. The results show an average gain to the economy of 0.3 percent between 2013 and 2015. The difficulty in predicting the precise trajectory of GDP in the early years of the models is that it is dependent on the pace at which both airlines and non-airline sector business are willing to invest. Nonetheless, we might expect the economic response to be front loaded as any cut in APD would most likely pass through to airline ticket prices relatively quickly.

All gains to the economy are shown to be permanent in the model. In the 7 years to 2020 the output of the economy could be around 1.5 percent bigger than it otherwise would have been without the abolition of APD.

**Figure 19: Impact on level of real GDP from the abolition of APD (percent change from the base case)**

```
<table>
<thead>
<tr>
<th>Year</th>
<th>Impact on GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>0.46%</td>
</tr>
<tr>
<td>2014</td>
<td>0.27%</td>
</tr>
<tr>
<td>2015</td>
<td>0.19%</td>
</tr>
<tr>
<td>2016</td>
<td>0.15%</td>
</tr>
<tr>
<td>2017</td>
<td>0.13%</td>
</tr>
<tr>
<td>2018</td>
<td>0.12%</td>
</tr>
<tr>
<td>2019</td>
<td>0.11%</td>
</tr>
<tr>
<td>2020</td>
<td>0.11%</td>
</tr>
</tbody>
</table>
```

*Note: The GDP impact of 0.15 percent in 2016 should be interpreted as: The level of real GDP in the economy will be 0.15 percent higher with an abolition of APD compared to the base case of no abolition.*

*Source: PwC analysis*

**What drives this result?**

**The initial stimulus** that occurs in the first full year of the policy’s implementation is driven by:

- An increase in industry investment in the aviation sector, which could comprise re-routing, the fast-tracking of aircraft upgrades and purchases, airline marketing spend or infrastructural improvements.

relative to GDP, can increase long-term productivity levels by 0.07%" and at the upper end a separate IATA study carries a similar coefficient equal to 0.9%.
The economic impact of Air Passenger Duty

- A behavioural reaction, as UK and non-UK consumers purchase more flight tickets due to their lower relative price for both business and leisure purposes. This effect is accentuated by the current high-level of APD compared with international air travel taxes. As a result, there is a net tourism inflow and a net tourism expenditure (and hence, net exports) increase.

- A small UK-wide productivity gain associated with business air usage. However, this effect is felt more strongly in later years as it takes time for businesses to build new international relationships. Any short-term gain is likely to materialise through more effective delivery of planned work or securing new short-term contracts.

Over the longer-term, the economy will experience a **small but permanent GDP gain**. This is characterised by:

- Firms having time to develop stronger international business relationships and raise productivity to meet increased demand. Household consumption and exports are modelled to increase through this period. Our results show modest increases in output across the majority of business sectors in our model. There would be increased job creation as well through this period and this would have positive second round effects on both consumption and investment as the additional employees spend their salaries. Estimates from the model suggest that that almost 60,000 jobs could be created between now and 2020.

- Investment by airlines is front-loaded, displacing a proportion of investment that might have occurred in later years.

- The volume of net foreign inbound tourism passengers is 7 percent higher by 2020 compared to the baseline where APD continues to rise in line with current announced plans. This 7 percent figure can be broken down into inbound and outbound tourists. Notably, inbound household and business passenger travel are modelled which increase by 11 percent and 10 percent respectively.

- A negative effect from the expenditure patterns of foreign and UK consumers limits the growth benefits over this period. This is a complex outcome. Over time, as UK consumers become wealthier, they demand more foreign holidays, for which they substitute away from domestic goods and services. This outflow is partially offset by expenditure from foreign inbound tourists, as described above. However, the positive effects of increased foreign tourism spending have weaker linkages with the rest of the economy. Foreign tourists tend to purchase a more limited range of lower value-added goods and services than domestic consumers. The net effect is a reduction in domestic production and consumption.

Overall, the economy benefits as the development of business linkages, the investment by the airlines sector and the volume of foreign tourism increases outlined above are modelled to outweigh the negative effect from a lower domestic expenditure multiplier.

Another key driver of the results is the level and type of taxation as described in the section above. Table 9 shows that the pre-existing tax burden on the airline sector is higher than perhaps previously understood, particularly with respect to the wider economy.

Table 9 provides a computation of different Average Effective Tax Rates (AETR) for the ‘Passenger Airline Sector’ which is the sector that represents the airline industry in Government economic statistics.\(^{74}\) This particular AETR measures only the APD paid by the airline sector as a proportion of its direct contribution to the economy. In this case the measure of economic contribution used is Gross Value Added (GVA).\(^{75}\) Dividing APD receipts, by GVA yields the AETR, which can be seen to have risen from 36 percent in 2008 to almost 56 percent in 2011/12.

---

\(^{74}\) This data is sourced from the Annual Business Survey (ABS) which is published annually by the Office of National Statistics.

\(^{75}\) GVA is a sub-component of the more commonly used measure of economic output Gross Domestic Product (GDP). GVA is chosen as it is available at the more disaggregated level of the airline sector. GDP data includes wider elements of the air transport sector that are not directly subject to APD. There are measures of the airline sector’s contribution to the economy that would produce much larger numbers, but these measure direct and indirect effects and would capture parts of the industry not directly affected by APD.
The economic impact of Air Passenger Duty

We have calculated a comparative figure for 2011/12 that takes into account all taxes paid for the whole economy and is computed on the basis of total tax and national insurance contributions divided by whole economy GVA. The all taxes paid calculation differs from the calculation that specifically looks at the AETR for the air passenger sector as it covers the full range of taxes in the UK economy. However, the comparative figure from the all taxes paid calculation is also almost 56 percent.

This initial high level of taxation coupled with the previously discussed finding of Diamond and Mirrlees (1971) that suggests that taxes on business inputs are particularly distortive implies that APD is at the more distortive end of the tax spectrum and that the current tax itself and any further increases would have a disproportionately negative impact on economic output.

Table 9: Comparing air transport sector Gross Value Added, APD receipts and whole economy taxes paid

<table>
<thead>
<tr>
<th></th>
<th>APD Receipts</th>
<th>GVA Air Passenger Sector</th>
<th>AETR Air Transport Sector (APD only)</th>
<th>AETR VAT and Fuel Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008/09</td>
<td>1,862</td>
<td>5,159</td>
<td>36.1%</td>
<td>10.7%</td>
</tr>
<tr>
<td>2009/10</td>
<td>1,856</td>
<td>4,826</td>
<td>38.5%</td>
<td>10.7%</td>
</tr>
<tr>
<td>2010/11</td>
<td>2,155</td>
<td>4,839</td>
<td>44.5%</td>
<td>11.8%</td>
</tr>
<tr>
<td>2011/12</td>
<td>2,607</td>
<td>4,680</td>
<td>55.7%</td>
<td>12.8%</td>
</tr>
</tbody>
</table>

Source: ONS, HMRC, HM Treasury, PwC Calculations

A further comparison is also undertaken that relates to VAT and fuel duty given that APD is designed as a replacement for VAT and fuel taxes for commercial flights (HM Treasury, 2011). The AETR for VAT and fuel duty adds together receipts data for these two taxes and then divides this total figure by whole economy GVA. There are issues with this comparison in that some sectors are VAT exempt, zero rated or have reduced rates and the calculations do not take into account the fuel intensity of the airline industry. Nonetheless, a comparison of the different year’s data in this initial high level of taxation coupled with the previously discussed finding of Diamond and Mirrlees (1971) that suggests that taxes on business inputs are particularly distortive implies that APD is at the more distortive end of the tax spectrum and that the current tax itself and any further increases would have a disproportionately negative impact on economic output.

shows that the differential between the AETR for VAT and fuel duty and the AETR for the airline sector is in the range of around 25 to 40 percent between 2008/09 and 2010/11. Which implies that the rate of APD charged could be higher than if fuel duties and VAT were directly levied on the industry.

As outlined above, economic theory demonstrates that the application of a tax on a product leads to a deadweight loss of welfare to society. There are several ways of measuring this deadweight loss. For instance, Varian (2010) measures it as the value of output that is not sold due to the presence of the tax. The change in GDP is used to measure the deadweight loss associated with different taxes in our model as we consider it better reflects the net impact of a tax – incorporating the offsetting effects and feedback mechanisms that work to augment or reduce the gross impact recorded in a measure such as output.

We have used our standard CGE model to investigate the impact on UK economic growth of cuts in different tax types in order to make comparisons of their relative economic efficiency. Table 10 below computes fiscal multipliers for a range of tax types.

---

76 “Reform of Air Passenger Duty: Response to Consultation” HM Treasury, 2011
78 Our ‘standard CGE model’ has not been explicitly adjusted to account for the airline or the tourism sector. This particular estimation is designed to capture the impact of APD in its basic form in a manner of directly equivalent modelling for the other tax heads shown.
The economic impact of Air Passenger Duty

Table 10: Results from a CGE model simulation: How much extra GDP results from a £1 tax cut (median value over 30-year time horizon)

<table>
<thead>
<tr>
<th>VAT</th>
<th>Income Tax</th>
<th>NICs</th>
<th>CT</th>
<th>APD</th>
<th>Fuel Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>£0.15</td>
<td>£0.25</td>
<td>£0.28</td>
<td>£0.55</td>
<td>£0.59</td>
<td>£0.63</td>
</tr>
</tbody>
</table>

Source: PwC analysis

There is a significant difference between two main groups of taxes:\(^79\)

i. **More efficient tax types** (including Income Tax, VAT and NICs) are less distortive and tend to be levied on consumers and employees. They boost growth by only between £0.15 and £0.28 when they are cut by £1; and,

ii. **Less efficient tax types** (including Corporation Tax, APD and Fuel Duty) which are more distortive taxes that affect business costs and profitability. They boost growth by between £0.55 and £0.63 when they are cut by £1.

This result is broadly consistent with the findings from other major studies in this area. In particular, our ranking is consistent with the findings from the OECD study, 'Tax and Economic Growth', which concludes that the distortions associated with company taxes provide the basis for revenue-neutral (i.e. policies that do not affect the total amount of tax revenue) growth-orientated tax reform that shift the tax revenue base away from more distortive taxes towards less distortive taxes.

As well as the importance of the rate and type of tax, there are a range of different effects in the model and these are given below:

| Investment effect | A high level of taxes in the airline sector will reduce the profitability of its production. This will reduce the return on investment and hence levels of investment. This effect is large relative to many of the other effects and is one of the primary drivers of the negative GDP impact. |
| Confidence effect | Abolition of APD will build confidence amongst businesses. They will look forward and see potential for profits to grow and invest accordingly. |
| Government expenditure effect | Our results show that abolishing APD will actually lead to an increase in Government tax revenues. In the CGE model, this additional revenue is used to pay down the Government deficit. Although the effects are small, this puts some downward pressure on interest rates. |
| Employment effect | Increased productivity and profitability for UK businesses will mean that returns to labour and capital will increase. Higher wages will attract more workers into employment and unemployment will fall. The strength of this effect will be governed by the availability of potential workers. Effective implementation of the Governments welfare reforms could enhance this effect significantly and lead to any vacancies created either in the airline sector or the wider economy to be filled relatively quickly. |

\(^79\) Our analysis shows that at the margin all tax cuts will raise the level of GDP. However, there will be a point where corresponding spending cuts become so substantive that tax cuts could potentially harm the economy if key public services can no longer be provided (e.g. Roads, Schools and Hospitals). However, given the scale of the tax cuts discussed here, this point is less relevant.
### Multiplier effect

The increase in output in both the airline sector and the wider economy will mean that across the whole economy there will be more demand for inputs from suppliers. This positively affects the downstream supply chain. This means that the positive aggregate demand effects are multiplied. This will be combined with a further knock-on impact on aggregate demand as workers employed will spend more on goods and services in the UK economy.

### Deadweight effect

A reduction in the tax burden will reduce the deadweight loss of taxation in the UK economy (leading to increased economic efficiency as producers’ and consumers’ decisions are less distorted). In response to this, there will be a higher level of real GDP in the economy, temporarily increasing economic growth in the short to medium term. A key point is that while the airline sector may face the tax in statutory terms, the real economic effect is likely to realised by the firms and households buying flights.

### Price rebound effect

As real GDP and aggregate demand increase, upward pressure is exerted on prices. As prices rise there will be a nominal, positive inflation effect.

### Trade effect

The net effect on UK trade is positive. There will be an increase in UK outbound and inbound flights and an increase. UK residents will spend more overseas; foreign tourists will spend more in the UK. The net effect on the tourism balance of payment is very difficult to determine. In the current abolition scenario, the overall impact is negative, but this does not take into account a further reaction from foreign tourists or the airline sector establishing new routes. If foreign tourism demand rose by around 10 percent, then we would see this effect reversed, but it is not included in our main scenario as the scale of the effect is uncertain. In terms of non-tourism exports and imports we observe a substantial benefit for exports as UK businesses are able to improve trade links and sell more goods overseas. UK firms often import goods, process them and then export them, this puts upward pressure on imports, but the net effect non-tourism trade balance is positive and export gains outweigh increases in imports.

### Crowding-in effect

A reduction in APD will lead to a substantial medium-term increase in airline sector investment. This will have positive downstream effects on UK manufacturers associated with the airline industry.

### Resource movement effect

Resources will flow into the airline sector from other parts of the economy as passenger numbers grow. The airline sector will expand, but so too will other key economic sectors (manufacturing and services). Overall there will be a higher utilisation of factor resources in the UK economy; this will help close the current UK output gap.

### Adjustment cost effect

The growth in the airline sector will be tempered by an adjustment cost effect. The airline sector will incur costs through re-routing, setting up new routes, or acquiring new infrastructure to meet demand. This effect is also observed in other sectors of the economy that expand as a result of the abolition of APD.

A further driver of the result is the different multipliers observed in the model. Figure 20 lists four different multipliers relating to the decision to travel and the decision to trade. The different multipliers are perhaps best illustrated by way of an example. For instance, when a UK resident travels on a holiday overseas, they will spend money in the foreign country which will be a positive gain for that country (represented by 4a on Figure 20). However, this money will be taken out of the UK and not spent on UK goods and services so this implies a negative multiplier (multiplier number 4 in Figure 20).
A key finding of the model is that the positive multiplier generated by foreign tourism spending (multiplier number 3 in Figure 20) is smaller than the cost to the UK economy of an additional UK resident travelling overseas (multiplier number 4). This is because of the strong downstream linkages that purchases of domestic non-tourism products has in the UK economy versus the weaker linkages of foreign tourism consumption. This is a potential negative impact of APD on the UK economy. However, our analysis only accounts partially for:

- A reaction from domestic tourism producers to attract more foreign tourists into the UK if airfares become cheaper following the abolition of APD and in turn the UK gaining more of the global tourism market.
- A reaction from domestic tourism producers to lower prices to make the UK a more price competitive destination for UK residents.

The model only captures these reactions in historic form. However, when faced with a large policy measure like the abolition of APD, a historic reaction function is not necessarily the best descriptor of future actions.

Figure 20: Multipliers associated with inbound and outbound tourism in the UK

A more detailed breakdown of the different components of GDP is given in Figure 21 below which shows the contribution of each of the demand components to the overall change in GDP (consumption, investment, exports and imports – government consumption is held constant in the model). In reading the chart a figure of 30 percent suggests that 30 percent of the GDP adjustment can be accounted for through that particular change. The majority of the adjustment in GDP is driven by tourist flows. Foreign inbound tourism is part of the export calculation and UK outbound tourists are part of the imports calculation. The CGE model reports a net inbound flow of foreign tourists and an improvement in the tourism balance of payments. Increased UK engagement with overseas contacts boosts exports substantially and as shows exports represent the largest single component increase in GDP.
Figure 21: Impact of the abolition of Air Passenger Duty on the components of UK GDP: percentage changes real values, 2010 prices. All figures shown relative to a baseline of no APD abolition in percentage changes

Source: PwC analysis

How plausible are the modelling results?

To check the plausibility of our result, we compared the ‘fiscal multiplier’ generated from our analysis with those derive in internationally recognised studies of the economic impact of taxation. A fiscal multiplier measures the change in GDP associated with a change in tax revenue. In the case of APD our model suggests that in the medium-term, after the initial adjustment from the abolition of APD has stabilised, the fiscal multiplier is approximately 0.5. This means that for every £1 cut in APD, GDP increases by 50 pence.

In their IMF paper, Spilembergo et al. (2009) collected data based on a comprehensive survey of fiscal multipliers over the previous decade. For tax cuts they suggest an average fiscal multiplier of 0.6. If this was applied to APD then it suggests that for every £1 cut in APD, GDP would increase by 60 pence. In effect, our estimate is 20 percent lower than this average estimate, which in part reflects the cautious assumptions that have used in our study. Since the publication of this paper another IMF paper by Blanchard and Leigh (2013) has cast doubt on the size of these multipliers arguing that in the context of current Government fiscal consolidations fiscal multipliers are arguably larger.

While the medium-term multiplier effect can be validated through comparison studies, the short-term boost to GDP that our model finds is less easily benchmarked through the use of external estimates. Extensive sensitivity testing of the model suggests that this effect is highly likely to occur. Although the overall profile might be flatter than in our preferred scenario, we would expect to see the same amount of GDP gain in the first 5 years of the model. So the magnitude of the GDP increase would be unchanged, although its profile could vary.

What is the impact on the public finances from our main scenario?

The HM Treasury Policy Costings document presents the economic assumptions that underpin the Government’s calculation of the impacts of policy changes on the Exchequer’s receipts and expenditure over a five-year horizon. It is a ‘static’ approach and estimates the effect of an APD policy change on APD receipts only. The method does not fully factor in the knock-on effects that one policy change will have on other tax receipts or spending requirements. Using this approach, the immediate loss to the Exchequer from the abolition of APD would be £2.9billion in FY2012-13, rising to £3.6billion in 2020-21.

---


An alternative ‘dynamic’ policy costing takes into account more detail relating to the potential economic response. For instance, it takes account of the economic growth effects on both receipts from other taxes and benefit spending from a change in policy. It therefore represents a more comprehensive approach to the expected impact on the public finances.

Using dynamic policy costing our model results show that the abolition of APD could well be self-financing – meaning that the initial loss of revenue to the Exchequer from cutting APD could be more than regained through additional receipts from other taxes82 (see Table 11, below). The analysis suggests an abolition of APD could raise a net £500m in extra tax receipts in each of the first two fiscal years, falling to £100 million by 2017-18.

This positive net benefit for the Exchequer arises from:

- **Higher tax receipts from indirect taxes.** The increased consumption and production associated with the abolition of APD raises VAT and other indirect tax receipts.

- **Higher tax receipts from corporations.** As business costs fall, domestic business activity expands and more firms set up in the UK, increasing corporation tax receipts.

- **Higher tax receipts from individuals.** Expanding business activity boosts employment, so direct income tax receipts increase.

- **Small increases in benefit expenditure.** Higher employment reduces the number of benefit claimants and lowers Government welfare payments. However, the increased productivity associated with the rise in business growth leads to a slowing of wage growth meaning that workers claiming in work benefits must then be compensated. Overall, there is a small net increase in benefit spending but this is a minor offsetting effect.

The conclusions this far is that APD is a relatively distortive tax and its abolition would most likely lead to a net revenue gain for the Government through to 2020. It is difficult to predict what might happen beyond this time frame, but it is likely that structural change in the airline sector could result in an increase in services in the airline sector, with further benefits.

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82 The model also suggests a small increase in benefit payments as while unemployment benefits fall, in work benefit payments will increase due to the changing distribution of types of people employed.
The economic impact of Air Passenger Duty

Table 11: Fiscal Impact of the abolition of APD – dynamic analysis capturing wider growth effects and impacts on other tax receipts (£billions, cash 2010 prices)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Static score card:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air passenger duty</td>
<td>(2.90)</td>
<td>(2.98)</td>
<td>(3.06)</td>
<td>(3.15)</td>
<td>(3.23)</td>
<td>(3.32)</td>
<td>(3.41)</td>
<td>(3.51)</td>
<td>(3.60)</td>
</tr>
<tr>
<td><strong>Dynamic Scorecard:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes on products (including APD)</td>
<td>(2.24)</td>
<td>(2.53)</td>
<td>(2.74)</td>
<td>(2.85)</td>
<td>(2.96)</td>
<td>(3.06)</td>
<td>(3.16)</td>
<td>(3.25)</td>
<td>(3.33)</td>
</tr>
<tr>
<td>VAT</td>
<td>0.26</td>
<td>0.52</td>
<td>0.44</td>
<td>0.39</td>
<td>0.34</td>
<td>0.31</td>
<td>0.29</td>
<td>0.28</td>
<td>0.27</td>
</tr>
<tr>
<td>Taxes on production</td>
<td>0.22</td>
<td>0.17</td>
<td>0.15</td>
<td>0.13</td>
<td>0.13</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Total indirect taxes (1)</td>
<td>(1.76)</td>
<td>(1.84)</td>
<td>(2.15)</td>
<td>(2.32)</td>
<td>(2.49)</td>
<td>(2.63)</td>
<td>(2.74)</td>
<td>(2.84)</td>
<td>(2.94)</td>
</tr>
<tr>
<td>Income tax</td>
<td>1.46</td>
<td>1.46</td>
<td>1.48</td>
<td>1.50</td>
<td>1.53</td>
<td>1.56</td>
<td>1.59</td>
<td>1.62</td>
<td>1.65</td>
</tr>
<tr>
<td>NICs</td>
<td>0.75</td>
<td>0.77</td>
<td>0.79</td>
<td>0.81</td>
<td>0.84</td>
<td>0.86</td>
<td>0.88</td>
<td>0.91</td>
<td>0.93</td>
</tr>
<tr>
<td>Corporation tax</td>
<td>0.06</td>
<td>0.17</td>
<td>0.23</td>
<td>0.28</td>
<td>0.32</td>
<td>0.36</td>
<td>0.39</td>
<td>0.43</td>
<td>0.46</td>
</tr>
<tr>
<td>Total direct taxes (2)</td>
<td>2.27</td>
<td>2.40</td>
<td>2.50</td>
<td>2.60</td>
<td>2.69</td>
<td>2.78</td>
<td>2.87</td>
<td>2.95</td>
<td>3.04</td>
</tr>
<tr>
<td>Benefits (3)</td>
<td>0.04</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Net position (1+2+3)</strong></td>
<td>0.48</td>
<td>0.51</td>
<td>0.31</td>
<td>0.23</td>
<td>0.14</td>
<td>0.10</td>
<td>0.07</td>
<td>0.05</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Source: PwC Analysis
How sensitive is our result to the assumptions made?

The scale of the impact on the economy and the Exchequer of the abolition of APD is sensitive to the assumptions made:

- **The magnitude of the cut in APD.** Keeping all other assumptions constant, we repeated our analysis for a range of different APD cuts. The results suggest that the magnitude of the economic benefits is broadly proportionate to the scale of the cut. For instance, in the case of a 50 percent APD reduction the impact on the economy is consistent with the pattern resulting from abolition: a substantial short-term stimulus is followed by a small but positive impact over the longer-term. These economic benefits were found to be around half the size of a full abolition of APD, and an increase in other tax receipts still makes the cut self-financing for the Exchequer.

- **An assumed productivity gain from airline sector expansion.** As stated above, we have incorporated a positive productivity gain of 0.2 percent for every 10 percent increase in business air usage which as cited above is based on a prudent estimate taken from previous studies. The actual productivity effect could be smaller or larger than we have assumed. If we use a higher estimate of the productivity gain, the economic and fiscal benefits increase. We also looked at the sensitivity of our results to using the lower-end estimate suggested one previous study of a 0.07 percent rise in the level of GDP associated with an increase in route connectivity. **In this circumstance the abolition of APD would average out to be fiscally neutral for the Government over the next 5 years, but would not be positive in terms of Exchequer receipts in all years.** However, in both circumstances, the assumed productivity gain could be accompanied by other input assumptions that might positively impact on the economic outcomes associated with APD (see next bullet).

- **Other input assumptions.** Credible adjustments could be made to other input assumptions, such as the responsiveness of labour and tourism markets. We have examined the sensitivity of our results to such changes as follows:
  
  - The level of the labour supply elasticity: in the economic model we increase the responsiveness of workers to wage changes in the labour market. This assumption is made to relate the model more closely to the current situation in the UK labour market. Unemployment is at a relative high in the UK and household incomes amongst certain groups are falling and there is substantial spare capacity in the economy. On this basis we would expect any job vacancies that are created through the expansion in GDP associated with the abolition of APD would be filled more rapidly than in a situation where there is high employment. **On balance we would expect this to be an appropriate adjustment as the take up of new employment vacancies offered in response to any rise in the level of GDP will likely be higher than if the economy was operating at full capacity.**
  
  - The level of tourism demand elasticity: the degree of responsiveness of both UK and foreign tourists to price changes in airline tickets is often discussed in the context of APD. Should the price of a flight fall in response to a cut in APD then we would expect the demand for plane tickets to rise. The elasticity estimates used in the modelling are estimated on historic data and do not fully embody large changes in tourism taxation. On this basis there is a distinct possibility that these elasticities are underestimates and so we increase their values by 10 percent in the sensitivity test.
  
  - The presence of a foreign tourism shock: for reasons of caution, the model scenario is designed purposefully not to capture the UK market gaining a substantial share of the global tourism market following the abolition of APD. It also does not account for new airline routes that may become viable once APD is not paid. Such an adjustment is appropriate as a sensitivity test.

We then estimate the impact of each adjustment compared to the level of GDP recorded in our main scenario. Our results are presented in Table 12, below, as the percentage difference in the level of GDP in 2013 and 2020 from our main scenario.

---

83 Additional reasons for an increase in the labour supply elasticity might be a possible response to current live Government policy measures such as the Universal credit or the ambition to reach a £10,000 personal income tax allowance. On a particularly technical point the CGE model is operating with a ‘micro’ elasticity rather than the larger macro elasticity more normally associated with models of this scale. Rogerson (2010) provides a useful overview of the issues relating to macro and micro elasticities.
Table 12: Percentage difference in level of GDP from main scenario

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Main Scenario assumption</th>
<th>New assumption</th>
<th>Impact on GDP in 2013</th>
<th>Impact on GDP in 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour supply elasticity</td>
<td>0.5</td>
<td>1.0</td>
<td>+0.04%</td>
<td>+0.11%</td>
</tr>
<tr>
<td>Tourism demand elasticities</td>
<td>Minor adjustments were made to elasticities in a range of tourism markets (inbound, outbound, business etc)</td>
<td>+0.01%</td>
<td>+0.01%</td>
<td></td>
</tr>
<tr>
<td>Foreign demand shock</td>
<td>None assumed</td>
<td>+10% increase in foreign tourists</td>
<td>+0.06%</td>
<td>+0.01%</td>
</tr>
</tbody>
</table>

Source: PwC analysis

Overall the changes to tourism demand elasticities and foreign tourism demand, do not have major implications for the results presented in this analysis. The labour supply effect is much stronger. Given that these assumptions are potential likely outcomes from the abolition of APD then we might expect them to occur in addition to the productivity adjustment in our main scenario.

We also test a set of small upward adjustments to tourism demand elasticities across all market segments, given evidence suggesting that the underlying decision to travel by air may be more sensitive to changes in price than recorded in our model. This has a negligible effect on the level of GDP recorded in our main scenario. This is predominantly because the benefits from a higher inflow of foreign tourists are offset by a higher outflow of domestic consumers – the latter of whom are typically associated with a higher impact on UK GDP.

Table 12 also shows the results of a further sensitivity test. In this test a one-off positive foreign tourism demand shock is modelled to approximate the effect of UK airlines being able to reposition themselves structurally to capture a larger share of the global travel market following a disproportionate drop in their cost bases relative to those of their competitors. This has a larger positive impact on our central scenario than increasing the tourism demand elasticity as the inflow of foreign tourists produces an increase in domestic consumption, without being offset by a corresponding flow of tourists out of the UK.
Basic fairness
Basic fairness

Section overview

This section provides a discussion of the impacts of APD on UK households based on their income. The majority of UK households will have to save for their holidays in some form or other, so it is important to address how savings might be structured and how different households will be affected.

The concept of fairness

The sheer number of different interpretations and political opinions regarding what basic fairness constitutes in the tax system makes it difficult to evaluate the degree to which a tax is judged to be fair or unfair. However, as concluded by the TSC84, fairness is important as ‘increased levels of avoidance and evasion’ or even a ‘loss of legitimacy’ is increasingly likely without it. The extent of progressivity is one measureable feature of a tax which may help to inform an evaluation of the tax’s degree of fairness without relying on value judgements or political leanings. Progressivity is normally built into the tax system so that households in higher-income segments of the income distribution pay higher effective tax rates than those in lower segments of the distribution. This is the case for basic income tax, for example, where those on higher incomes pay higher personal income tax rates.

Conversely, indirect taxes, such as APD, are regressive in nature. This is because the tax paid as a proportion of an individual’s wealth or income is lower for a wealthy individual than for a low-income individual85. This assumes that the propensity to consume a product is independent of income or wealth. Some goods, such as tobacco and alcohol, make up a larger share of a low-income individual’s consumption basket than for a higher-income individual, therefore making any indirect tax applied even more regressive.

Is APD a regressive tax?

There are conflicting perspectives over how regressive APD is. As an indirect tax, APD is regressive as the flat-rates apply to everyone who flies in the same-class of seating, regardless of income or wealth. The tax applies equally to children (apart from children under two, without their own seat) and OAPs so this increases the tax burden on working-age people who will frequently pay for the travel of their dependents.

It costs more in taxes to fly a family of four on holiday originating from the UK than from any other European country (see Table 13, below).

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The economic impact of Air Passenger Duty

Table 13: Comparative aviation tax rates for a family of four in economy-class seating (GBP)

<table>
<thead>
<tr>
<th>Origin</th>
<th>To Europe</th>
<th>To USA</th>
<th>To Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>From UK</td>
<td>52</td>
<td>260</td>
<td>368</td>
</tr>
<tr>
<td>From Germany</td>
<td>24</td>
<td>137</td>
<td>137</td>
</tr>
<tr>
<td>From Austria</td>
<td>26</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>From Ireland</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>From France</td>
<td>17</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>From Italy</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>From Greece</td>
<td>39</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>From Sweden</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>From Belgium</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: IATA Charges Monitor – current as at September 2012, Oanda exchange rates (based on average for January – September 2012)

However, the tax does have some elements of progressivity. The dual-charge structure for economy and business-class seating naturally increases the progressivity of the tax. The banding structure also means that flights to longer-haul (and typically more expensive) destinations are taxed at a higher rate (albeit with the anomalies which result from distance being measured from capital cities). The 2011 Consultation also extended the APD regime to smaller business jets, which were previously exempt from APD. Furthermore, some parties view air travel as a luxury good and therefore conclude that those individuals that go on international flights can always afford to pay the tax. However, evidence shows that foreign holidays have become a staple part of the consumption basket of low and middle-income earners, alongside higher-income groups (the analysis of Figure 22 below provides further consideration of this issue).

Figure 22: UK leisure passengers (by income)

![Proportion of UK leisure passengers, by income]

Source: CAA, PwC Analysis. Note: CAA uses passenger data from 12 representative UK airports
Research from the ONS has found that households have been reluctant to cut spending on foreign holidays due to a habituation effect. The 2011 Family Spending Survey found that ‘households may not alter their spending patterns in response to changes in economic conditions...certain items that may have traditionally been considered discretionary, such as recreation and culture expenditure for instance, may be considered essential by many households through a habituation effect. Some households may have enjoyed regular holidays...for many years during economic prosperity and continue with this consumption despite the less favourable economic conditions’\(^86\). However, the cost of APD can be very high for such low-income demographics, which may start to price them out of the market as the tax continues to rise. For the bottom three income deciles, APD costs a family of four flying to a Band A destination between 19-28% of weekly household expenditure, compared to 5-9% of the top three deciles (see Figure 23 below).

\textit{Figure 23: APD as a share of average weekly household expenditure based on a family of four flying to a Band A destination.}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure23.png}
\caption{APD as a share of average weekly household expenditure based on a family of four flying to a Band A destination.}
\end{figure}

Whilst those in higher-income brackets tend to consume foreign air travel more frequently, APD was also paid on 34.6 million leisure trips in 2010 (45 percent of the total) where the passengers had below-average household income.\(^87\) Social objectives relating to households taking overseas trips should not be discounted. Foreign holidays or being able to take overseas trips to visit friends and relatives are a contributor to general well-being, and have been found to have specific benefits for low-income families.\(^88\) The recently national well-being index also cites the importance of holidays in generating well-being and improved quality of life.\(^89\)

Holidays may be even more important for lower-income segments of society: a study by the University of Nottingham found that holidays help to address complex social needs and deliver a wide-range of benefits for lower-income families. With low-income families encountering ‘multiple, complex and inter-related’\(^90\) issues, their research argues that a holiday can help to provide a ‘uniquely holistic experience that all the family can engage in at the same time’. This can help to achieve ‘a number of different outcomes for the whole family...that is difficult to recreate through other therapies and interventions’.

\(^87\) Based on PwC analysis of CAA survey data. CAA uses passenger data from 12 UK airports.
\(^88\) “Briefing Paper for Policymakers: Evaluating Stated Needs for Support for Holidays”, Christel De Haan Tourism and Travel Research Institute, the University of Nottingham.
\(^90\) ‘Briefing Paper for Policymakers: Evaluating Stated Needs for Support for Holidays’, Christel De Haan Tourism and Travel Research Institute, the University of Nottingham.
Procedural principles
Procedural principles

Section overview

This section outlines our assessment of what we have classified as procedural principles. These principles relate more to the administration of APD from both an airline and a Government perspective. In their framework for assessing tax policy the TSC did not include an explicit environmental indicator. In order to present a balanced view about the impact of APD we feel that it is necessary to discuss the associated environmental consequences.

In our survey of evidence relating to the impact of APD, or airline taxes and charges in general less evidence was found that related to these principles. Conducting a detailed survey relating to the compliance and administration of APD was outside the scope of this study. On this basis, the evidence presented in this section is more qualitative.

Stability

The stability of the political and tax environment is a crucial factor for businesses making long-term investment decisions. The TSC recommends that: “sudden and unexpected changes to tax policy are harmful to business and to the Exchequer and should be avoided unless there are exceptional reasons requiring immediate intervention”.

Figure 24 shows that the period 2000-2006 was a stable period for APD receipts. However, the period since 2006 has seen the tax take almost triple in absolute terms, driven by several increases in APD rates for both reduced and standard rates.

Figure 24: Historical and projected receipts from APD

Source: HMRC, OBR, PwC Analysis

For airlines attempting to assess their future liabilities, this period has been associated with significant volatility. The Government has now committed to increasing APD on an annual basis in line with the Retail Price Index (RPI), which will add a greater degree of stability for future tax receipts. However, the tax is relatively easy to change and so is exposed to swings in political sentiment. This means there will always be an

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element of uncertainty in calculating future liabilities, The Office of Budget Responsibility (OBR) estimates that receipts from APD will increase to nearly £4 billion by 2015-16 – or 0.2% of GDP. They forecast that this level of receipts will be sustained until 2029-30. However, this forecast is built on very specific assumptions of passenger growth in the UK. The OBR estimate that chargeable passenger growth will average 4.0% a year between 2012 and 2016, we understand this is largely driven by an ageing population with increased leisure time. Whilst this is in line with historic trends (the number of chargeable passengers has grown by an average of 3.7% over the past twenty years), HM Treasury expects that average long-term annual passenger growth will fall to 1.5-2.3% until 2050 due to airport capacity constraints.

These apparent contradictions mean that it is important to evaluate the ability of the Government to collect APD revenues over a longer-term horizon. Historically, underlying assumptions of passenger growth have fed directly into tax revenue projections. Figure 25 below, shows the difference between HM Treasury’s Budget and Pre-Budget Report projections and the actual outturn of tax revenues for each financial year since 2000.

Figure 25: HM Treasury Budget and PBR projections compared to actual outturn (£, billions)

Source: HM Treasury

HM Treasury forecasts the relevant tax base for APD, leisure passenger numbers, based on three key determinants:

- Historic passenger numbers;
- Forecasts for household’s disposable income; and
- Price of air travel (which is influenced by expectations of inflation, APD rates and the oil prices).

For the majority of years since 2000, this approach has been relatively successful at generating revenue projections that have been largely been consistent with actual receipts. However, when large forecast errors have occurred, these have tended to systematically overestimate future APD receipts. For example, actual APD outturns fell short of projections by 20% in 2001/02 and 10% in 2008/09 due to September 11th terrorist

93 APD Bulletin, HM Revenue and Customs, November 2011.
attacks and the financial crisis respectively. This reflects a tendency for low-frequency, high-impact external events to disproportionately affect commercial airline travel, given its reliance on cross-border connectivity. More recent Budget, Pre-Budget Report and Autumn Statement projections have shown a divergence in revenue expectations for the tax.

In their 2011 policy costings document, HM Treasury suggest the main risk to their forecasts for APD receipts relate to the underlying elasticity estimates. These estimates determine the expected behavioural impacts embedded in the forecasts. As our discussion of the key characteristics of previous forecast errors have suggested, we conclude that the forecasting approach for APD should reflect a broader range of risks, including the probability of external shocks and potential future capacity limitations. Unless specifically accounted for, these effects highlight the potential for weak passenger growth to undermine the stability of the APD revenue base over time.

**Certainty**

The tax rules, procedures and rates should be certain for those that pay it. The TSC sets out three requirements for certainty:

- Legal clarity;
- Simplicity; and
- Properly targeted

**Legal certainty** requires that laws are drafted clearly and there is no ambiguity to whom the tax applies. Following the 2011 Consultation, some of the application issues originally associated with APD have been ironed out. For example, the Government announced it would extend APD explicitly to business aviation and clarified the types of aircraft that are exempt from APD. At the same time, the Government agreed to ‘explore the feasibility and likely effects of devolution of APD to Scotland and Wales’\(^96\). This adds uncertainty for regional aircraft operators in calculating their future obligations of APD. Indeed, the recent decision to lower the long-haul APD duty for passengers departing from airports in Northern Ireland has further contributed towards such uncertainty.

The TSC state; ‘the more complex a tax system is, the harder it is to administer and the harder it is for taxpayers to assess their own liability’\(^97\). A flat fee structure of APD ensures that it is relatively simple to collect and administer. HMRC statistics show there are no significant tax gaps associated with compliance with HMRC. Of the £2,186million APD liability declared on trader returns in FY2010/11, £2,155million was received by HMRC. The small gap is due to the fact that receipts can be received later than the liability has arisen.

However, the specific banding structure of APD can make the tax rate applied on some journeys difficult for consumers to understand. An individual in reduced-class seating pays £81 in APD to fly to Kingston, Jamaica (4700 miles from London) whilst paying £65 to San Francisco (5400 miles from London). The Government acknowledged that ‘no banding structure will be entirely free of anomalies’ when no change to the APD bands resulted from the 2011 Consultation.

A certain tax is also one which is properly targeted. The TSC consider a tax to be properly targeted if taxpayers ‘have certainty about which rules apply to them’\(^98\). Given the vocal public debate surrounding APD, most UK passengers are likely to be aware they pay APD as part of the price of their flight ticket. However, APD is not always clearly itemised when customers purchase their ticket, so many customers will be unaware of the exact APD rate they pay. Moreover, airlines are not obligated to pass on APD or increases in APD to the consumer, so the amount individuals pay in APD may vary across different airlines for the same product. The list of exemptions to APD was clarified as a result of the 2011 Consultation, with APD now extended to smaller business jets, giving more clarity that all types of commercial aircraft passengers fall within the remit of the tax.

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\(^{96}\) Page 12, ‘Reform of Air Passenger Duty: Response to Consultation, HM Treasury (December 2011).


The economic impact of Air Passenger Duty

Practicality

The costs of compliance with the tax system fall on both the tax authorities and taxpayers. The TSC emphasize the need to compare this compliance burden with revenues raised from the tax over time to ensure “these costs [are] taken into account when developing policy”\(^9\).

APD relies on self-reporting of chargeable passenger data from airlines. Therefore, the majority of the compliance costs with APD fall on the airlines rather than the tax authority. At the time of APD’s introduction in 1993, HM Revenue and Customs estimated that “50% of the airlines operating in the UK” would register to pay duty, “in effect, all the major airlines and charter airlines”\(^10\) within the UK. With the announcement of the extension of APD to smaller business jets in the 2011 Consultation, APD is now likely to cover the vast majority of airline operators operating in the UK.

There is little hard evidence on the exact administration burden for complying with APD. The general perception from the UK airline operators we have spoken to is that the tax does not lead to significant administrative burdens. The most practical difficulty for airlines is encountered when policy rates change at short notice without time for operators to make adjustments. In December 2006, the then Chancellor of the Exchequer Gordon Brown doubled the APD rate for all bands, to be brought into force from 1 February 2007. As a large proportion of passengers due to travel after February 2007 had already purchased their tickets before this announcement, some airlines were unable to pass these costs on to passengers, and instead, were forced to absorb substantial cost increases at short notice, disruption their strategic planning processes\(^1\). The current Government, who have established a one-year period between an APD rate change and its application, has improved this process.

Whilst HM Revenue and Customs do not publish compliance costs for APD specifically, the impact assessment of the extension of APD to business jets includes an analysis of the expected compliance costs associated with the policy’s implementation\(^12\). HMRC expects the one-off compliance costs will be between £1.5-2.0million for the airline sector, with an ongoing administration cost of £500,000 per year. It is estimated that HMRC will incur a one-off cost in the region of £650,000 to introduce and administer the new tax regime, with an estimated ongoing burden of around £450,000 per year. The total ongoing administrative burden for business and Government as a result of this policy change is, therefore, expected to be around £950,000 per year. This compares to a forecast of £5million in extra revenue to be received by the Exchequer on an annual basis between 2013/14 and 2016/17 as a result of the policy change. Therefore, the administration costs as a proportion of the total tax revenue is equivalent to nearly 20% of the tax receipts raised. We do not expect this relative administration burden to hold across the much-larger commercial aviation sector, due to the significant economies of scale expected to be realised in the collection and processing of APD.

Coherence

The TSC conclude that the tax system as a whole should be coherent so that “new provisions should complement the existing tax system, not conflict with it”\(^13\). This coherence between the tax in question and the other taxes that make up the overall system is important as taxes that overlap in either application or objectives are confusing for taxpayers and can induce incentives that distort economic behaviour. This makes other objectives of the tax system difficult to achieve (for example, for encouraging growth). Therefore, how far APD is coherent with the remainder of the tax system can be assessed by whether the tax targets the same tax base as others in the tax system. The general principle we apply is that the same tax base should not targeted by more than one type of tax.

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\(^12\) Annex A, ‘Reform of Air Passenger Duty: Response to Consultation, HM Treasury (December 2011).

The Government makes clear in its 2011 Consultation that: 104

“APD is primarily a revenue-raising duty which makes an important contribution to the public finances, whilst also giving rise to secondary environmental benefits”

Government response to 2011 Consultation on APD

APD is imposed to replace the role of VAT in the tax system, which is zero-rated for scheduled flights (and most other types of flight) and fuel for international or domestic travel. As the service of air transport is effectively performed across several tax boundaries, its tax treatment would be complex unless this exception was implemented. The vast majority of sovereign states exempt international transport from value-added taxes. Therefore, the imposition of a passenger tax does not conflict with the VAT regime in the existing tax system.

At the same time, the Government emphasizes the ‘secondary’ role of APD in realising ‘environmental benefits’. The UK aviation industry entered the EU-wide Emissions Trading Scheme (ETS) on 1 January 2012 105. The ETS involves capping the emissions of all flights that fly in and out of the EU at 95% of historical emissions. To comply with the directive, airlines will have to reduce their emissions by flying fewer journeys or by purchasing international carbon credits. It is expected these compliance costs will be passed onto customers, which the European Commission estimates could increase ticket prices for an intra-EU return flight by between €2 and €9 106. Given the environmental role of APD (albeit a secondary one) overlaps with the ETS, there is a ‘double treatment’ of external costs associated with the same tax base. This inconsistency is potentially confusing for customers and may result in an excess tax burden being imposed on airline passenger tickets.

In conjunction with the domestic view of coherence, the international view is also important. Figure 4 and Figure 5 above have illustrated the high rates of passenger taxation in the UK with respect to the rest of the world. Table 9 considers the effective tax rate levied on the air transport sector under APD and compares it to the effective tax rate for VAT and fuel duty in the wider economy. The findings in this table suggest that depending on the year, that if the effective tax rate for VAT and fuel duty in the wider economy was levied on the air transport sector it might have paid considerably less tax (in the approximate range of 15 to 40 percent per annum). The scale of this disparity has the potential to influence business and consumer decisions in a relatively incoherent manner due to a skewed set of incentives. For instance, we have examined the potential for multi-ticketing behaviour and the influence of APD on a firms cost base. From both a domestic and international perspective such outcomes are not consistent with a well benchmarked tax.

Impact on the environment

The impact on the environment was not an explicit principle of the tax system considered by the TSC in its 2011 report. However, it is important to evaluate APD’s environmental credentials as, in economic theory; indirect taxes are also sometimes justified on the grounds that they can help to control the consumption of goods with strong negative externalities (such as negative effects on consumers’ health or the environment). As a tax on a carbon-intensive method of travel, APD is often referred to as playing an important environmental role through its ability to reduce consumption. Indeed, whilst the Government insists that APD’s application is a response to the zero-rated nature of other inputs into aviation, as described above it also emphasizes the tax’s secondary role in curbing carbon emissions.


105 ‘EU ETS and Aviation’, House of Commons Library, Dr. Alena Aresy, May 2012.

Whilst aviation emitted around 37.5 MtCO2 in 2009, this figure was expected to rise to around 60 MtCO2 by 2030. This compares to total UK GHG emissions in 2011 of around 550 MtCO2. In this context, the Government has set a target of reducing CO2 emissions from aviation to 2005 levels by 2050. The current environmental debate focuses on how successful APD is as a tool for meeting these emissions targets. This debate is also closely tied to the research undertaken into estimating the elasticity of demand for air travel as any environmental benefits will only be made if the tax induces a behavioural response from consumers. We briefly highlight some of the research undertaken into APD’s environmental credentials below:

- In December 2009, the Committee on Climate Change produced a report which looked at the potential options available for the UK to meet the Government’s aviation emissions target. They conclude that maximum demand growth of around 60% between 2005 and 2050 would still be compatible with this target. This compares with a Business-as-usual scenario of 150% growth (given planned capacity limits). The report does not mention APD explicitly, but one of the possible elements suggested *inter alia* to meet this target would be some form of carbon tax.

- The Governments position that the environmental benefits of APD are secondary indicates a change in stance on the role of the tax. Analysis by IATA in 2007 compared the relative environmental credentials of the UK’s planned doubling of the APD rate to the introduction of the EU ETS. The results found that the UK’s APD reforms were far less cost effective for passengers in reducing emissions than the EU ETS introduction. A tonne of CO2 emissions cut under the ETS would cost passengers €122, compared to €1,009 for the UK’s APD reforms. On a per-passenger basis, APD is even less cost-effective. The EU ETS introduction would cost passengers €0.44 per return passenger trip in 2011 to save one tonne of CO2. This is compared to APD which would cost passengers €9.18 per tonne of CO2 saved.

Overall, we conclude that while APD does help to reduce UK emissions by reducing the demand for flying it is not well targeted and does not encourage sustainable flying. For instance, even if a plane flew 100 percent on biofuel, under the current regime passengers would pay APD and this would be unnecessarily detrimental to economic growth. These unintended consequences suggest that there are better instruments available for incentivising emissions reductions in the airline sector.

It is very difficult to predict the scale of emissions changes that might come about if APD were abolished. Factors relating to anecdotal evidence that APD may also divert emissions to foreign countries due to the trend of multi-ticketing make this analysis complicated.

PwC would advocate a global emissions solution, but there is also a wider question over how the Government balances environmental objectives with economic objectives given that delivering such targets through taxation appear to go against the grain of several principles of tax policy as outlined by the TSC, particularly their role in supporting economic growth and the coherence of the tax system.

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107 “Meeting the UK aviation target – options for reducing emissions to 2050”, Committee on Climate Change, December 2009.


109 “Meeting the UK aviation target – options for reducing emissions to 2050”, Committee on Climate Change, December 2009.

110 “Meeting the UK aviation target – options for reducing emissions to 2050”, Committee on Climate Change, December 2009.

Overall assessment
Overall assessment

In March 2011, the TSC outlined four procedural principles (practicality, stability, certainty and coherence) and two fundamental principles (growth and fairness) that should be the benchmark for a well-designed tax. Overall, we find that APD scores relatively highly on the procedural principles of tax policy, but poorly on the fundamental principles of supporting growth and achieving basic fairness (see Table 14, below).

Table 14: PwC’s assessment of APD against core tax principles

<table>
<thead>
<tr>
<th>Core treasury* tax principle</th>
<th>PwC score for APD</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economic principles</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting growth and</td>
<td>-1.0</td>
<td>The UK has the highest rate of air passenger taxes in the world. It cost those using the UK as a place to do business £500m in 2010/11. Using our model to simulate a cut in six different UK taxes, APD was found to be in the group of more distortive taxes in the economy. Our main model scenario shows that an abolition of APD might boost growth by almost 0.5 percent in 2013 with the economy around 0.1 percent larger over the longer-term. Abolition might also increase net tourism inflows and improve productivity. It may also lead to higher receipts from other taxes, making the abolition self-financing for the Exchequer.</td>
</tr>
<tr>
<td>encouraging competition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic fairness</td>
<td>-2.0</td>
<td>It currently costs more in taxes to fly a family of four flying from the UK than in any other European country. APD also makes up a higher proportion of low-income households’ weekly expenditure. Class and route banding improves progressivity, whilst higher income passengers have a higher propensity to travel.</td>
</tr>
<tr>
<td><strong>Procedural principles</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stability</td>
<td>1.0</td>
<td>The tax base is forecast to be stable over time, but there are other downside risks such as external demand shocks and capacity constraints that may not have been factored in.</td>
</tr>
<tr>
<td>Certainty</td>
<td>1.0</td>
<td>APD has legal clarity and is simple to collect and administer.</td>
</tr>
<tr>
<td>Practicality</td>
<td>1.0</td>
<td>Administration costs are low but there is evidence of avoidance through multi-ticketing.</td>
</tr>
<tr>
<td>Coherence</td>
<td>1.0</td>
<td>The primary role of APD to replace VAT is coherent with remainder of tax system.</td>
</tr>
<tr>
<td>Environment</td>
<td>1.0</td>
<td>Discourages flying, but better targeted taxes such as the EU ETS are shown to be more effective at reducing emissions.</td>
</tr>
</tbody>
</table>

*These are the principles used the Treasury Select Committee to assess tax policy: see Treasury Committee, Eighth Report of Session 2010-12, Principles of Tax Policy, HC 753

Ultimately, whether any cut or abolition of APD can be justified depends on the objectives of policy makers. We also conclude that an abolition of APD would be difficult to justify on procedural and practicality grounds. It is a practical tax to collect and administer, has strong legal clarity, coherence with the rest of the tax system and has a relatively stable tax base. However, if the policymaker’s main priorities are to bring about growth and improve fairness, our evidence suggests a cut or abolition of APD would achieve this, while remaining fiscally neutral.
Appendix A: Elasticity analysis literature review

The price elasticity of tourism demand

This annex outlines the key concepts underlying the price elasticity of tourism demand used in this report. The price elasticity of demand measures the sensitivity of consumers to a change in the price of the underlying product or service. There are two important types of elasticity which are influenced by the price of an international flight ticket, and hence, the rate of APD. Firstly, the own-price elasticity of demand for international air travel measures the sensitivity of consumers to a change in the flight ticket price exclusively. Secondly, the tourism demand elasticity measures the sensitivity of consumers to a change in the overall tourism product, a portion of which is influenced by the price of an air ticket.

A review of the economic literature for each of these elasticity measures conclude that elasticity estimates vary across three different characteristics of the international travel undertaken, including:

- **Underlying purpose to travel,**
- **The stage of the purchase decision making process; and**
- **The location of the origin and destination markets.**

The final demand for taking a flight is the product of several decisions the consumer makes. In Figure 26, below, we set out a framework for analysing how the elasticity estimates vary across this decision-making process for different underlying purposes of travel\(^{112}\). This is based on the multi-stage budgeting process set out by De Mellor (2005) in her application of the Deaton and Muellbauer’s (1980) Almost Ideal Demand System (AIDS) for UK tourism demand\(^{113}\) and involves three key steps:

- **Examine individual budget constraint:** Once the underlying need to travel is established, the individual decides an overall budget for the trip.
- **Location decision:** The individual then decides which location to choose within this set budget.
- **Allocation of the budget:** Given the location choice, the individual decides how to allocate the budget amongst the major expenditure items of the trip (including flights, accommodation, activities etc).

At each of these steps, the consumer proceeds to the next step based on an evaluation of the total expected benefits and the total expected costs. The price of the final product (i.e. the holiday or the business trip) is one of the main components of the total costs that the individual expects to incur and this is weighed up at each stage of the process. For example, at the first stage if the cost a foreign holiday is greater than what an individual can afford, they will decide not to go. We suggest that the purchase decision is at its most sensitive to the price of the trip at the start of the decision-making process. It is only at the last stage when the flight is purchased and the consumer’s decision is at its most inelastic. This implies that it is not sufficient to only use the pure own-price elasticity of air travel to estimate the behavioural impact of APD, a broader appreciation of the elasticity to undertake tourism, business trips and visiting family and friends is also required. The decision tree is replicated from Figure 26 above and represented below for convenience.

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\(^{112}\) We have split the underlying reasons to travel into the three main groups cited by the ONS; holiday, business and visiting friends and family

\(^{113}\) [xxxx]
The economic impact of Air Passenger Duty

Figure 26: Motives behind decision to travel:

<table>
<thead>
<tr>
<th>Underlying reason to travel</th>
<th>Examine individual budget constraint</th>
<th>Location choice</th>
<th>Allocation of the budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why do I need to travel?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examine individual budget constraint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underlying reason to travel</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Examine individual budget constraint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location choice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allocation of the budget</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Elasticities

- Very elastic
- Moderately elastic/inelastic
- Very inelastic

Source: PwC analysis

We now evaluate the empirical evidence from existing studies into the elasticity types that will be included in our CGE model. One of the most important assumptions into our CGE model relates to how the estimate for the tourism demand elasticity for UK outbound tourists compares to the estimate for the tourism demand elasticity for UK inbound tourists. If the outbound elasticity is higher than the inbound elasticity, an equal change in price resulting from a change in the rate of APD would result in a greater reaction from outbound tourists leaving the UK than inbound tourists coming into the UK.

Evidence of the price elasticity of inbound tourists to the UK

Several studies have estimated the price elasticity of inbound tourists into the UK. One of the most recent and relevant studies was commissioned by the Department for Culture, Media and Sport (DCMS) to identify the drivers of tourism demand in the UK. The authors, Adam Blake and Isabel Cortes-Jimenez from the University of Nottingham, used data from the International Passenger Survey (from 1994 to 2006) to construct a structural time-series econometric model which estimates the impact of a number of variables on tourism demand. Tourism demand was defined by a mixed variable constructed from real tourism expenditure and tourist arrivals. The authors find that the overall elasticity of demand for UK inbound tourists was -0.61, with the precise elasticity estimates varying according to the source market and the purpose of visit (these results are shown in Table 15, below).

The economic impact of Air Passenger Duty

Table 15: Elasticity estimates from DCMS (2007)

<table>
<thead>
<tr>
<th>Destination market</th>
<th>Price elasticity of demand</th>
<th>Purpose of visit</th>
<th>Price elasticity of demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>0.53</td>
<td>Holiday</td>
<td>1.23</td>
</tr>
<tr>
<td>Germany</td>
<td>0.33</td>
<td>Business</td>
<td>0.18</td>
</tr>
<tr>
<td>Spain</td>
<td>1.38</td>
<td>Visiting Friends and Relatives</td>
<td>0.93</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>0.61</td>
<td>Study</td>
<td>0.12</td>
</tr>
<tr>
<td>Ireland</td>
<td>1.86</td>
<td>Overall</td>
<td>0.61</td>
</tr>
<tr>
<td>Italy</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: DCMS (2007)

The DCMS (2007) study indicates that overall inbound tourism demand is relatively inelastic, with a coefficient below 1. However, particular segments of the overall tourism market, such as holidaymakers travelling to short-haul destinations are likely to be very elastic. Later we show that this particular market segment accounts for the vast majority of tourist arrivals, and so its sensitivity to price changes (including APD) is particularly important.

Other studies have used alternative approaches for estimating the impact of price on inbound tourism demand. Durbarry (2008) adapts a gravitational model conventionally used for explaining the international trade in goods to a tourism services sector. The author estimates the effect of two sets of prices on inbound tourism flows. The first is the real effective price of tourism in the UK. This influences the decision of tourists whether to travel to the UK or to stay at home. The second price variable is the real effective tourism price of competing destinations to the UK. This captures the top five countries that account for more than 60% of tourist outflows from the country in question (not including the UK) and influences the decision of tourists whether to travel to the UK or to a competitor country. Table 16, below, outlines these price elasticity estimates for three separate model specifications which use three different dependent variables to capture tourism demand.

Table 16: Elasticity estimates from Durbarry (2008)

<table>
<thead>
<tr>
<th>Independent price variable used</th>
<th>Dependent variable specified</th>
<th>Tourism arrivals</th>
<th>Total real tourism expenditure</th>
<th>Real expenditure per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real effective price of tourism in the UK</td>
<td>-2.31 (FE) and -2.04 (RE)</td>
<td>-1.95 (FE) and -1.50 (RE)</td>
<td>-1.52 (FE) and -1.53 (RE)</td>
<td></td>
</tr>
<tr>
<td>Real effective price of tourism for competing destinations to the UK</td>
<td>0.55 (FE) and 0.58 (RE)</td>
<td>1.07 (FE) and 1.12 (RE)</td>
<td>0.04 (FE) and 0.44 (RE)</td>
<td></td>
</tr>
</tbody>
</table>


116 The real effective price of tourism is characterised by both the relative differences in the cost of living between the UK and foreign departure destination and the exchange rate.
The economic impact of Air Passenger Duty

Source: Durbarry (2008). RE refers to a regression specification using random effects. FE refers to a regression using fixed effects. All coefficients are statistically significant at the 1% level, apart from the competitor price coefficient using the real expenditure per capita model with fixed effects, which is statistically significant at the 5% level.

The Durbarry (2008) study suggests that inbound tourists are more elastic than the DCMS study indicates. For example, the range of coefficients for the price of UK tourism of -1.5 to -2.3 across the three model specifications using both fixed and random effects regressions imply that if tourism prices increase by 1% in the UK, tourism demand will fall by between 1.5% and 2.3%. However, this study uses inbound tourism data between 1968 and 1998, and so may not capture more recent trends in international travel. For example, the emergence of low-cost carriers may have caused consumers to become more price inelastic as the relative cost of international flights (as a proportion of a consumer’s overall disposable income) has fallen over time.

The 2001 British Tourism Authority (BTA) report, ‘The Price Sensitivity of Tourism to Britain’ used quarterly data between 1975 and 1999 estimated a price elasticity of demand estimate of -1.28, indicating that a 10% fall in the UK trade-weighted nominal exchange rate (effectively a 10% fall in price) generates, a 12.8% increase in total UK tourism receipts. BALPPA updated this analysis in 2008, analysing quarterly trends over the period between 1980 and 2007, recommending a central price elasticity estimate of -1.2, around a lower and upper bound of -1.05 and -1.35 respectively.

The elasticities measures resulting from the three main studies are outlined in, below. For the purposes of caution we select a tourism demand elasticity of 0.6 in line with the DCMS estimates.

Figure 27: Tourism demand elasticity ranges for three main UK inbound studies

![Image of Figure 27]

In order to be cautious we set the price elasticity of demand for UK inbound tourists to be 0.8 for holiday makers.

Evidence of the price elasticity of UK outbound tourists

A wide range of studies have estimated the own-price elasticity for outbound tourists from the UK. However, very few use recent data sources. The literature review commissioned by DCMS (2007) found five studies with findings on UK outbound price elasticities, all using tourism data pre-2000. A more recent literature review

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conducted by Song, Kim and Yang (2010) found a further seven studies published since 2000 which have estimated price elasticities for UK outbound tourists across a number of markets. This paper also suggests that point estimates for tourism demand elasticities may have limited value as their sampling variability is unknown. The authors use a new statistical method called bias-corrected bootstrapping to construct accurate confidence intervals for tourism demand elasticities. Given the inherent uncertainty around elasticity estimates raised in this paper and that it is not clear how large changes in tourism or airline sector taxation have been accounted for in any of the estimates (if at all needed) we in turn conduct extensive sensitivity analysis on our elasticity estimates.

We have reviewed these two sources of UK outbound tourism demand elasticities and reported the range of estimates split by destination markets in Table 17, below. It should be noted that whilst different authors use alternative model specifications and underlying data sets, the fundamental characteristics of the estimation processes are similar enough to allow such an aggregation to take place. Indeed, all the studies use econometric models to identify the statistically significant drivers of tourism demand, of which price is one. In all cases, the dependent variable represents some measure of tourism demand and is commonly proxied by tourism arrivals, expenditure, or both.

Table 17: Range of tourism demand elasticity estimates for outbound UK tourists from DCMS (2007) and Song, Kim and Yang (2010) for short-haul destinations

<table>
<thead>
<tr>
<th>Destination</th>
<th>Elasticity range</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall short-haul</td>
<td>(9.9) to (0.2)</td>
<td>(1.3)</td>
<td>(1.0)</td>
</tr>
<tr>
<td>France</td>
<td>(1.8) to (0.5)</td>
<td>(1.1)</td>
<td>(1.2)</td>
</tr>
<tr>
<td>Germany</td>
<td>(4.0) to (0.7)</td>
<td>(2.0)</td>
<td>(1.3)</td>
</tr>
<tr>
<td>Greece</td>
<td>(9.9) to (0.2)</td>
<td>(2.9)</td>
<td>(2.0)</td>
</tr>
<tr>
<td>Italy</td>
<td>(1.2) to (0.7)</td>
<td>(1.0)</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>n/a</td>
<td>(0.2)</td>
<td>(0.2)</td>
</tr>
<tr>
<td>Portugal</td>
<td>(2.9) to (0.2)</td>
<td>(1.6)</td>
<td>(1.4)</td>
</tr>
<tr>
<td>Spain</td>
<td>(3.0) to (0.5)</td>
<td>(1.1)</td>
<td>(1.2)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>n/a</td>
<td>(0.1)</td>
<td>(0.1)</td>
</tr>
</tbody>
</table>


Table 18: Range of tourism demand elasticity estimates for outbound UK tourists from DCMS (2007) and Song, Kim and Yang (2010) for long-haul destinations

<table>
<thead>
<tr>
<th>Destination</th>
<th>Elasticity range</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall long-haul</td>
<td>(2.1) to (0.2)</td>
<td>(0.6)</td>
<td>(0.6)</td>
</tr>
<tr>
<td>Australia</td>
<td>n/a</td>
<td>(2.1)</td>
<td>(2.1)</td>
</tr>
<tr>
<td>USA</td>
<td>n/a</td>
<td>(0.2)</td>
<td>(0.2)</td>
</tr>
<tr>
<td>Thailand</td>
<td>n/a</td>
<td>(0.4)</td>
<td>(0.4)</td>
</tr>
<tr>
<td>South Korea</td>
<td>n/a</td>
<td>(0.0)</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>(0.49) to (0.54)</td>
<td>(0.5)</td>
<td>(0.5)</td>
</tr>
<tr>
<td>Tunisia</td>
<td>(0.41) to (0.93)</td>
<td>(0.7)</td>
<td>(0.7)</td>
</tr>
</tbody>
</table>


Table 17 and Table 18 reveal that the mean and median UK short-haul price elasticity of tourism demand is -1.3 and -1.0 respectively, compared to -0.6 for long-haul travel. This result suggests that UK outbound tourists are less price sensitive for longer-haul destinations compared to short-haul travel. This mirrors the findings from DCMS (2007) analysis of UK inbound passengers which found, on average, higher elasticities for tourists from short-haul arrival markets than from long-haul destinations.

A general conclusion from the studies included in the literature review is that elasticities which are estimated over a longer-term period are higher than shorter-term elasticities. Travellers are less sensitive in the shorter-term as they may not be able to adjust their behaviour when a change in price occurs.

A full review of each of the main studies cited in our literature revenue are presented in Table 19 and Table 20.
### Table 19: UK tourism demand elasticities

<table>
<thead>
<tr>
<th>Source</th>
<th>Scope of report</th>
<th>Range of elasticity</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Song, Kim and Yang (2010)</strong></td>
<td>Analyses the point estimate elasticities for developed market tourism from 18 studies undertaken since 2000.</td>
<td>Most recent report estimates UK tourism price elasticity of demand varies between -0.16 (for Portugal) to -1.96 (Greece). However, other reports indicate a wider range of elasticities, ranging from +0.95 for UK travel to Ireland to -0.9 for UK travel to Greece.</td>
<td>Elasticities vary significantly over different studies and across source and destination countries. Due to wide range of estimates, the importance of reliable confidence intervals is even greater.</td>
</tr>
<tr>
<td><strong>Department for Culture, Media and Sport (2007)</strong></td>
<td>Analyses the sensitivity of foreign arrivals in the UK to price of UK travel.</td>
<td>The study found that the weighted average price elasticity of demand for UK inbound tourists was -0.61, estimated across seven departure countries. The price elasticities ranged from 0.49 in Italy to -1.86 for Ireland. Domestic tourists are more elastic, with an elasticity of -1.95 across the whole market but with a wide range of estimates across market segments. The price elasticity for domestic travel ranges from -2.62 for the holiday segment, to -1.84 for the Business and Visiting Family and Relatives Segments.</td>
<td>Estimated elasticities vary across different types of market segment. Business travellers were found to be the most inelastic (estimated price elasticity of demand of 0.18); with holidaymakers the most elastic (estimated price elasticity of demand of -1.23). Further evidence that domestic and foreign tourism are substitutes in some cases. Cross-price elasticity of 0.84 indicates that if foreign tourism becomes 1% more expensive than domestic tourism, domestic tourism spending will increase by 0.84%</td>
</tr>
<tr>
<td><strong>De Mello (2005)</strong></td>
<td>Uses Dynamic Almost Ideal Demand System (DAIDS) to obtain Estimates for tourism price and expenditure elasticities for UK travel to short-haul European destinations.</td>
<td>Short-term: from -1.05 (holidays to Spain) to -1.90 (holidays to Portugal) Long-term: from -1.73 (holidays to Portugal) to -2.61 (holidays to France)</td>
<td>De Mello has been the frontrunner of the application of system of equations models to the UK inbound tourism sector. These models solve multiple equations simultaneously which allows an analysis of the interdependence of budget allocations to different consumer goods/services in a multi-stage budgeting process. Elasticities differ across destination markets. An analysis for travel to Spain, Portugal and France show a range of elasticity estimates. Elasticities also differ across time horizon period. Consumers are more elastic over a longer-term period to the changing price of the holiday. Evidence that European destinations are close substitutes with a number of significant cross-price elasticity coefficients found between French, Spanish and Portuguese markets, particularly over a longer-term period.</td>
</tr>
</tbody>
</table>
Table 20: UK air travel demand elasticities

<table>
<thead>
<tr>
<th>Source</th>
<th>Range of elasticity</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayor and Tol (2007)</td>
<td>-0.45 (base case) to -0.68 (high elasticity scenario)</td>
<td>Assumed price elasticities are very uncertain and studies reveal a wide range of estimates. Impacts from elasticities also depend on whether assume a substitution effect between foreign and domestic holidays. Mayor and Tol use as a base case no substitution effect.</td>
</tr>
<tr>
<td>Department of Finance Canada literature review</td>
<td>Range from -0.27 (long haul international traveller) to -1.52 (short haul leisure traveller)</td>
<td>Analyses 21 Canadian and international empirical studies of own-price elasticities. Findings suggest that it is not advisable to use general elasticities to evaluate specific market segment. Each market segment is defined by the type of traveller and the distance travelled and each have unique elasticities.</td>
</tr>
<tr>
<td>IATA: Estimating Air Travel Demand Elasticities (2007)</td>
<td>Guidance for; base elasticities for route/market level: -1.4, national level: -0.8 and pan-national level; -0.6</td>
<td>Extensive literature review of 23 papers showed a range of estimates.</td>
</tr>
</tbody>
</table>
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