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Modelling the Effects of Price Differentials at UK Airports

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1. Introduction

1. HMRC has commissioned research from the Department for Transport (DfT) into how localised price changes at UK airports may affect total aviation demand, and how that demand is distributed between airports. This research is relevant to:
    - Considering the recommendations of the Calman Commission report;
    - The forthcoming Silk Commission report;
    - The Government's commitment to continue examining the role of the tax system in support of rebalancing the economy across the regions.

2. The price changes that were modelled focused on four main scenarios of interest. In order to understand the implications of possibly devolving Air Passenger Duty (APD) to Scotland and Wales, the first two scenarios directly examine the impact that differential price levels in these countries could have on passenger demand, and in particular how such price changes affect demand at English airports.

3. The second two scenarios examine the implications of modelled price changes at the UK's two busiest airports, Heathrow and Gatwick. As with the first two, these scenarios look at the impact that differential price levels at these airports may have, not just on demand at these airports, but also on other UK airports.

4. This report is set out as follows:
    - Section 2 provides a brief overview on the aviation sector in the UK.
    - Section 3 describes the project's methodology in more detail, and outlines the key assumptions that have been made.
    - Section 4 details the results of the modelling. It begins by outlining the impact that these price changes could have on total aviation demand in the UK, before going into the specific effects in each of the four scenarios in turn.
    - Section 5 sets out the conclusions.
    - Additional information and detailed results are provided in the Annexes.

5. This report draws on analysis completed using the Department for Transport's Aviation Model. The model is designed to capture the key inter-relationships between demand at different airports, making it well suited to this work. However, it is recognised that, as with all models, it is a simplification of reality and can never capture the full complexity of the aviation sector. The behavioural responses assumed within the model are grounded in analysis of data from the CAA Passenger Survey but it should be recognised that the degree of uncertainty can be relatively high at an airport by airport level. As such, although specific changes in demand for

particular airports are cited within this paper to illustrate the potential effects, the emphasis of this project has been on finding consistent patterns of results across a range of price changes within each scenario. This research also does not consider how the results may change if any of the underlying assumptions of the model are altered.

2. Aviation in the UK

6. The aviation sector plays an important role in the UK economy, through both the output it produces and the number of people it employs. Its significance in the UK economy was driven by the rapid improvements in air transport technology in the late 20th century which led to dramatically lower average fares. This reduction in fares made air travel more affordable for more people, and resulted in large increases in both the number of passengers flying, and the number of airports in the UK offering international flights.

7. Despite significant growth in regional airports, the aviation market remains dominated by airports in London and the South East. The DfT model forecasts that approximately 100million APD payable passengers will depart from a UK airport in 2014. Just over half (53million) of these passengers will depart from one of the five major airports in the South East[1], with just over a fifth (23million) departing from Heathrow alone[2].

3. Methodology

3.1. The DfT's Aviation Model

8. The DfT's aviation model is a two stage allocation model[3]. The first stage looks to estimate the level of aviation demand in the UK using economic determinants and various time-series econometric models. This demand is then allocated across UK districts based on local income, population and employment levels. This produces a forecast of passenger demand at local level, based on no airport being capacity constrained.

9. The second stage then allocates this unconstrained district level passenger demand to certain airports based on a set of passenger choice equations. These equations have been calibrated to 2008 CAA survey data using a standard transport modelling

[1] Heathrow, Gatwick, Stansted, Luton & London City
[2] Annex B contains baseline passenger numbers for all the airports in the DfT model
[3] A more detailed description of the DfT Aviation Model's methodology can be found in Annex D

approach of combining journey time (including waiting and interchanging) and money costs into a single measure of "generalised cost". It is through these passenger choice equations that the model determines how passenger demand is reallocated due to price changes at certain airports.

10. There are two key components of this generalised cost. The first of these is the surface access cost. As you would expect, those airports with lower surface access costs will be more desirable to consumers. The second key component of generalised cost is the service frequency. Airports which offer a higher service frequency for a certain route will be more desirable, and passengers will be willing to pay extra in order to travel from airports with greater service frequency. In practice there may be other factors that affect passenger demand that are not captured by the model such as the relationships between airports and certain airlines.

11. Frequency of service plays a key part in many of the results that will be presented, as when passenger demand changes in reaction to a change in price, this has a knock on effect on service frequencies. This impact can then escalate over time as, for example, more services are offered – the airport attracts more passengers, which in turn leads to additional services/frequencies and so on.

12. In instances where the model allocates more passengers to a certain airport than that airport can accommodate, the model imposes additional costs at these airports to solve this excess demand problem. These "capacity premiums" will increase until a sufficient number of the most price sensitive passengers are either persuaded to travel from another airport, or not to travel at all. This effect is most prevalent at Heathrow which becomes capacity constrained in the model by 2013[4].

3.2. Modelling the Price Differentials

13. The price changes that are modelled in this work are treated similarly to the capacity premiums. By implementing them in this way we are able to analyse the effect that these price changes have on total demand, and on how demand is re-allocated in the model.

14. In order to accurately assess the demand suppression and reallocations, the price changes had to be consistent across airports. The price changes that are being imposed in the model are not based on any particular factor however in order to be consistent across airports we have based our price changes on APD. This is one of the few constant prices across airports; as ticket price, travel cost etc, are different for each passenger. However whilst they are modelled on the value of APD, these price changes are not assumed to derive from any one particular factor.

[4] Annex C details when airports become capacity constrained in the DfT model's baseline.

15. There are other advantages to using APD to model these price changes; one being that its structure is a reasonable proxy for the total price of a flight, due to the fact that APD increases the longer the distance travelled. Also, by using APD as the medium for the price changes it is easier to analyse passenger effects by APD band, allowing us to separate out the effects that certain price changes have on the short and long haul markets.

16. Price changes are modelled from 2014 with results presented through to 2025[5]. Whilst in reality any price changes at airports would affect all passengers, the price changes that have been modelled have been restricted to affect departing passengers only. This is because the main focus of this project is on how departing passengers change their behaviour in response to a price change. An implicit assumption in this work is that any arriving passenger will have a matching return flight; therefore they will be subject to the price change on the departing leg of their journey.

17. In presenting the results, we should stress that the price changes modelled here are not intended to simulate actual Government policy. The intention of this work is solely one of improving our understanding of the impact that differential prices at UK airports could have on passenger demand patterns.

3.3. Other Key Modelling Assumptions

18. The model also assumes that no new runways are built, but that where there is no explicit planning prohibition in place, airports can and do develop terminal capacity in order to take advantage of additional demand. There are also some assumptions that are made to manage technical modelling constraints in a way that best reflects realistic patterns of demand. Those relevant to this analysis are:
    * Cardiff and Edinburgh cannot operate direct flights to extremely long distance destinations (e.g. Far East, Australia, NZ) until 2021 although there are no restrictions on most long-haul routes (e.g. transatlantic services).
    * Only Heathrow, Gatwick, Stansted, Manchester, Luton & Birmingham can serve international-to-international interlining[6] passenger traffic.
    * Only Heathrow, Gatwick, Manchester & Stansted can serve domestic-to-international interlining passenger traffic.

[5] However Annex B does contain passenger numbers out to 2030.
[6] Interlining passengers are passengers who are only travelling through an airport; whose journey does not begin or finish at the airport in question.

3.4. Modelled Scenarios

19. The baseline for all scenarios is the DfT UK Aviation Forecasts, published in August 2011[7]. These forecasts assumed that APD rates will rise in line with inflation from April 2011 levels and the simulations below are based on the nominal APD rates set out in Annex A. The scenarios that have been modelled use a weighted average rate based on the proportion of reduced and standard rate passengers travelling to each APD Band[8].

20. The first two scenarios analyse the impact of differing price levels at Scottish and Welsh airports. The focus of these scenarios is on the impact a price cut at these airports has on passenger demand. A wide range of price cuts have been modelled in order to understand how these impacts differ depending on the scale of the cut. The exact price changes that have been modelled are presented in Annex A.

21. The focus in the second two scenarios is on how passenger demand responds to a price increase at the UK's two busiest airports. Again, as with the previous scenarios, a wide range of price increases have been modelled so as to understand how demand responses change depending on the scale of the price increase. The exact price changes that have been modelled are detailed in Annex A.

[7] http://www.dft.gov.uk/publications/uk-aviation-forecasts-2011
[8] This is taken from CAA survey data.

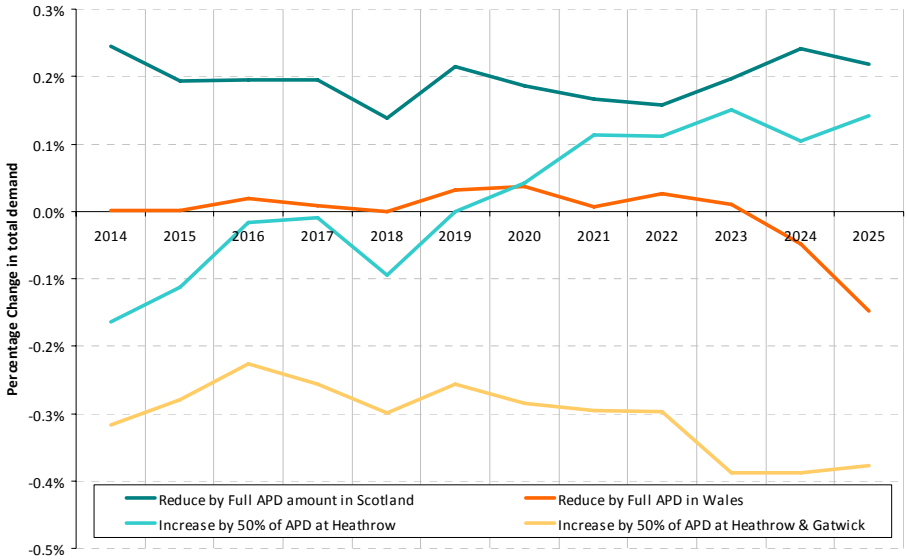
4. Modelling Results

22. This section sets out the results from each scenario in turn, but firstly the impact that these price changes have on total passenger demand will be presented. Each scenario will focus on those airports which are most affected by the price change.

4.1. Impact on Total Passenger Numbers

23. The price changes shown in Figure 1 represent the most extreme price change modelled in each of the four scenarios. As Figure 1 illustrates, even for these more extreme price changes the impact on total UK passenger demand is small – less than +/- 0.5%, which equates to just over 0.5million passengers.

Figure 1: Percentage change in Total APD Payable Passengers for selected Price Changes



24. Holding everything else constant, we would expect an increase in airport specific prices to reduce the total number of passengers, and vice versa. However due to capacity constraints in the baseline, this is not necessarily the case. Box 1 discusses this in more detail for the case of a price increase at Heathrow equivalent to 50% of APD.

25. These results suggest that unless the change in price is substantial or the price change occurs at a greater number of airports, then the primary impact will be a redistribution of passengers between airports as oppose to a significant increase in the number of journeys being undertaken. The exact nature of this reallocation will be addressed for each scenario in the next sections of this note.

Box 1: The Interaction between Airport Specific Prices and Congestion Premiums

A key feature of the DfT model is that it explicitly captures the impact that capacity constraints have on passenger choices. It does this by increasing prices at capacity constrained airports until sufficient demand has been re-directed to alternative airports. This is called a congestion premium.

If we model an airport specific price increase at an airport that is expected to be capacity constrained in the baseline, then this price increase can perform the same role as the congestion premium – encourage passengers to use alternative airports.

When a relatively large increase in price is introduced at Heathrow, sufficient demand is displaced to alternative airports that Heathrow no longer needs to charge an additional congestion premium in the short term. Furthermore, new routes can start up from alternative airports providing passengers with more options to travel that are free from a congestion premium.

As a result the specific price increase at Heathrow will be reducing demand by less in future years, than if airports were charging congestion premiums as per the baseline. However we would not expect this effect to be sustained indefinitely. Other airports in the South East will reach capacity sooner than in the baseline, therefore they will begin to charge congestion premiums, therefore reducing total demand in future years.

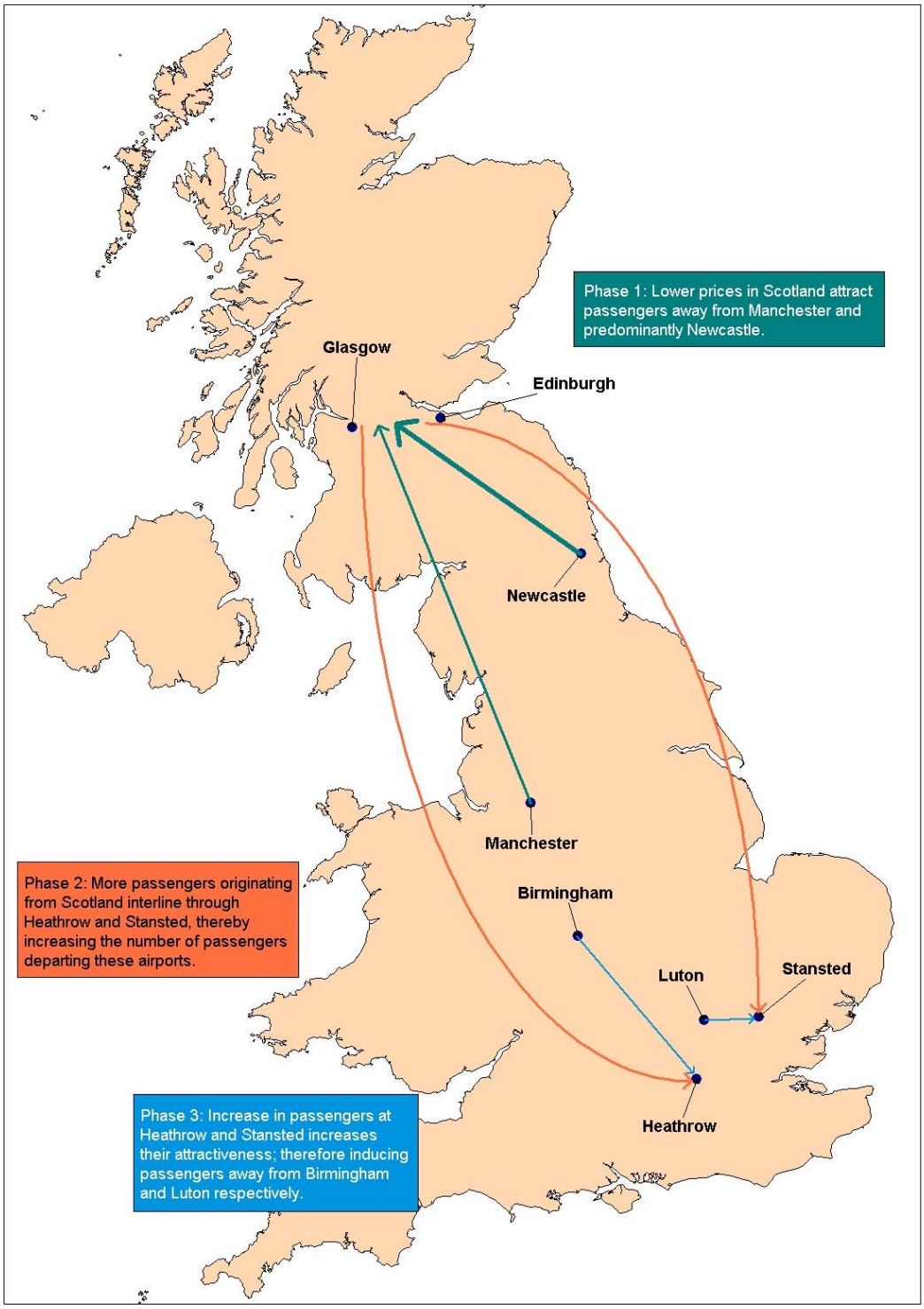
4.2. Impact of Price Changes at Scottish Airports

26. Map A illustrates how a price reduction equivalent to the full value of APD at Scottish airports affects the flow of passengers in the UK. The exact percentage changes at each of the main affected airports are shown in Figure 2. The change in passenger flows can be divided into three phases, each of which will be discussed in turn. The initial phase is that Scottish airports attract passengers away from Newcastle, and to a lesser extent Manchester [Phase 1 on Map A].

27. As we would expect, the main beneficiaries from this price change are the two major Scottish airports: the number of passengers travelling from Edinburgh and Glasgow increases by around 5% and 10% respectively, by 2020. There are two main reasons why the percentage increases at Glasgow are higher than Edinburgh. The first is simply that Glasgow starts with a smaller total number of passengers than Edinburgh. The second is that as this price reduction represents a bigger drop in price for long haul journeys and Glasgow has an initial frequency advantage over Edinburgh for these journeys; long haul demand will initially flow to Glasgow to take

advantage of these existing services. This increase in demand for these services will then induce a greater shift in these services to Glasgow in future years.

Map A: The change in passenger flows in response to a price reduction equivalent to the full value of APD at Scottish Airports.



28. Whilst some of this increased passenger demand will be as a result of the price reduction enticing additional journeys; a large proportion of the increase will be passengers induced from other airports, in particular Newcastle. As shown in Figure 2 total passenger numbers at Newcastle are nearly 10% lower than the baseline in 2015, and recover slightly over time. The level of demand redistribution between airports that are close geographically is dependant on the level of the price change, and how this interacts with passengers' surface access cost and the value they place on service frequency. This interaction is discussed further in Box 2.

Figure 2: Percentage change in APD payable passengers in response to a price reduction equivalent to the full value of APD at Scottish airports.

29. In particular, the number of medium to long haul passengers at Newcastle falls significantly. This is because a cut of this magnitude is greater than the cost of travelling between Newcastle and Edinburgh/Glasgow for many passengers (estimated to be around £50, including both hard costs and the value of additional travel time to the passenger).

30. As the surface access cost for many passengers is now eclipsed by the price reduction, there is a shift in passenger demand for long haul flights away from Newcastle, to the two main Scottish airports. Using the same argument it is understandable why short haul passenger numbers are less affected. The saving on a short haul flight is likely to be less than the cost of travelling to a Scottish airport for many passengers, therefore there is less incentive for these types of passengers to switch their demand to either Edinburgh or Glasgow.

Box 2: How does a Price Change at a specific Airport affect neighbouring unaffected Airports?

As discussed in Section 3.1, there are two main influences on passenger demand at a certain airport; surface access cost and service frequency. Whilst a price change at certain airports will alter passenger demand, it is how the price change interacts with these two other factors that is important in understanding passenger reallocations.

For airports which offer similar service frequencies; a price reduction at one airport means passengers will essentially weigh up this saving in price against the increase in travel cost. In these instances the geographic proximity of the alternative airport is a key driver behind any passenger reallocations.

Conversely, many passengers are willing to accept higher travel costs if an airport holds a significant service frequency advantage over other neighbouring airports. Therefore if prices rise at airports that have a frequency advantage, passengers will weigh up this price increase against their preference to travel from airports with greater service frequency.

31. In addition to these impacts, price changes of this magnitude also cause significant knock-on effects at other UK airports because of how passengers are redistributed. This is labelled as Phase 2 on Map A. As shown in Figure 2, passenger numbers at Heathrow increase in future years, as Scottish passengers use it to transfer through[9]. Consequently an increase in passengers from Scottish airports will lead to increased passenger traffic at Heathrow. For this reason, even though prices are higher at Heathrow due to its capacity constraints, the price reduction at Scottish airports means more Scottish passengers can now afford to pay the additional premium for transferring there.

32. In the Scottish scenarios, the key reason why more Scottish passengers will choose to interline through Heathrow despite the additional price premium; is because of the greater choice of long haul services offered at Heathrow. The result of this increased demand for medium and long haul services at Heathrow means these services switch away from Luton in the medium term.

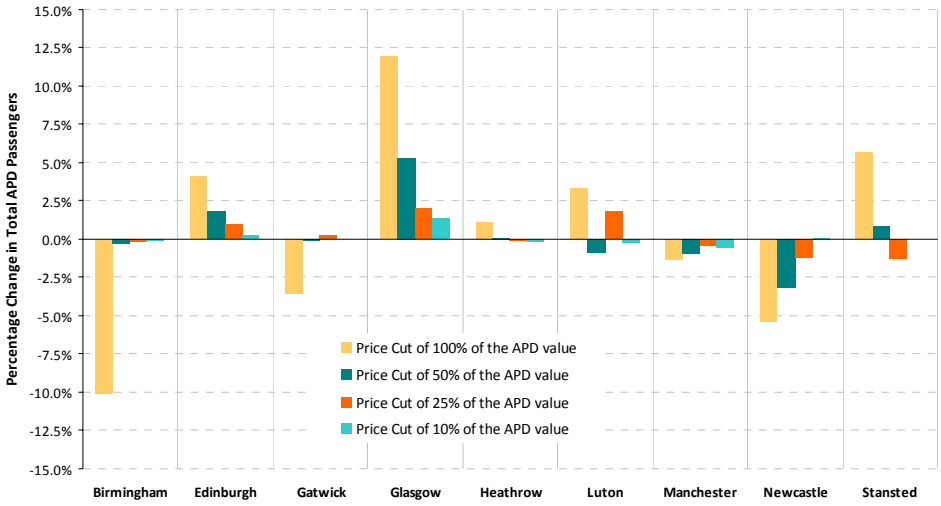
33. The increase in passengers and therefore services at Heathrow also attracts additional passengers that previously travelled on long-haul services from Birmingham Airport – Phase 3 on Map A. This drives the 10% reduction in passenger traffic at Birmingham by 2020 as shown by Figure 2.

[9] As Heathrow is at capacity in the model, this rise in passenger numbers occurs due to larger planes operating these routes; by 2025 the number of passengers per plane in 13% than in the baseline.

34. Stansted also sees a small increase in passenger numbers in the medium term. This is a combination of two main factors. Firstly Stansted is a popular airport for interlining Scottish passengers therefore, like Heathrow; an increase in the number of Scottish passengers will mean an increase in passengers at Stansted [Phase 2 – Map A]. Secondly as services shift away from Luton to Heathrow, Stansted gains a greater frequency advantage over Luton over the medium term. This causes further switching in passenger demand from Luton to Stansted [Phase 3 – Map A].

35. These impacts occur under the most extreme price cut; however for less substantial price reductions, passenger re-allocations become much more subdued, as Figure 3 shows.

Figure 3: Percentage change in APD passengers in 2020 for a variety of different price cuts at Scottish Airports.

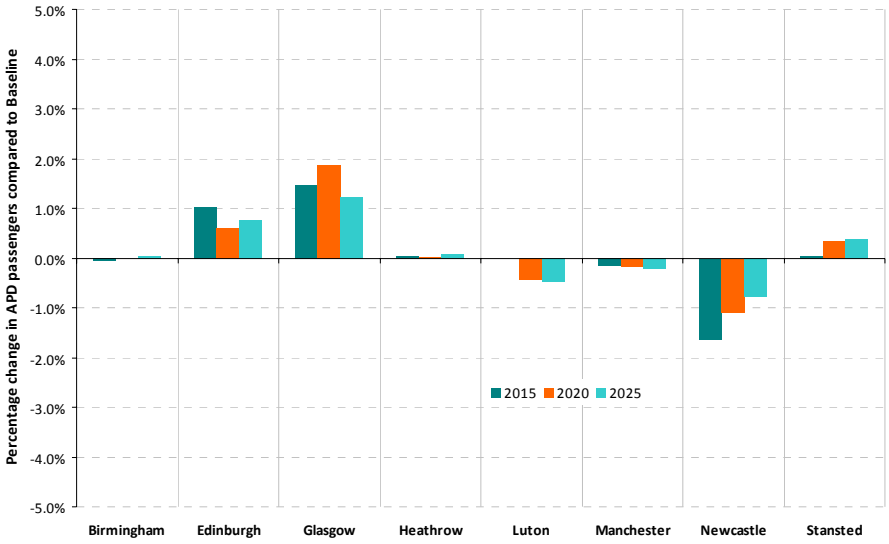


36. As the price reduction gets smaller, the incentive for passengers to switch from Newcastle to a Scottish airport reduces. Even if prices fell by half of what they do in the more extreme case presented above, the price advantage for long haul flights from Scottish airports is reduced, due to the travel costs. Additional demand is also stifled as the scale of the price cut is reduced.

37. A further difference in the results is that for many passengers a small price cut is insufficient to overcome the additional price premium of interlining through Heathrow, as Figure 3 clearly illustrates. These passengers are instead forced to interline through either Stansted or Luton, where there is no capacity premium in the near term. A knock-on effect of fewer Scottish passengers interlining through Heathrow is that demand is insufficient to attract long haul services away from Birmingham.

38. If the price change takes the form of a fixed amount, this represents a larger percentage change on short haul travel as fares are generally smaller. However as Figure 4 illustrates, any passenger reallocations are minimal. There is still a trade off between Newcastle and Glasgow/Edinburgh, although it is only in the region of +/- 1%-2%.

Figure 4: Percentage change in APD payable passengers in response to a price reduction of £5 on all flights from Scottish airports.



4.3. Impact of Price Changes at Welsh Airports

39. As Cardiff is the only Welsh airport in the DfT model, this is the only airport which is subject to a price cut in the Welsh scenarios. Figures 5a & 5b illustrate the percentage change in APD payable passengers in response to a price reduction equal to APD on flights from Welsh airports in 2015, 2020 and 2025.

40. As Figure 5a shows, passenger travel through Cardiff increases almost 5 fold as a result of this price reduction, although this impact declines over time. The percentages are very high due to the relatively small number of passengers that travel from Cardiff currently (just over 0.5m).

41. A price fall of this magnitude has a positive effect on all types of flight (scheduled, charter, Low Cost Carrier [LCC] etc.), and on all types of destination, both short and long haul. In absolute terms the model predicts that by 2020 around 3.5m passengers will be travelling from Cardiff as a result of this price change, giving it a similar annual footfall to London City airport. Box 3 explains in more detail why Cardiff's passenger numbers increase so substantially.

42. Due to their close geographical proximity a price reduction at Cardiff attracts passengers that previously travelled through Bristol airport. Whilst the fall in the number of passengers at Bristol is substantial – a 25% fall by 2020, as shown in Figure 5b – it is limited as Bristol airport serves predominantly Band A destinations. Therefore for many passengers the price fall at Cardiff does not offset the increased cost of travelling to Cardiff airport instead. In addition to this, Bristol has a significant frequency advantage over Cardiff, particularly in the LCC market. Therefore many passengers are willing to forego the lower prices at Cardiff, in order to exploit the greater service frequency at Bristol.

Figures 5a & 5b: Percentage Change in APD Payable Passengers due to a price reduction equal to the equivalent of APD on flights from Cardiff

Figure 5a:

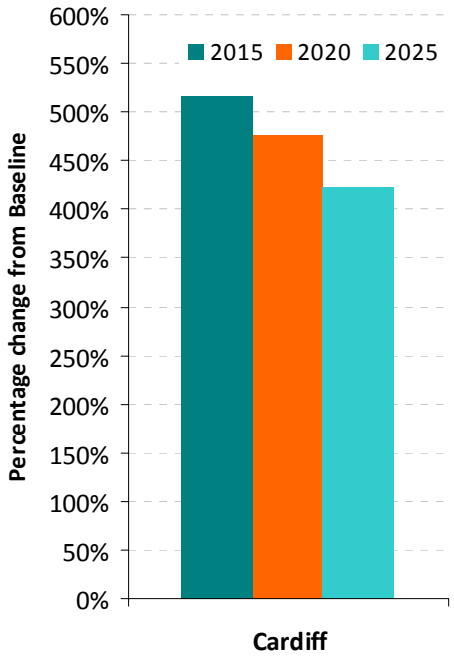
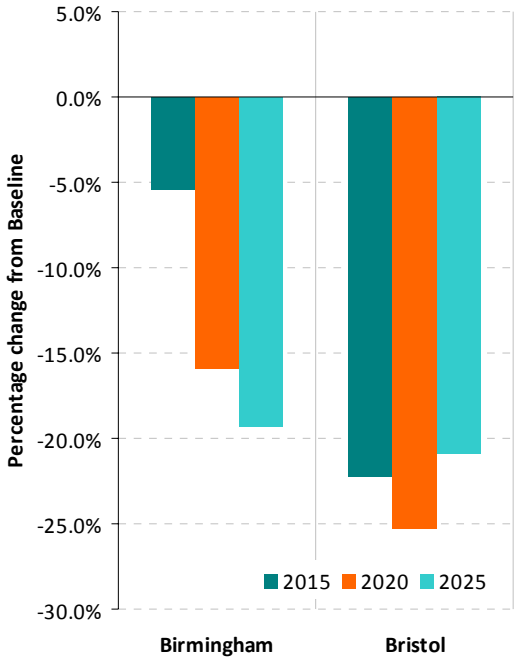


Figure 5b:

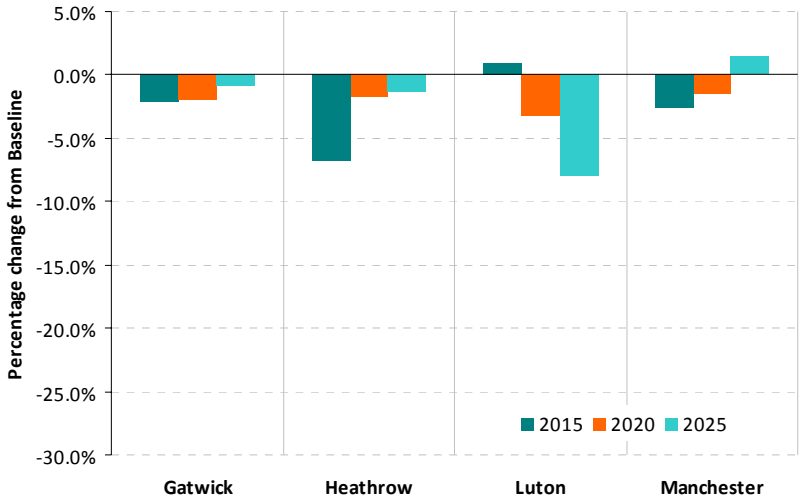


43. As Figure 5b also illustrates, Birmingham also sees a significant reduction in passengers – around 15% by 2020 – in response to cut in price at Cardiff. The decline in passengers is in two stages. Firstly there is an immediate fall in passengers due to the cheaper flights that can be offered from Cardiff. Secondly, as Cardiff's long haul market develops more long haul services become less attractive from Birmingham. This is because some long haul demand switches directly to Cardiff as it now offers services to European hubs; this makes similar routes from Birmingham less viable. This is a similar effect to that seen when analysing the impact of cut in price at Scottish airports.

44. The additional impact that this price cut has on other UK airports is fairly minimal as shown by Figure 6. The development of more Band A and Band B services at Cardiff

(either direct or via a European hub) results in small declines in passenger numbers at Gatwick, Luton and initially at Heathrow as well, although demand at Heathrow recovers in the medium term. In addition to this the fall in the number of long haul services from Birmingham leads to a further small shift in passengers to Manchester in the long run, as it becomes a comparatively more attractive airport for long haul destinations.

Figure 6: Percentage Change in APD payable passengers due to a price reduction equal to the equivalent of APD on flights from Cardiff



Box 3: Why does the number of passengers travelling from Cardiff increase so markedly?

In the baseline Cardiff is a small airport carrying around half a million passengers per annum, almost exclusively to Band A destinations. Due to the lack of service frequencies many passengers choose to travel from another airport, even though they incur a greater travel cost.

A reduction in price at Cardiff airport means that more passengers are now willing to accept lower service frequencies in order to take advantage of the lower price. Supply follows demand, meaning that more services are now offered from Cardiff, including services to major European hubs; as well as services flying direct to Band B destinations.

As Cardiff's indirect long haul market develops due to the increased number of services to hub airports, its previous frequency disadvantage is reduced, further increasing the airports attractiveness to passengers over the medium to long term.

45. If the price reduction is much less than the equivalent of APD, then whilst some switching continues to occur between Bristol and Cardiff it is on a much smaller scale. In addition to this most other passenger substitutions die out very quickly, as shown in Figures 7a & 7b. As was the case with Scottish airports; for smaller price cuts, the price advantage for long haul destinations is now much lower. Furthermore the price saving is no longer enough to overcome the additional congestion premium of interlining through Heathrow. Without sufficiently frequent connections to European hubs, significant numbers of long haul travellers will not switch to services originating from Cardiff.

Figures 7a&b: Percentage Change in APD Payable Passengers in 2020 for a variety of different price cuts at Welsh Airports

Figure 7a:

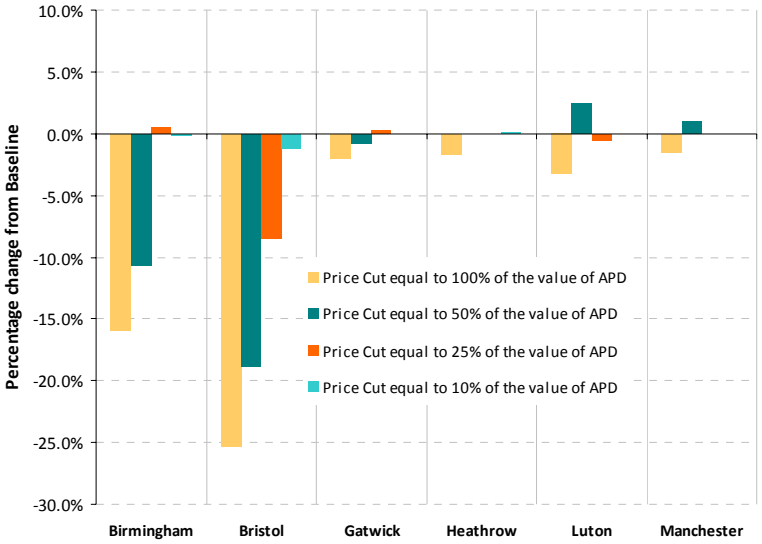
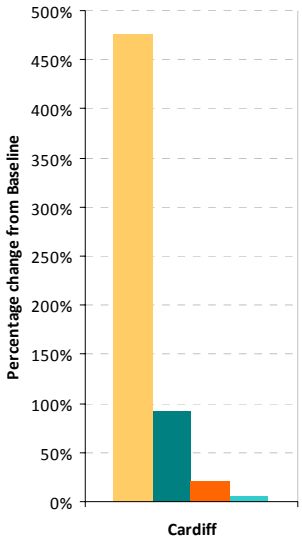


Figure 7b:



46. In the case of a fixed price change, the redistribution of passengers is again subdued. Cardiff still sees an increase in total passengers by around 50%; however as already mentioned, the higher frequency of Band A services at Bristol helps it to maintain a large proportion of its flights.

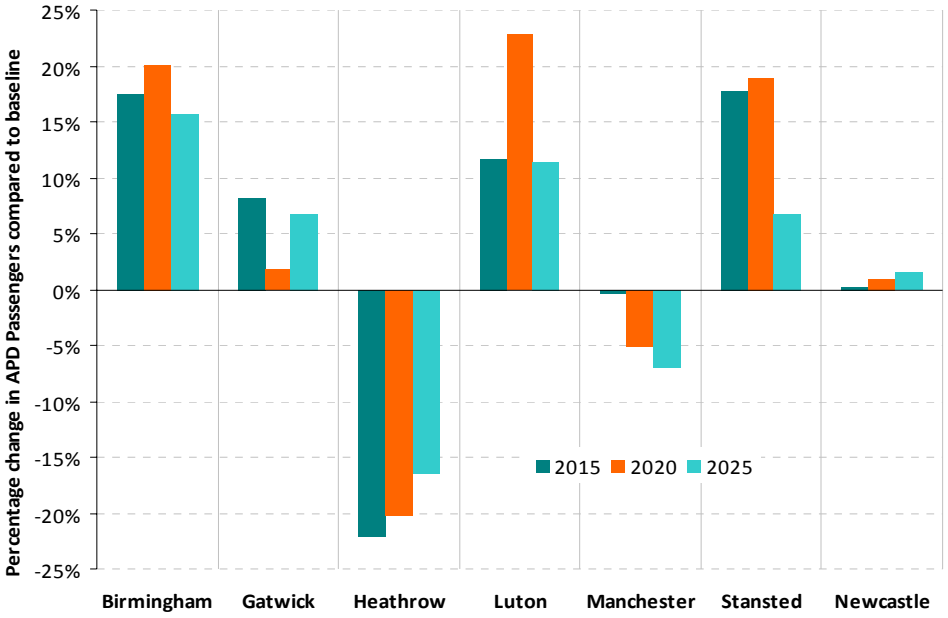
4.4. Impact of a Price Change at Major UK Airports

47. This section will focus on the impact of price changes at the two largest UK airports in terms of the number of passengers carried – Heathrow & Gatwick. Firstly the effects of a price change at Heathrow alone will be analysed, before discussing how these results change if Gatwick is also affected. Whilst the scenarios presented here detail the possible impact of a price increase at these two airports; if prices fall at all other airports instead, the results have a similar profile.

4.4.1. Heathrow

48. Figure 8 illustrates the change in APD payable passengers in response to a price increase equivalent to half of APD on flights from Heathrow in 2015, 2020 and 2025. As we would expect, there is a sizeable reduction in the number of passengers travelling from Heathrow. However even if prices increase quite substantially, there are still significant advantages of travelling from Heathrow. In particular, many destinations are only served by Heathrow and even for those that are served from other airports, in most cases Heathrow offers a greater frequency of service. Due to these advantages a certain level of demand to travel from Heathrow will persist even with large price changes.

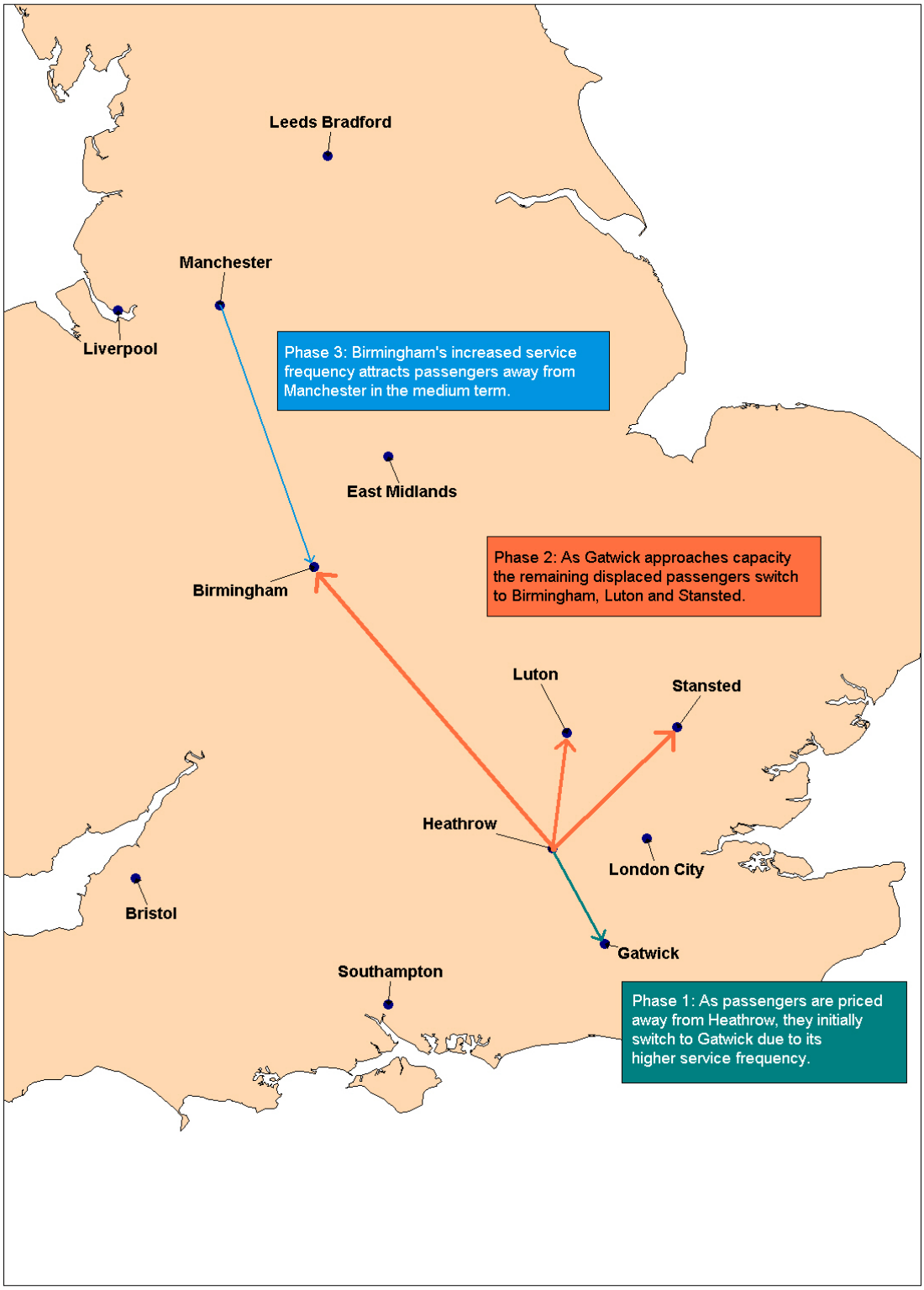
Figure 8: Percentage Change in APD Payable Passengers due to a price increase equal to the equivalent of 50% of APD on flights from Heathrow



49. As Figure 8 illustrates, the immediate response is a decline in the number of APD passengers departing from Heathrow by around 22%, with services shifting mainly to other unconstrained airports that are close geographically to Heathrow. Box 4 discusses why these reallocations are concentrated at large airports in The Midlands and the South East.

50. These passenger flows are shown graphically on Map B. This price increase has two main impacts: firstly there is a small increase in passengers at Gatwick [Phase 1]. However due to the capacity constraints at Gatwick a large number of passengers are redistributed to other airports in the area; namely, Stansted and Birmingham – both up around 20% by 2020, and Luton – up by nearly 25% in 2020 [Phase 2].

Map B: The change in passenger flows in response to a price increase equivalent to 50% of the full value of APD at Heathrow.



Box 4: Why are these passenger reallocations concentrated at other large airports in the South East?

A large price increase at Heathrow causes a significant number of passengers to switch their demand to other airports. The majority of these passengers switch their demand to those airports in closest proximity to Heathrow.

If passengers switch their demand away from Heathrow they will still prefer to travel from airports that offer a high service frequency. Whilst there are many airports in the UK that offer good service frequencies, the large passenger base in London, The Midlands & the South East means a significant number of passengers will prefer to travel from airports in this area in order to limit any additional travel cost.

Suppliers will attempt to match this demand by shifting services away from Heathrow to other airports in this area. Due to the large amount of spare capacity at these airports, particularly Birmingham and Stansted, there is little incentive for suppliers to shift services further afield.

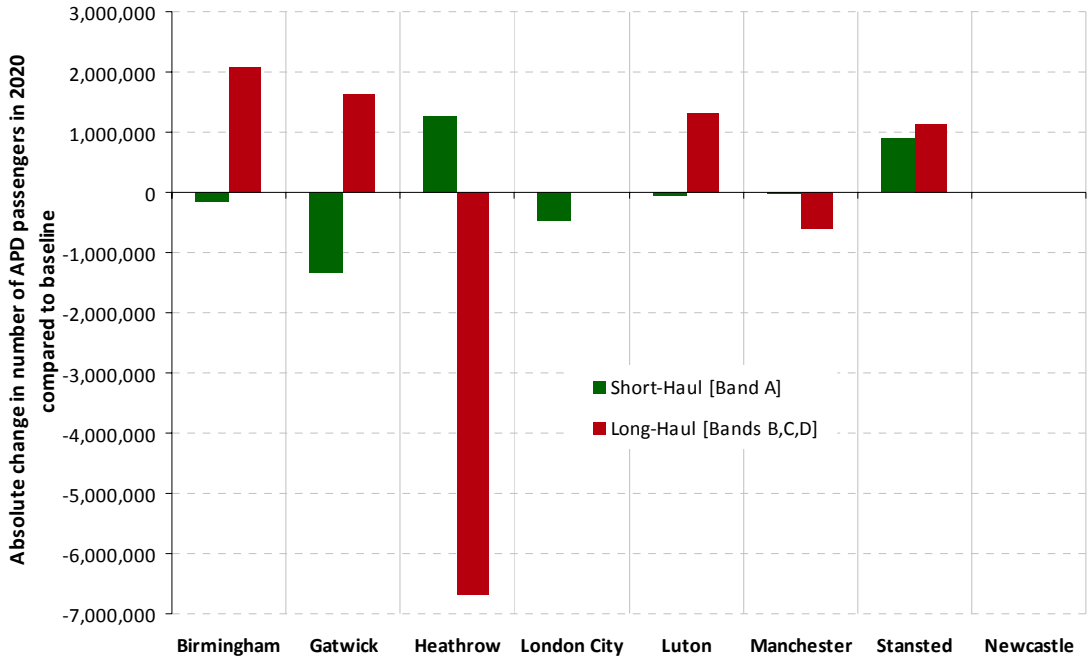
51. However looking solely at total passenger numbers does not tell the full story as the impact this price change has on the short and long haul markets is very different. As shown in Figure 9, if prices at Heathrow are increased by the equivalent of 50% of APD the decline in passenger numbers at Heathrow is mainly due to a decline in long haul passenger demand as these are the routes that are hardest hit by the price increase. However for reasons outlined earlier in this section, travelling from Heathrow offers significant advantages that other airports cannot match. So total demand remains high even though prices have risen quite significantly.

52. The impact on the short haul market is quite different. Even though a larger number of long haul passengers shift away from Heathrow, a number of the more price inelastic short haul passengers and services begin to utilise the spare capacity at Heathrow, as these services are comparatively less affected by the price change. This helps to partially offset the large fall in long haul passengers (see Figure 9).

53. As previously mentioned, passengers initially flow to Gatwick [Map B – Phase 1], as it offers good service frequency, whilst not greatly increasing many passengers' travel costs. However as Gatwick is much closer to capacity than other airports in the South East, it is limited in how many more passengers it can accommodate. This excess demand pushes up the price at Gatwick with the result that most of these additional services which are reallocated from Heathrow replace existing, more price sensitive services. Short-haul Charter and Low Cost Carrier flights are the first to be priced away from Gatwick, switching mainly to Stansted. As illustrated in Figure 9, long haul passengers at Gatwick are around 1.5million higher by 2020, whilst short haul passengers fall by just over 1million.

54. A greater proportion of demand shifts to Birmingham and Stansted as these are the two biggest, unconstrained airports that are in close proximity to Heathrow [Map B – Phase 2]. A significant amount of this demand is for long haul services, as shown in Figure 9. By 2020 the number of long-haul passengers at Stansted is over 1million higher, and at Birmingham it is around 2million higher.

Figure 9: Absolute change in APD passengers in 2020 in response to an increase in price at Heathrow by the equivalent of 50% of APD.



55. This step change in demand for long haul services also has a lasting impact over time. As more passengers switch their demand to these airports, this then entices more services to shift to these airports. As this effect prevails, Stansted and Birmingham begin to offer more services and with a greater frequency, thereby attracting further passenger demand in future years.

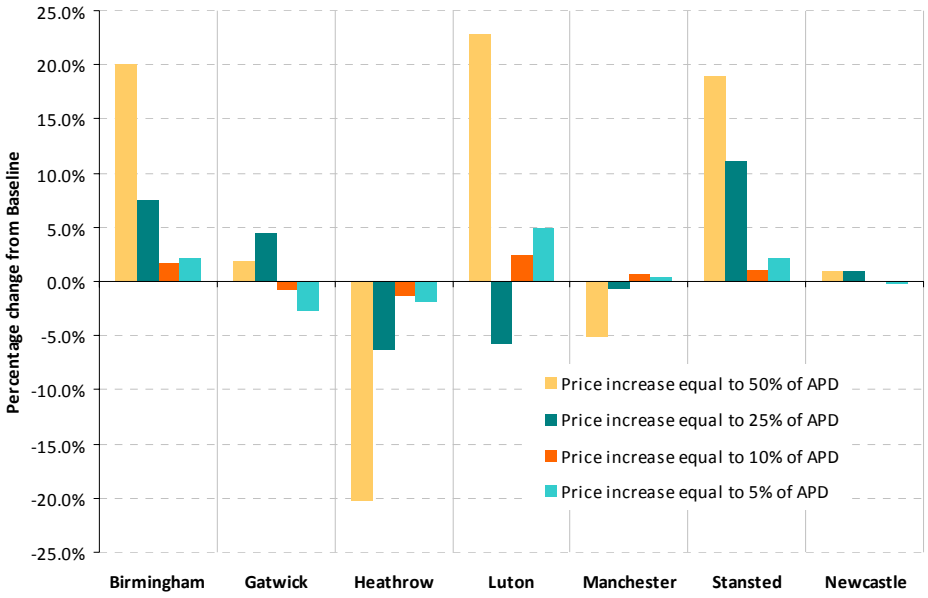
56. This redistribution of passengers also has a further knock on impact on Manchester [Map B – Phase 3]. Due to the increased number of long haul services offered from Birmingham in the medium to long run, Birmingham becomes a more attractive airport for long haul travel than Manchester. This drives the reduction in passengers travelling from Manchester in future years, as shown in Figure 8.

57. Whilst these figures refer to APD payable passengers, an additional impact of the increased price at Heathrow is that this increases the number of transfer passengers choosing to hub through Heathrow. As the price increase displaces demand away from Heathrow, the reduction in passenger numbers means that no congestion premium is charged until much later than in the baseline (see Box 1). Therefore the

price facing transfer passengers is lower, as the price increase only applies to departing passengers. The result of this is that up to a million additional transfer passengers travel through Heathrow by 2020.

58. If the price increase at Heathrow is lower, then the impacts that have been described above are far less severe; as can be seen in Figure 10. For lower price increases more passengers are willing to accept this higher price in order to reap the benefits of travelling from Heathrow.

Figure 10: Percentage change in APD passengers in 2020 for a variety of different price increases at Heathrow.



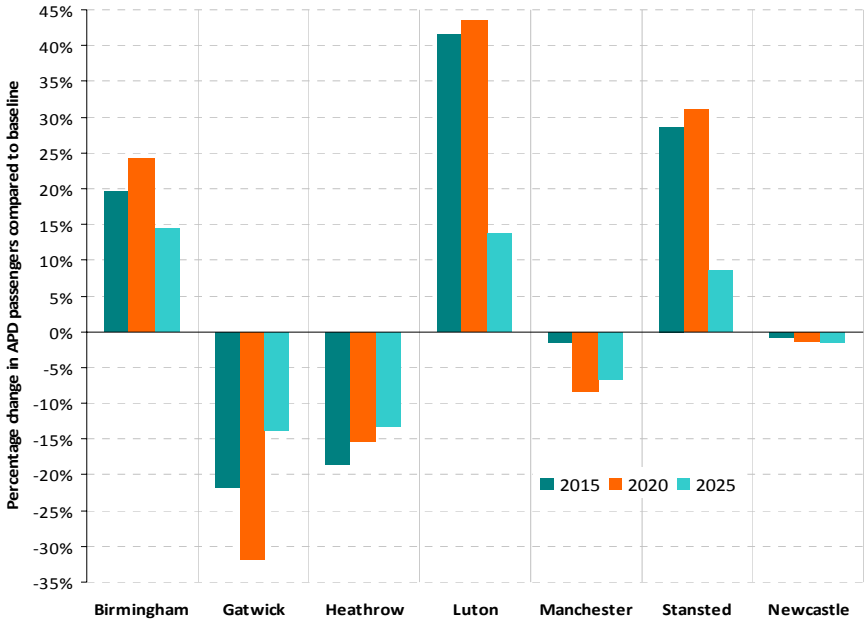
59. For lower price increases, the way passengers are redistributed also changes. One instance of this is that Luton does not see such a dramatic rise in demand for long haul services. In the more extreme scenario, the switch of passengers from Heathrow to Gatwick is so large, that Gatwick becomes constrained by 2016. This then forces some of the more price sensitive long haul services to relocate to Luton. However if the price increase is lower, the number of passengers switching to Gatwick is less severe, therefore Gatwick does not reach capacity as quickly, therefore meaning less of Gatwick's more price sensitive services are redistributed to Luton.

60. If prices are increased by a fixed amount on all flights, the number of short haul passengers at Heathrow declines by around 15%, although these numbers recover by 2020. These services switch primarily to Gatwick, London City and Luton. The increase in passengers is most persistent at Luton as both Gatwick and London City become capacity constrained by around 2020. The decline in long haul passengers is much lower – just under 5%.

4.4.2. Heathrow and Gatwick

61. This section looks at how the results discussed above change if the price increase also occurs at Gatwick. On the whole the results have a similar profile, the reasons for which are outlined in Box 5. Therefore this section will only focus on explaining the major differences between the two scenarios, which is mainly how the impact on Heathrow and Gatwick themselves differs. Figure 11 shows the effect of a price increase at both Heathrow and Gatwick that is equivalent to 50% of APD, on departing passengers at each of these two airports.

Figure 11: Percentage Change in APD Payable Passengers due to a price increase equal to the equivalent of 50% of APD on flights from Heathrow & Gatwick



62. As we would expect the major difference between the two scenarios is the impact this has on Gatwick. Whereas previously we forecast that Gatwick will receive a small increase in passengers, now the number of APD passengers falls substantially – around 30% by 2020. The impact on Gatwick is much more severe due the more price sensitive nature of its customer base, and the lower frequencies offered on many routes relative to Heathrow. Therefore price increases at Gatwick do not have to be as severe as at Heathrow in order to cause a significant shift in demand away from Gatwick.

63. The key driver behind this decline is the reduction in short haul passengers, as shown in Figure 12. There are a number of alternative airports in close proximity to Gatwick, whose prices have not increased and have plenty of spare capacity in order to accommodate any additional displaced demand. Gatwick's long haul passenger numbers also decline, but are not affected to the same extent.

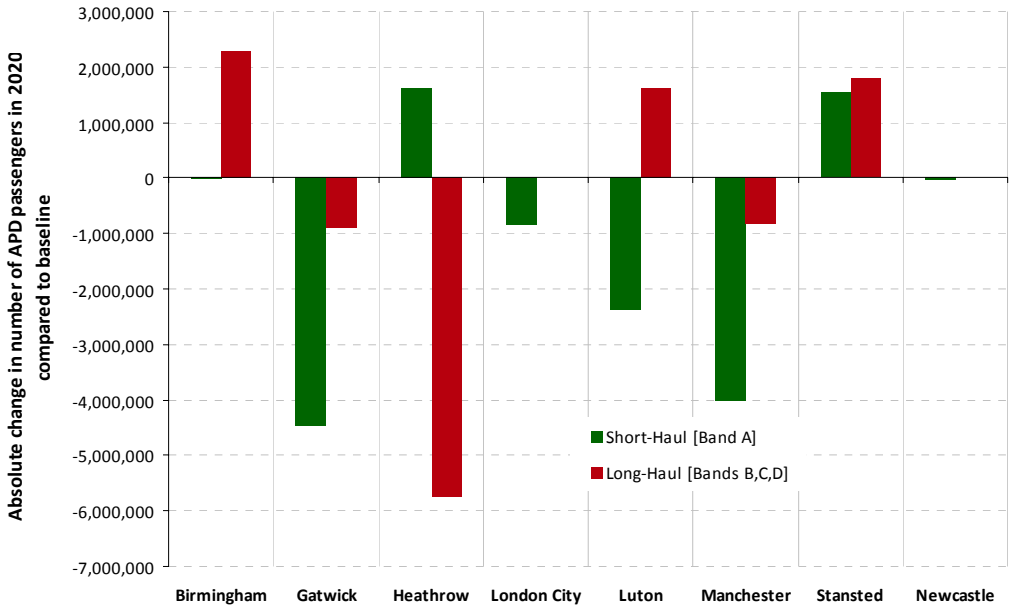
Box 5: Why do headline passenger reallocations not change when Gatwick Airport is also subject to a price increase?

As Gatwick is close to capacity in the DfT model (by 2019 in the baseline – see Annex B) there is a limited number of passengers redistributed there when prices increase at Heathrow only. A significantly larger number of passengers move to either Luton, Birmingham or Stansted. Therefore if prices rise at Gatwick as well, the increase in the number of passengers shifting away from Heathrow and Gatwick can still be accommodated by these other airports, due to their spare capacity, so passenger reallocation remain concentrated in the South East.

64. As Figure 11 shows, there is still a significant fall in the number of passengers travelling from Heathrow although the magnitude of this fall is much less as Gatwick is no longer a viable competitor for Heathrow's long haul routes. As a consequence the number of APD passengers moving away from Heathrow is reduced by around 1m per year, as opposed to the scenarios when Heathrow alone experiences a price increase.

65. As with the previous scenario, Stansted receives a significant proportion of the passengers switching away from Heathrow and Gatwick as shown in Figure 11. This is primarily due to its position as the largest unaffected and unconstrained airport in the South East. As Figure 11 also shows, a significant number of passengers also switch to both Birmingham and Luton.

Figure 12: Absolute change in APD passengers by APD Band in 2020, in response to an increase in price at Heathrow & Gatwick by the equivalent of 50% of APD.



66. As in the scenarios where only Heathrow is affected; if the price increase is smaller then the passenger re-allocations are subdued. For small price increases the results can appear fairly volatile as the model forecasts passengers and services to switch between airports regularly due to the intense route level competition. Whilst small price increases cause some passenger reallocation in the short term; in the long run there is no sustained shift in demand to one particular airport. This volatility is also present if prices are increased by a fixed amount on all routes at these airports.

5. Conclusions

67. The analysis presented in this paper helps to understand the dynamic effect that price changes may have on air passenger demand across UK airports. Whilst it is not possible for economic models to fully capture the wide range of information that goes into airport and airline scheduling decisions, the simulations demonstrate the sensitivity of demand to price changes and the reallocation patterns that arise across different UK airports.

68. A key finding from the modelling is that even the larger price changes that have been modelled in this work have a relatively small impact on total passenger demand. A key reason for this is that whilst these price changes are large in terms of the size of the tax, they are smaller in terms of the total cost of a flight (including fare, cost of travelling to the airport etc.). It is therefore perhaps unsurprising to see that price changes of this magnitude have a relatively small impact on total demand.

69. Secondly the results suggest that large price changes at airports (i.e. the largest of those modelled in each scenario) can lead to passenger reallocation but marginal changes only have more limited impacts. There are two key reasons for this; small price changes are insufficient to either 1) overcome the additional travel costs, or 2) override a passenger's preference for greater service frequency. This second point is particularly important when examining the impact of price changes at Heathrow. In the model passengers are prepared to accept higher prices to a certain extent, in order to travel from airports that offer them greater frequency and connectivity benefits.

70. The results also show that lower prices at Scottish and Welsh airports could attract demand away from neighbouring airports. However, other factors such as travel cost and service frequency limit the potential shift of passengers and services that would occur. Similarly the model predicts that price increases at Heathrow and Gatwick may only result in a shift of passengers to other airports in close proximity. As passengers would still prefer to travel from the same area to minimise any additional travel cost, suppliers would look to satisfy this demand by switching services to other airports nearby who are unaffected by the price increases and have the necessary spare capacity.

Annex A: Baseline APD Rates & List of Modelled Scenarios

Baseline APD Rates 2014

	Band A	Band B	Band C	Band D
APD Rates in 2014 [reduced/standard]	£14/£28	£69/£138	£86/£172	£98/£196

Scenario A: Price reduction at Scottish Airports.

Five different price cuts at Scottish airports were modelled. They are shown in the table below.

	Price change in monetary terms (£) *[in 2014 Prices]*			
Price Cut in APD terms	Band A	Band B	Band C	Band D
A1] Price cut equal to full value of APD	- 14	-69	-86	-98
A2] Price cut equal to 50% of the value of APD	-7	-34.5	-43	-49
A3] Price cut equal to 25% of the value of APD	-3.5	-17.25	-21.5	-24.5
A4] Price cut equal to 10% of the value of APD	-1.4	-6.9	-8.6	-9.8
A5] Price cut of £5 on all flights	-5	-5	-5	-5

Scenario B: Price reduction at Welsh Airports.

Five different price cuts at Welsh airports were modelled. They are shown in the table below.

	Price change in monetary terms (£) *[in 2014 Prices]*			
Price Cut in APD terms	Band A	Band B	Band C	Band D
B1] Price cut equal to full value of APD	- 14	-69	-86	-98
B2] Price cut equal to 50% of the value of APD	-7	-34.5	-43	-49
B3] Price cut equal to 25% of the value of APD	-3.5	-17.25	-21.5	-24.5
B4] Price cut equal to 10% of the value of APD	-1.4	-6.9	-8.6	-9.8
B5] Price cut of £5 on all flights	-5	-5	-5	-5

Scenario C: Price increase at Heathrow.

Five different price increases at Heathrow were modelled. They are shown in the table below.

	Price change in monetary terms (£) *[in 2014 Prices]*			
Price Cut in APD terms	Band A	Band B	Band C	Band D
C1] Price increase equal to 50% of the value of APD	+7	+34.5	+43	+49
C2] Price increase equal to 25% of the value of APD	+3.5	+17.25	+21.5	+24.5
C3] Price increase equal to 10% of the value of APD	+1.4	+6.9	+8.6	+9.8
C4] Price increase equal to 5% of the value of APD	+0.7	+3.45	+4.3	+4.9
C5] Price increase of £10 on all flights	+10	+10	+10	+10

Scenario D: Price increase at Heathrow & Gatwick.

Five different price increases at Heathrow & Gatwick were modelled. They are shown in the table below.

Price Cut in APD terms	Price change in monetary terms (£) *[in 2014 Prices]* Band A	Band B	Band C	Band D
D1] Price increase equal to 50% of the value of APD	+7	+34.5	+43	+49
D2] Price increase equal to 25% of the value of APD	+3.5	+17.25	+21.5	+24.5
D3] Price increase equal to 10% of the value of APD	+1.4	+6.9	+8.6	+9.8
D4] Price increase equal to 5% of the value of APD	+0.7	+3.45	+4.3	+4.9
D5] Price increase of £10 on all flights	+10	+10	+10	+10

Annex B: Number of APD Payable Passengers departing each UK airport

The tables below detail the number of APD liable passengers departing each UK airport in both the baseline and in each of the scenarios modelled.
(Figures shown are in millions)

Key:

Base	**Passenger numbers in the baseline**		
Scenario A: Price Change at Scottish Airports		**Scenario B: Price Change at Welsh Airports**	
A1	Price reduction equal to equivalent of 100% of APD	**B1**	Price reduction equal to equivalent of 100% of APD
A2	Price reduction equal to equivalent of 50% of APD	**B2**	Price reduction equal to equivalent of 50% of APD
A3	Price reduction equal to equivalent of 25% of APD	**B3**	Price reduction equal to equivalent of 25% of APD
A4	Price reduction equal to equivalent of 10% of APD	**B4**	Price reduction equal to equivalent of 10% of APD
A5	Price reduction equal to £5	**B5**	Price reduction equal to £5
Scenario C: Price Change at Heathrow		**Scenario D: Price Change at Heathrow & Gatwick**	
C1	Price increase equal to 50% of APD	**D1**	Price increase equal to 50% of APD
C2	Price increase equal to 25% of APD	**D2**	Price increase equal to 25% of APD
C3	Price increase equal to 10% of APD	**D3**	Price increase equal to 10% of APD
C4	Price increase equal to 5% of APD	**D4**	Price increase equal to 5% of APD
C5	Price increase equal to £10	**D5**	Price increase equal to £10

ABERDEEN

	2014	2018	2022	2026	2030		2014	2018	2022	2026	2030
Base	**1.5**	**1.6**	**1.8**	**2.0**	**2.1**						
Scenario A: Price Change at Scottish Airports						**Scenario B: Price Change at Welsh Airports**					
A1	1.5	1.6	1.8	2.0	2.1	**B1**	1.5	1.6	1.8	2.0	2.1
A2	1.5	1.6	1.8	2.0	2.1	**B2**	1.5	1.6	1.8	2.0	2.1
A3	1.5	1.6	1.8	2.0	2.1	**B3**	1.5	1.6	1.8	2.0	2.1
A4	1.5	1.6	1.8	2.0	2.1	**B4**	1.5	1.6	1.8	2.0	2.1
A5	1.5	1.6	1.8	2.0	2.1	**B5**	1.5	1.6	1.8	2.0	2.1
	2014	**2018**	**2022**	**2026**	**2030**		**2014**	**2018**	**2022**	**2026**	**2030**
Scenario C: Price Change at Heathrow						**Scenario D: Price Change at Heathrow & Gatwick**					
C1	1.5	1.6	1.8	2.0	2.1	**D1**	1.5	1.6	1.8	2.0	2.1
C2	1.5	1.6	1.8	2.0	2.1	**D2**	1.5	1.6	1.8	2.0	2.1
C3	1.5	1.6	1.8	2.0	2.1	**D3**	1.5	1.6	1.8	2.0	2.1
C4	1.5	1.6	1.8	2.0	2.1	**D4**	1.5	1.6	1.8	2.0	2.1
C5	1.5	1.6	1.8	2.0	2.1	**D5**	1.5	1.6	1.8	2.0	2.1

BELFAST INTERNATIONAL

	2014	2018	2022	2026	2030
Base	2.4	2.8	3.2	3.6	4.0
Scenario A: Price Change at Scottish Airports					
A1	2.4	2.8	3.2	3.6	4.0
A2	2.4	2.8	3.2	3.6	4.0
A3	2.4	2.8	3.2	3.6	4.0
A4	2.4	2.8	3.2	3.6	4.0
A5	2.4	2.8	3.2	3.6	4.0
Scenario B: Price Change at Welsh Airports					
B1	2.4	2.8	3.2	3.6	4.0
B2	2.4	2.8	3.2	3.6	4.0
B3	2.4	2.8	3.2	3.6	4.0
B4	2.4	2.8	3.2	3.6	4.0
B5	2.4	2.8	3.2	3.6	4.0
Scenario C: Price Change at Heathrow					
C1	2.4	2.8	3.1	3.5	3.9
C2	2.4	2.8	3.2	3.6	4.0
C3	2.4	2.8	3.2	3.6	4.0
C4	2.4	2.8	3.2	3.6	4.0
C5	2.4	2.8	3.1	3.6	4.0
Scenario D: Price Change at Heathrow & Gatwick					
D1	2.4	2.8	3.1	3.6	4.0
D2	2.4	2.8	3.2	3.6	4.0
D3	2.4	2.8	3.2	3.6	4.0
D4	2.4	2.8	3.2	3.6	4.0
D5	2.4	2.8	3.2	3.6	4.0

BELFAST CITY

	2014	2018	2022	2026	2030
Base	1.4	1.5	1.7	1.9	2.1
Scenario A: Price Change at Scottish Airports					
A1	1.4	1.5	1.7	1.9	2.1
A2	1.4	1.5	1.7	1.9	2.1
A3	1.4	1.5	1.7	1.9	2.1
A4	1.4	1.5	1.7	1.9	2.1
A5	1.4	1.5	1.7	1.9	2.1
Scenario B: Price Change at Welsh Airports					
B1	1.4	1.5	1.7	1.9	2.1
B2	1.4	1.5	1.7	1.9	2.1
B3	1.4	1.5	1.7	1.9	2.1
B4	1.4	1.5	1.7	1.9	2.1
B5	1.4	1.5	1.7	1.9	2.1
Scenario C: Price Change at Heathrow					
C1	1.4	1.6	1.8	1.9	2.1
C2	1.4	1.6	1.7	1.9	2.1
C3	1.4	1.5	1.7	1.9	2.1
C4	1.4	1.5	1.7	1.9	2.1
C5	1.4	1.6	1.7	1.9	2.1
Scenario D: Price Change at Heathrow & Gatwick					
D1	1.4	1.6	1.7	1.9	2.1
D2	1.4	1.6	1.7	1.9	2.1
D3	1.4	1.5	1.7	1.9	2.1
D4	1.4	1.5	1.7	1.9	2.1
D5	1.4	1.6	1.7	1.9	2.1

BIRMINGHAM

	2014	2018	2022	2026	2030
Base	6.5	8.8	10.3	11.9	12.9
Scenario A: Price Change at Scottish Airports					
A1	6.5	7.8	9.1	10.5	11.9
A2	6.5	8.7	10.2	11.8	12.7
A3	6.5	8.8	10.2	11.8	13.0
A4	6.5	8.8	10.3	11.8	12.9
A5	6.5	8.8	10.3	11.9	12.9
Scenario B: Price Change at Welsh Airports					
B1	6.4	7.6	8.2	9.6	11.4
B2	6.5	7.8	9.1	10.3	11.7
B3	6.5	8.8	10.4	11.9	13.2
B4	6.5	8.8	10.3	11.8	13.0
B5	6.5	8.8	10.3	11.8	13.1
Scenario C: Price Change at Heathrow					
C1	7.0	10.6	12.0	13.7	13.5
C2	6.7	9.6	10.9	12.7	13.2
C3	6.6	8.9	10.4	11.8	13.0
C4	6.6	8.9	10.5	11.8	13.2
C5	6.7	8.9	10.3	12.0	13.0
Scenario D: Price Change at Heathrow & Gatwick					
D1	7.4	10.6	12.9	13.1	13.5
D2	6.9	10.1	11.6	13.6	13.8
D3	6.6	8.9	10.0	11.6	12.8
D4	6.6	8.8	10.2	11.7	12.7
D5	6.9	8.8	9.6	11.1	12.3

BLACKPOOL

	2014	2018	2022	2026	2030
Base	0.0	0.1	0.1	0.1	0.1
Scenario A: Price Change at Scottish Airports					
A1	0.0	0.1	0.1	0.1	0.1
A2	0.0	0.1	0.1	0.1	0.1
A3	0.0	0.1	0.1	0.1	0.1
A4	0.0	0.1	0.1	0.1	0.1
A5	0.0	0.1	0.1	0.1	0.1
	2014	2018	2022	2026	2030
Scenario C: Price Change at Heathrow					
C1	0.0	0.1	0.1	0.1	0.1
C2	0.0	0.1	0.1	0.1	0.1
C3	0.0	0.1	0.1	0.1	0.1
C4	0.0	0.1	0.1	0.1	0.1
C5	0.0	0.1	0.1	0.1	0.1

	2014	2018	2022	2026	2030
Scenario B: Price Change at Welsh Airports					
B1	0.0	0.1	0.1	0.1	0.1
B2	0.0	0.1	0.1	0.1	0.1
B3	0.0	0.1	0.1	0.1	0.1
B4	0.0	0.1	0.1	0.1	0.1
B5	0.0	0.1	0.1	0.1	0.1
	2014	2018	2022	2026	2030
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.0	0.1	0.1	0.1	0.1
D2	0.0	0.1	0.1	0.1	0.1
D3	0.0	0.1	0.1	0.1	0.1
D4	0.0	0.1	0.1	0.1	0.1
D5	0.0	0.1	0.1	0.1	0.1

BOURNEMOUTH

	2014	2018	2022	2026	2030
Base	0.5	0.5	0.5	0.7	1.0
Scenario A: Price Change at Scottish Airports					
A1	0.5	0.5	0.5	0.7	0.9
A2	0.5	0.5	0.5	0.6	1.0
A3	0.5	0.5	0.5	0.7	1.0
A4	0.5	0.5	0.5	0.7	1.0
A5	0.5	0.5	0.5	0.7	1.0
	2014	2018	2022	2026	2030
Scenario C: Price Change at Heathrow					
C1	0.5	0.5	0.5	0.6	0.9
C2	0.5	0.4	0.5	0.6	0.9
C3	0.5	0.5	0.5	0.6	0.9
C4	0.5	0.5	0.6	0.6	0.9
C5	0.5	0.5	0.6	0.7	0.9

	2014	2018	2022	2026	2030
Scenario B: Price Change at Welsh Airports					
B1	0.5	0.4	0.5	0.6	1.0
B2	0.5	0.5	0.6	0.7	1.0
B3	0.5	0.4	0.5	0.6	1.0
B4	0.5	0.4	0.5	0.7	0.9
B5	0.5	0.4	0.5	0.6	1.0
	2014	2018	2022	2026	2030
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.6	0.7	0.8	1.0	1.3
D2	0.5	0.6	0.8	0.9	1.2
D3	0.5	0.5	0.7	0.9	1.2
D4	0.5	0.5	0.6	0.7	1.0
D5	0.6	0.8	0.9	1.0	1.3

BRISTOL

	2014	2018	2022	2026	2030
Base	2.7	2.9	3.2	3.7	4.4
Scenario A: Price Change at Scottish Airports					
A1	2.7	2.9	3.2	3.6	4.4
A2	2.7	2.9	3.3	3.6	4.5
A3	2.7	2.9	3.3	3.7	4.5
A4	2.7	2.9	3.2	3.7	4.4
A5	2.7	2.9	3.2	3.7	4.5
	2014	2018	2022	2026	2030
Scenario C: Price Change at Heathrow					
C1	2.8	2.9	3.3	3.6	4.6
C2	2.7	2.8	3.2	3.6	4.4
C3	2.7	2.8	3.1	3.7	4.5
C4	2.7	2.8	3.1	3.6	4.5
C5	2.8	3.0	3.3	3.7	4.5

	2014	2018	2022	2026	2030
Scenario B: Price Change at Welsh Airports					
B1	2.3	2.2	2.6	2.9	3.3
B2	2.5	2.3	2.7	3.1	3.7
B3	2.6	2.7	2.9	3.4	4.0
B4	2.6	2.8	3.2	3.7	4.4
B5	2.6	2.4	2.9	3.4	4.0
	2014	2018	2022	2026	2030
Scenario D: Price Change at Heathrow & Gatwick					
D1	2.9	3.1	3.2	3.8	4.8
D2	2.7	2.9	3.2	3.6	4.5
D3	2.7	2.8	3.3	3.6	4.4
D4	2.7	2.8	3.2	3.7	4.4
D5	2.9	3.2	3.7	4.1	4.9

CARDIFF

	2014	2018	2022	2026	2030
Base	0.7	0.6	0.7	0.8	0.8
Scenario A: Price Change at Scottish Airports					
A1	0.7	0.6	0.7	0.8	0.8
A2	0.7	0.6	0.7	0.8	0.8
A3	0.7	0.6	0.7	0.8	0.8
A4	0.7	0.6	0.7	0.8	0.8
A5	0.7	0.6	0.7	0.8	0.8
Scenario B: Price Change at Welsh Airports					
B1	2.3	3.4	3.7	4.0	4.3
B2	1.0	1.1	1.3	1.4	1.6
B3	0.7	0.7	0.8	0.9	1.1
B4	0.7	0.6	0.7	0.8	0.9
B5	0.8	0.9	1.0	1.0	1.2
Scenario C: Price Change at Heathrow					
C1	0.7	0.6	0.7	0.8	1.0
C2	0.7	0.6	0.7	0.7	0.8
C3	0.7	0.6	0.7	0.8	0.8
C4	0.7	0.6	0.7	0.8	0.8
C5	0.7	0.6	0.7	0.8	0.8
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.7	0.6	0.7	0.9	0.9
D2	0.7	0.6	0.7	0.8	0.9
D3	0.7	0.6	0.7	0.8	0.9
D4	0.7	0.6	0.7	0.8	0.9
D5	0.7	0.6	0.7	0.8	0.9

DONCASTER SHEFFIELD

	2014	2018	2022	2026	2030
Base	0.6	0.5	0.6	0.7	0.7
Scenario A: Price Change at Scottish Airports					
A1	0.6	0.5	0.5	0.6	0.7
A2	0.6	0.5	0.6	0.6	0.6
A3	0.6	0.5	0.6	0.7	0.7
A4	0.6	0.5	0.6	0.7	0.7
A5	0.6	0.5	0.6	0.7	0.7
Scenario B: Price Change at Welsh Airports					
B1	0.6	0.5	0.8	0.8	0.8
B2	0.6	0.5	0.6	0.7	0.6
B3	0.6	0.5	0.6	0.7	0.7
B4	0.6	0.5	0.6	0.7	0.7
B5	0.6	0.5	0.6	0.7	0.7
Scenario C: Price Change at Heathrow					
C1	0.6	0.5	0.6	0.6	0.8
C2	0.6	0.5	0.6	0.6	0.6
C3	0.6	0.5	0.5	0.7	0.8
C4	0.6	0.5	0.5	0.6	0.7
C5	0.6	0.5	0.6	0.6	0.7
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.6	0.7	0.6	0.6	0.9
D2	0.6	0.5	0.6	0.6	0.8
D3	0.6	0.4	0.6	0.6	0.7
D4	0.6	0.5	0.5	0.6	0.6
D5	0.6	0.5	0.6	0.6	0.6

EAST MIDLANDS

	2014	2018	2022	2026	2030
Base	1.3	1.4	1.5	1.6	1.9
Scenario A: Price Change at Scottish Airports					
A1	1.3	1.4	1.5	1.6	1.8
A2	1.3	1.4	1.5	1.6	1.9
A3	1.3	1.4	1.5	1.6	1.9
A4	1.3	1.4	1.5	1.6	1.9
A5	1.3	1.4	1.5	1.6	1.9
Scenario B: Price Change at Welsh Airports					
B1	1.3	1.4	1.5	1.6	1.8
B2	1.3	1.4	1.5	1.6	1.9
B3	1.3	1.4	1.5	1.6	1.9
B4	1.3	1.4	1.5	1.6	1.9
B5	1.3	1.4	1.5	1.6	1.9
Scenario C: Price Change at Heathrow					
C1	1.3	1.5	1.5	1.7	2.3
C2	1.3	1.4	1.5	1.6	2.0
C3	1.3	1.4	1.5	1.6	1.9
C4	1.3	1.4	1.5	1.6	1.9
C5	1.3	1.4	1.5	1.6	1.9
Scenario D: Price Change at Heathrow & Gatwick					
D1	1.4	1.4	1.5	1.9	2.4
D2	1.3	1.4	1.5	1.6	2.0
D3	1.3	1.4	1.5	1.6	1.8
D4	1.3	1.5	1.5	1.6	1.9
D5	1.3	1.4	1.5	1.6	1.9

EDINBURGH

	2014	2018	2022	2026	2030
Base	5.0	6.0	6.9	7.4	8.1
Scenario A: Price Change at Scottish Airports					
A1	5.3	6.3	7.1	7.8	8.4
A2	5.1	6.1	6.9	7.6	8.3
A3	5.1	6.0	7.0	7.6	8.3
A4	5.0	6.0	6.9	7.4	8.1
A5	5.1	6.0	6.9	7.5	8.1
Scenario B: Price Change at Welsh Airports					
B1	5.0	6.0	6.9	7.5	8.1
B2	5.0	6.0	6.8	7.4	8.1
B3	5.0	6.0	6.9	7.4	8.0
B4	5.0	6.0	6.9	7.4	8.0
B5	5.0	6.0	6.9	7.4	8.0
Scenario C: Price Change at Heathrow					
C1	5.0	5.9	7.0	7.5	8.2
C2	5.0	5.9	6.8	7.6	8.1
C3	5.0	6.0	6.9	7.5	8.1
C4	5.0	6.0	6.8	7.5	8.1
C5	5.0	6.0	6.9	7.6	8.2
Scenario D: Price Change at Heathrow & Gatwick					
D1	5.0	6.0	6.9	7.5	8.0
D2	5.0	5.9	6.8	7.5	8.1
D3	5.0	6.1	6.8	7.5	8.1
D4	5.0	6.0	6.8	7.5	8.1
D5	5.0	6.1	6.9	7.9	8.8

EXETER

	2014	2018	2022	2026	2030
Base	0.5	0.6	0.7	0.7	0.8
Scenario A: Price Change at Scottish Airports					
A1	0.5	0.6	0.7	0.8	0.8
A2	0.5	0.6	0.7	0.8	0.8
A3	0.5	0.6	0.7	0.7	0.8
A4	0.5	0.6	0.7	0.7	0.8
A5	0.5	0.6	0.7	0.7	0.8
Scenario B: Price Change at Welsh Airports					
B1	0.5	0.6	0.6	0.7	0.8
B2	0.5	0.7	0.8	0.8	0.9
B3	0.5	0.6	0.8	0.8	1.0
B4	0.5	0.6	0.7	0.7	0.8
B5	0.5	0.6	0.7	0.8	0.9
Scenario C: Price Change at Heathrow					
C1	0.5	0.5	0.6	0.8	0.9
C2	0.5	0.5	0.6	0.8	0.9
C3	0.5	0.6	0.7	0.7	0.8
C4	0.5	0.6	0.7	0.8	0.8
C5	0.5	0.5	0.7	0.8	0.8
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.5	0.5	0.7	0.7	0.8
D2	0.5	0.5	0.6	0.7	0.7
D3	0.5	0.6	0.6	0.7	0.8
D4	0.5	0.6	0.7	0.7	0.8
D5	0.5	0.5	0.6	0.7	0.7

GLASGOW

	2014	2018	2022	2026	2030
Base	3.0	3.2	3.6	4.4	4.8
Scenario A: Price Change at Scottish Airports					
A1	3.5	3.6	4.1	4.8	5.1
A2	3.2	3.3	3.9	4.6	4.9
A3	3.0	3.3	3.7	4.3	4.7
A4	3.0	3.2	3.7	4.5	4.8
A5	3.0	3.2	3.7	4.5	4.8
Scenario B: Price Change at Welsh Airports					
B1	3.0	3.2	3.7	4.4	4.8
B2	3.0	3.2	3.7	4.4	4.7
B3	3.0	3.2	3.7	4.4	4.8
B4	3.0	3.2	3.7	4.4	4.8
B5	3.0	3.2	3.7	4.4	4.9
Scenario C: Price Change at Heathrow					
C1	3.0	3.3	3.7	4.5	4.8
C2	2.9	3.3	3.8	4.3	4.7
C3	3.0	3.2	3.6	4.4	4.7
C4	3.0	3.2	3.7	4.4	4.7
C5	3.0	3.2	3.6	4.2	4.6
Scenario D: Price Change at Heathrow & Gatwick					
D1	2.9	3.2	3.7	4.4	4.9
D2	2.9	3.3	3.7	4.4	4.7
D3	3.0	3.1	3.7	4.4	4.7
D4	3.0	3.2	3.7	4.4	4.7
D5	3.0	3.1	3.7	3.9	4.0

HUMBERSIDE

	2014	2018	2022	2026	2030
Base	0.3	0.4	0.6	0.7	0.8
Scenario A: Price Change at Scottish Airports					
A1	0.3	0.4	0.6	0.7	0.7
A2	0.3	0.4	0.5	0.7	0.7
A3	0.3	0.4	0.5	0.7	0.8
A4	0.3	0.4	0.6	0.7	0.8
A5	0.3	0.4	0.6	0.7	0.8
Scenario B: Price Change at Welsh Airports					
B1	0.3	0.4	0.6	0.7	0.7
B2	0.3	0.4	0.6	0.7	0.7
B3	0.3	0.4	0.6	0.7	0.8
B4	0.3	0.4	0.6	0.7	0.8
B5	0.3	0.4	0.6	0.7	0.8
Scenario C: Price Change at Heathrow					
C1	0.3	0.4	0.5	0.7	0.8
C2	0.3	0.4	0.5	0.7	0.7
C3	0.3	0.4	0.6	0.7	0.7
C4	0.3	0.4	0.6	0.8	0.7
C5	0.3	0.4	0.5	0.7	0.7
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.3	0.3	0.6	0.7	0.7
D2	0.3	0.4	0.6	0.7	0.7
D3	0.3	0.4	0.6	0.7	0.7
D4	0.3	0.4	0.6	0.7	0.7
D5	0.3	0.4	0.6	0.8	0.7

INVERNESS

	2014	2018	2022	2026	2030
Base	0.3	0.6	0.7	0.2	0.3
Scenario A: Price Change at Scottish Airports					
A1	0.3	0.6	0.7	0.2	0.3
A2	0.3	0.6	0.7	0.2	0.3
A3	0.3	0.6	0.7	0.2	0.3
A4	0.3	0.6	0.7	0.2	0.3
A5	0.3	0.6	0.7	0.2	0.3
Scenario B: Price Change at Welsh Airports					
B1	0.3	0.6	0.7	0.2	0.3
B2	0.3	0.6	0.7	0.2	0.3
B3	0.3	0.6	0.7	0.2	0.3
B4	0.3	0.6	0.7	0.2	0.3
B5	0.3	0.6	0.7	0.2	0.3
Scenario C: Price Change at Heathrow					
C1	0.3	0.6	0.7	0.2	0.3
C2	0.3	0.6	0.7	0.2	0.3
C3	0.3	0.6	0.7	0.2	0.3
C4	0.3	0.6	0.7	0.2	0.3
C5	0.3	0.6	0.7	0.2	0.3
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.3	0.6	0.7	0.2	0.3
D2	0.3	0.6	0.7	0.2	0.3
D3	0.3	0.6	0.7	0.2	0.3
D4	0.3	0.6	0.7	0.2	0.3
D5	0.3	0.6	0.7	0.2	0.3

LEEDS BRADFORD

	2014	2018	2022	2026	2030
Base	1.4	1.5	1.7	1.9	2.2
Scenario A: Price Change at Scottish Airports					
A1	1.4	1.5	1.7	1.9	2.2
A2	1.4	1.5	1.7	1.9	2.2
A3	1.4	1.5	1.7	1.9	2.2
A4	1.4	1.5	1.7	1.9	2.2
A5	1.4	1.5	1.7	1.9	2.2
Scenario B: Price Change at Welsh Airports					
B1	1.4	1.5	1.7	1.9	2.2
B2	1.4	1.5	1.7	1.9	2.2
B3	1.4	1.5	1.7	1.9	2.2
B4	1.4	1.5	1.7	1.9	2.2
B5	1.4	1.5	1.7	1.9	2.2
Scenario C: Price Change at Heathrow					
C1	1.4	1.6	1.8	2.0	2.3
C2	1.4	1.6	1.8	2.0	2.3
C3	1.4	1.6	1.7	1.9	2.2
C4	1.4	1.6	1.7	1.9	2.2
C5	1.4	1.5	1.7	1.9	2.2
Scenario D: Price Change at Heathrow & Gatwick					
D1	1.4	2.3	2.4	2.6	2.8
D2	1.4	1.6	1.8	2.0	2.3
D3	1.4	1.6	1.7	1.9	2.2
D4	1.4	1.6	1.7	1.9	2.2
D5	1.4	1.5	1.8	1.9	2.2

LIVERPOOL

	2014	2018	2022	2026	2030
Base	2.1	2.3	2.6	2.8	3.2
Scenario A: Price Change at Scottish Airports					
A1	2.1	2.3	2.6	2.8	3.2
A2	2.1	2.3	2.6	2.8	3.2
A3	2.1	2.3	2.6	2.8	3.2
A4	2.1	2.3	2.6	2.8	3.2
A5	2.1	2.3	2.6	2.8	3.2
Scenario B: Price Change at Welsh Airports					
B1	2.1	2.3	2.6	2.9	3.2
B2	2.1	2.3	2.6	2.8	3.2
B3	2.1	2.3	2.6	2.8	3.1
B4	2.1	2.3	2.6	2.8	3.1
B5	2.1	2.3	2.6	2.8	3.1
Scenario C: Price Change at Heathrow					
C1	2.1	2.3	2.6	2.9	3.2
C2	2.1	2.3	2.6	2.9	3.2
C3	2.1	2.3	2.6	2.8	3.2
C4	2.1	2.3	2.6	2.8	3.2
C5	2.1	2.3	2.6	2.8	3.1
Scenario D: Price Change at Heathrow & Gatwick					
D1	2.1	2.3	2.6	2.9	3.2
D2	2.1	2.3	2.6	2.8	3.2
D3	2.1	2.3	2.6	2.8	3.2
D4	2.1	2.3	2.6	2.8	3.2
D5	2.1	2.3	2.5	2.8	3.2

LONDON CITY

	2014	2018	2022	2026	2030
Base	1.7	2.5	3.5	3.3	3.3
Scenario A: Price Change at Scottish Airports					
A1	1.7	2.6	3.0	3.3	3.4
A2	1.7	2.5	3.3	3.4	3.6
A3	1.7	2.6	3.3	3.3	3.5
A4	1.7	2.5	3.5	3.3	3.3
A5	1.7	2.5	3.5	3.3	3.3
Scenario B: Price Change at Welsh Airports					
B1	1.7	2.5	3.3	3.4	3.5
B2	1.7	2.6	3.3	3.4	3.3
B3	1.7	2.5	3.5	3.2	3.3
B4	1.7	2.5	3.5	3.3	3.3
B5	1.7	2.5	3.5	3.2	3.3
Scenario C: Price Change at Heathrow					
C1	1.9	2.4	3.0	3.2	3.2
C2	1.8	2.2	3.3	3.2	3.5
C3	1.7	2.5	3.5	3.4	3.2
C4	1.7	2.6	3.3	3.4	3.4
C5	2.0	3.0	3.3	3.3	3.2
Scenario D: Price Change at Heathrow & Gatwick					
D1	2.0	2.7	3.4	3.3	3.2
D2	1.8	2.8	3.3	3.3	3.3
D3	1.7	2.7	3.3	3.4	3.2
D4	1.7	2.5	3.2	3.5	3.4
D5	2.3	3.3	3.2	3.4	3.4

LONDON GATWICK

	2014	2018	2022	2026	2030
Base	15.1	16.6	17.0	17.5	18.1
Scenario A: Price Change at Scottish Airports					
A1	15.1	16.4	17.0	17.8	18.3
A2	15.1	16.6	17.1	17.9	17.9
A3	15.1	16.6	17.0	17.6	18.0
A4	15.1	16.6	17.1	17.5	18.1
A5	15.1	16.6	17.0	17.6	18.1
Scenario B: Price Change at Welsh Airports					
B1	15.0	16.2	16.9	17.5	17.9
B2	15.0	16.3	16.9	17.7	17.9
B3	15.1	16.6	17.1	17.9	18.1
B4	15.1	16.6	17.1	17.6	18.3
B5	15.1	16.6	17.1	17.9	18.1
Scenario C: Price Change at Heathrow					
C1	16.6	17.0	18.0	18.7	19.1
C2	16.0	17.0	18.0	18.3	18.7
C3	15.4	16.6	16.9	17.9	18.1
C4	15.2	16.5	16.9	17.8	17.8
C5	16.0	16.5	17.4	17.9	18.4
Scenario D: Price Change at Heathrow & Gatwick					
D1	12.8	10.8	12.5	16.0	18.1
D2	13.9	13.5	15.1	16.9	17.9
D3	14.6	15.4	16.5	17.5	18.0
D4	14.8	16.0	16.7	17.2	18.1
D5	12.2	10.3	11.9	14.4	16.7

LONDON HEATHROW

	2014	2018	2022	2026	2030
Base	23.1	25.7	26.9	27.7	28.8
Scenario A: Price Change at Scottish Airports					
A1	23.1	26.4	28.0	28.9	29.5
A2	23.1	25.7	27.2	28.3	28.8
A3	23.1	25.7	27.3	28.0	28.7
A4	23.1	25.7	26.9	27.7	28.8
A5	23.1	25.7	26.9	27.7	28.8
Scenario B: Price Change at Welsh Airports					
B1	22.3	25.1	27.0	27.7	28.0
B2	23.3	26.3	27.7	28.6	29.3
B3	23.1	25.7	26.9	28.2	28.7
B4	23.1	25.7	26.9	28.0	29.0
B5	23.1	25.7	26.9	28.2	28.7
Scenario C: Price Change at Heathrow					
C1	18.9	19.8	22.3	22.9	24.2
C2	21.1	24.1	25.3	26.3	26.6
C3	22.6	25.2	26.7	27.8	28.5
C4	23.0	25.3	26.7	28.1	28.6
C5	20.9	24.6	26.2	27.0	28.1
Scenario D: Price Change at Heathrow & Gatwick					
D1	20.1	21.5	23.2	23.6	24.8
D2	22.0	24.4	25.9	26.7	27.3
D3	23.0	25.5	26.6	27.9	28.6
D4	23.2	25.8	27.1	28.0	28.4
D5	21.5	25.2	26.8	27.8	28.4

LONDON LUTON

	2014	2018	2022	2026	2030
Base	4.6	5.2	6.6	7.9	8.6
Scenario A: Price Change at Scottish Airports					
A1	4.6	5.2	6.5	7.6	8.5
A2	4.6	5.2	6.5	7.5	8.5
A3	4.6	5.2	6.8	8.5	8.6
A4	4.6	5.2	6.6	7.9	8.6
A5	4.6	5.2	6.5	7.9	8.5
Scenario B: Price Change at Welsh Airports					
B1	4.6	5.2	6.1	7.3	8.4
B2	4.6	5.2	6.5	7.4	8.5
B3	4.6	5.2	6.5	7.7	8.6
B4	4.6	5.2	6.6	7.9	8.6
B5	4.6	5.2	6.5	7.7	8.6
Scenario C: Price Change at Heathrow					
C1	5.0	6.5	7.5	8.6	8.4
C2	4.8	5.1	6.1	7.6	8.4
C3	4.6	5.2	6.6	7.6	8.6
C4	4.6	5.2	6.7	7.7	8.4
C5	4.8	5.4	7.0	8.3	8.6
Scenario D: Price Change at Heathrow & Gatwick					
D1	5.6	7.7	8.4	8.4	8.5
D2	5.1	5.8	6.4	7.5	8.5
D3	4.7	5.6	6.6	7.5	8.5
D4	4.7	5.3	6.5	7.6	8.6
D5	5.6	6.7	7.8	8.3	8.4

LONDON STANSTED

	2014	2018	2022	2026	2030
Base	8.9	9.8	11.8	14.7	15.9
Scenario A: Price Change at Scottish Airports					
A1	8.9	10.0	12.2	14.8	16.2
A2	8.9	9.8	11.9	14.5	16.1
A3	8.9	9.7	11.4	13.8	15.4
A4	8.9	9.8	11.9	14.7	15.9
A5	8.9	9.8	11.9	14.8	16.0
Scenario B: Price Change at Welsh Airports					
B1	8.9	10.0	12.1	14.6	16.2
B2	8.8	9.9	12.1	15.0	16.4
B3	8.9	9.8	11.8	14.4	16.1
B4	8.9	9.8	11.8	14.6	16.1
B5	8.9	9.8	11.9	14.4	16.1
Scenario C: Price Change at Heathrow					
C1	9.8	11.6	13.3	15.6	16.8
C2	9.1	10.7	12.8	15.0	16.7
C3	8.9	9.8	11.9	14.4	16.2
C4	8.8	9.9	11.9	14.4	16.1
C5	9.1	9.9	11.4	14.1	16.2
Scenario D: Price Change at Heathrow & Gatwick					
D1	10.5	13.8	14.5	15.7	16.3
D2	9.5	11.9	14.0	15.4	16.5
D3	9.0	10.3	12.6	14.9	16.5
D4	8.9	9.9	12.4	15.1	16.3
D5	10.3	13.0	15.3	16.3	17.2

MANCHESTER

	2014	2018	2022	2026	2030
Base	11.2	12.8	13.9	15.2	17.2
Scenario A: Price Change at Scottish Airports					
A1	10.9	12.5	13.7	15.1	17.2
A2	11.1	12.6	13.7	15.1	17.1
A3	11.2	12.7	13.8	15.2	17.1
A4	11.2	12.7	13.9	15.2	17.2
A5	11.2	12.7	13.9	15.2	17.2
Scenario B: Price Change at Welsh Airports					
B1	11.0	12.5	13.9	15.5	17.4
B2	11.2	12.9	14.1	15.7	17.7
B3	11.2	12.7	13.9	15.2	17.1
B4	11.2	12.8	13.9	15.3	17.0
B5	11.2	12.7	13.9	15.2	17.1
Scenario C: Price Change at Heathrow					
C1	11.5	12.2	13.0	14.5	16.9
C2	11.4	12.6	13.8	15.2	17.3
C3	11.3	12.8	14.0	15.4	17.2
C4	11.3	12.8	14.0	15.3	17.2
C5	11.4	12.9	14.0	15.5	17.2
Scenario D: Price Change at Heathrow & Gatwick					
D1	11.6	11.7	12.7	14.7	16.6
D2	11.5	12.5	13.5	14.8	16.8
D3	11.3	12.9	14.1	15.5	17.3
D4	11.3	12.8	14.0	15.4	17.3
D5	11.4	12.9	14.2	15.7	17.5

NEWCASTLE

	2014	2018	2022	2026	2030
Base	2.1	2.2	2.4	2.7	2.9
Scenario A: Price Change at Scottish Airports					
A1	1.9	2.1	2.3	2.6	2.8
A2	2.0	2.2	2.4	2.6	2.8
A3	2.0	2.2	2.4	2.7	2.8
A4	2.1	2.2	2.4	2.7	2.9
A5	2.1	2.2	2.4	2.7	2.8
Scenario B: Price Change at Welsh Airports					
B1	2.1	2.3	2.4	2.7	2.9
B2	2.1	2.3	2.5	2.7	2.9
B3	2.1	2.2	2.4	2.7	2.9
B4	2.1	2.2	2.4	2.7	2.9
B5	2.1	2.2	2.4	2.7	2.9
Scenario C: Price Change at Heathrow					
C1	2.1	2.3	2.5	2.7	2.9
C2	2.1	2.3	2.5	2.7	2.9
C3	2.1	2.3	2.4	2.7	2.9
C4	2.1	2.2	2.4	2.7	2.9
C5	2.1	2.3	2.5	2.7	2.9
Scenario D: Price Change at Heathrow & Gatwick					
D1	2.1	2.2	2.4	2.6	2.8
D2	2.1	2.3	2.5	2.7	2.9
D3	2.1	2.2	2.4	2.7	2.9
D4	2.1	2.3	2.4	2.7	2.9
D5	2.1	2.3	2.4	2.7	2.8

NEWQUAY

	2014	2018	2022	2026	2030
Base	0.2	0.3	0.3	0.3	0.3
Scenario A: Price Change at Scottish Airports					
A1	0.2	0.3	0.3	0.3	0.3
A2	0.2	0.3	0.3	0.3	0.4
A3	0.2	0.3	0.3	0.3	0.3
A4	0.2	0.3	0.3	0.3	0.3
A5	0.2	0.3	0.3	0.3	0.3
Scenario B: Price Change at Welsh Airports					
B1	0.2	0.3	0.3	0.3	0.4
B2	0.2	0.3	0.3	0.3	0.3
B3	0.2	0.3	0.3	0.3	0.4
B4	0.2	0.3	0.3	0.3	0.3
B5	0.2	0.3	0.3	0.3	0.4
Scenario C: Price Change at Heathrow					
C1	0.2	0.2	0.2	0.2	0.3
C2	0.2	0.2	0.2	0.3	0.3
C3	0.2	0.3	0.3	0.3	0.3
C4	0.2	0.3	0.3	0.3	0.3
C5	0.2	0.3	0.3	0.3	0.3
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.2	0.2	0.2	0.3	0.3
D2	0.2	0.2	0.2	0.3	0.3
D3	0.2	0.3	0.3	0.3	0.3
D4	0.2	0.3	0.3	0.3	0.3
D5	0.2	0.3	0.3	0.3	0.3

NORWICH

	2014	2018	2022	2026	2030		2014	2018	2022	2026	2030
Base	0.3	0.3	0.4	0.4	0.5						
Scenario A: Price Change at Scottish Airports						Scenario B: Price Change at Welsh Airports					
A1	0.3	0.3	0.4	0.4	0.5	B1	0.3	0.3	0.3	0.4	0.5
A2	0.3	0.3	0.4	0.4	0.5	B2	0.3	0.3	0.4	0.4	0.5
A3	0.3	0.3	0.4	0.4	0.5	B3	0.3	0.3	0.3	0.4	0.5
A4	0.3	0.3	0.3	0.4	0.5	B4	0.3	0.3	0.4	0.4	0.5
A5	0.3	0.3	0.3	0.4	0.5	B5	0.3	0.3	0.3	0.4	0.5
	2014	2018	2022	2026	2030		2014	2018	2022	2026	2030
Scenario C: Price Change at Heathrow						Scenario D: Price Change at Heathrow & Gatwick					
C1	0.3	0.3	0.3	0.4	0.5	D1	0.3	0.3	0.4	0.4	0.5
C2	0.3	0.3	0.3	0.4	0.5	D2	0.3	0.3	0.3	0.4	0.5
C3	0.3	0.3	0.3	0.4	0.5	D3	0.3	0.3	0.4	0.4	0.5
C4	0.3	0.3	0.4	0.4	0.5	D4	0.3	0.3	0.4	0.4	0.5
C5	0.3	0.3	0.4	0.4	0.5	D5	0.3	0.3	0.4	0.4	0.5

PLYMOUTH

	2014	2018	2022	2026	2030		2014	2018	2022	2026	2030
Base	0.1	0.2	0.2	0.3	0.2						
Scenario A: Price Change at Scottish Airports						Scenario B: Price Change at Welsh Airports					
A1	0.1	0.2	0.2	0.3	0.3	B1	0.1	0.2	0.2	0.3	0.2
A2	0.1	0.2	0.2	0.3	0.2	B2	0.1	0.2	0.2	0.3	0.2
A3	0.1	0.2	0.2	0.3	0.3	B3	0.1	0.2	0.2	0.3	0.2
A4	0.1	0.2	0.2	0.3	0.2	B4	0.1	0.2	0.2	0.3	0.3
A5	0.1	0.2	0.2	0.3	0.2	B5	0.1	0.2	0.2	0.3	0.2
	2014	2018	2022	2026	2030		2014	2018	2022	2026	2030
Scenario C: Price Change at Heathrow						Scenario D: Price Change at Heathrow & Gatwick					
C1	0.1	0.3	0.4	0.5	0.4	D1	0.1	0.3	0.4	0.4	0.4
C2	0.1	0.3	0.4	0.4	0.4	D2	0.1	0.3	0.4	0.4	0.4
C3	0.1	0.2	0.2	0.3	0.2	D3	0.1	0.2	0.2	0.3	0.3
C4	0.1	0.2	0.2	0.3	0.2	D4	0.1	0.2	0.2	0.3	0.3
C5	0.1	0.2	0.2	0.3	0.4	D5	0.1	0.2	0.2	0.3	0.3

PRESTWICK

	2014	2018	2022	2026	2030		2014	2018	2022	2026	2030
Base	1.2	1.0	1.0	1.1	1.2						
Scenario A: Price Change at Scottish Airports						Scenario B: Price Change at Welsh Airports					
A1	1.2	1.0	1.0	1.1	1.2	B1	1.2	1.0	1.0	1.1	1.2
A2	1.2	1.0	1.0	1.1	1.2	B2	1.2	1.0	1.0	1.1	1.2
A3	1.2	1.0	1.0	1.1	1.2	B3	1.2	1.0	1.0	1.1	1.1
A4	1.2	1.0	1.0	1.1	1.2	B4	1.2	1.0	1.0	1.1	1.1
A5	1.2	1.0	1.0	1.1	1.2	B5	1.2	1.0	1.0	1.1	1.1
	2014	2018	2022	2026	2030		2014	2018	2022	2026	2030
Scenario C: Price Change at Heathrow						Scenario D: Price Change at Heathrow & Gatwick					
C1	1.2	1.0	1.0	1.0	1.2	D1	1.2	1.0	1.0	1.1	1.2
C2	1.2	1.0	1.0	1.0	1.2	D2	1.2	1.0	1.0	1.0	1.2
C3	1.2	1.0	1.0	1.1	1.2	D3	1.2	1.0	1.0	1.1	1.2
C4	1.2	1.0	1.0	1.1	1.1	D4	1.2	1.0	1.0	1.0	1.2
C5	1.2	1.0	1.0	1.1	1.2	D5	1.2	1.0	1.0	1.1	1.2

SOUTHAMPTON

	2014	2018	2022	2026	2030
Base	1.0	1.1	1.4	2.1	3.1
Scenario A: Price Change at Scottish Airports					
A1	1.0	1.1	1.4	2.1	3.0
A2	1.0	1.1	1.4	2.0	3.1
A3	1.0	1.1	1.4	2.1	3.3
A4	1.0	1.1	1.4	2.1	3.1
A5	1.0	1.1	1.4	2.1	3.1
Scenario B: Price Change at Welsh Airports					
B1	0.9	1.1	1.3	1.8	2.9
B2	0.9	1.1	1.4	2.0	3.1
B3	0.9	1.1	1.4	2.0	3.1
B4	0.9	1.1	1.4	2.0	2.9
B5	0.9	1.1	1.4	2.0	3.1
Scenario C: Price Change at Heathrow					
C1	1.2	1.9	2.1	2.6	3.8
C2	1.1	1.1	1.3	1.8	3.1
C3	1.0	1.1	1.4	2.0	3.1
C4	1.0	1.1	1.4	1.9	3.1
C5	1.1	1.1	1.4	2.2	3.0
Scenario D: Price Change at Heathrow & Gatwick					
D1	1.4	2.1	2.4	3.2	3.8
D2	1.1	1.1	1.3	1.7	2.9
D3	1.0	1.1	1.4	1.8	2.9
D4	1.0	1.1	1.4	2.0	3.1
D5	1.2	1.3	1.7	2.2	3.0

TEESIDE

	2014	2018	2022	2026	2030
Base	0.1	0.0	0.0	0.0	0.0
Scenario A: Price Change at Scottish Airports					
A1	0.1	0.0	0.0	0.0	0.0
A2	0.1	0.0	0.0	0.0	0.0
A3	0.1	0.0	0.0	0.0	0.0
A4	0.1	0.0	0.0	0.0	0.0
A5	0.1	0.0	0.0	0.0	0.0
Scenario B: Price Change at Welsh Airports					
B1	0.1	0.0	0.0	0.0	0.0
B2	0.1	0.0	0.0	0.0	0.0
B3	0.1	0.0	0.0	0.0	0.0
B4	0.1	0.0	0.0	0.0	0.0
B5	0.1	0.0	0.0	0.0	0.0
Scenario C: Price Change at Heathrow					
C1	0.1	0.0	0.0	0.0	0.0
C2	0.1	0.0	0.0	0.0	0.0
C3	0.1	0.0	0.0	0.0	0.0
C4	0.1	0.0	0.0	0.0	0.0
C5	0.1	0.0	0.0	0.0	0.0
Scenario D: Price Change at Heathrow & Gatwick					
D1	0.1	0.0	0.0	0.0	0.0
D2	0.1	0.0	0.0	0.0	0.0
D3	0.1	0.0	0.0	0.0	0.0
D4	0.1	0.0	0.0	0.0	0.0
D5	0.1	0.0	0.0	0.0	0.0

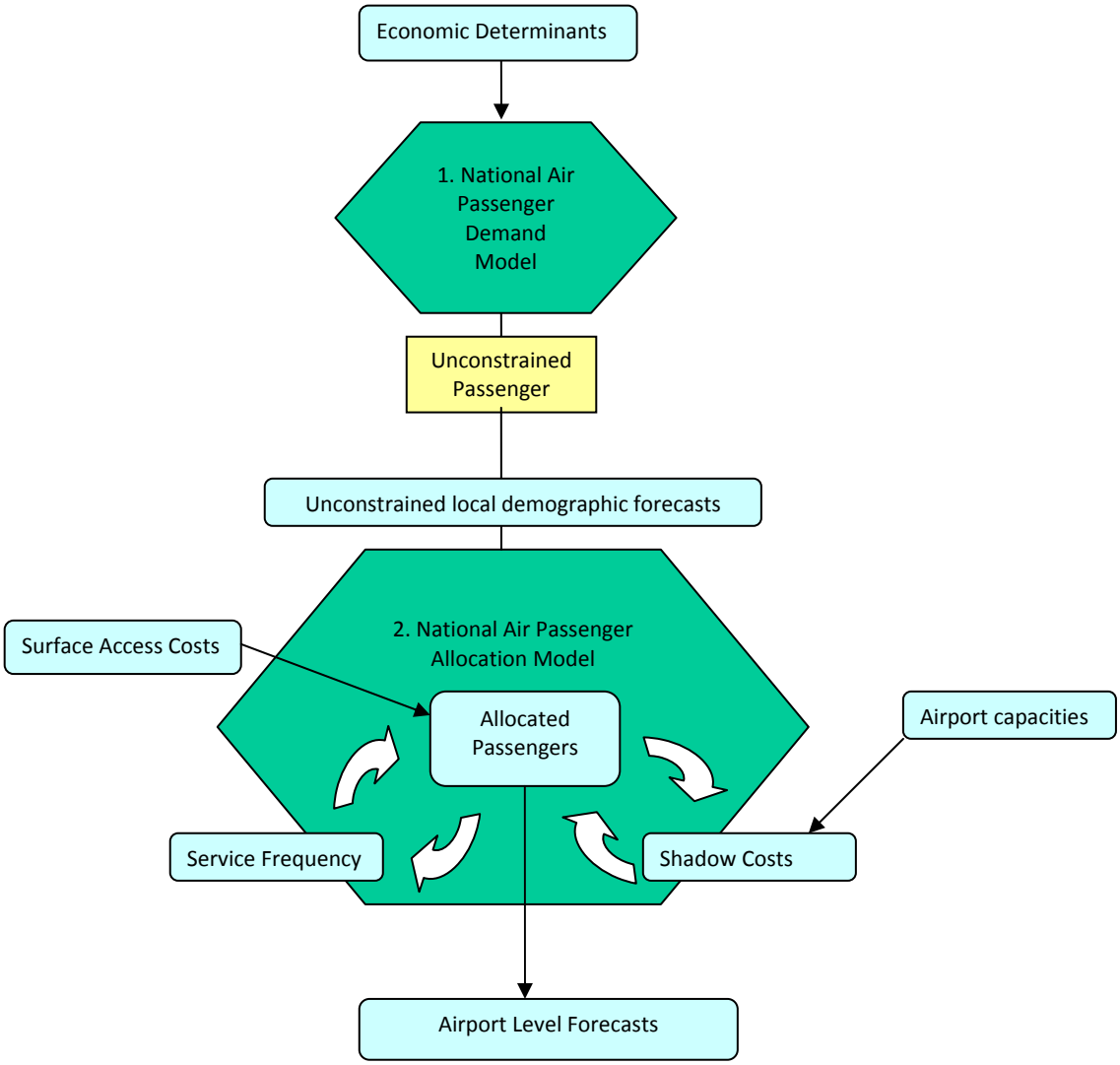
Annex C: Year that Airports become capacity constrained in the baseline of the DfT Model

London Heathrow:	2013
London Gatwick:	2019
London City:	2021
London Stansted:	2028
Birmingham:	2028
London Luton:	2029

All other airports are forecast not to be at capacity by 2030.

Annex D: Description of DfT's Aviation Model

For the purposes of this analysis, the aviation model is comprised of two key components – shown below.



1. National Air Passenger Demand Model

The model starts with aggregated forecasts for demand from the National Air Passenger Demand model. This divides passengers travelling through UK airports into nineteen sectors[10] and uses time-series econometric models to establish relationships with key economic variables historically. Forecasts of these key variables are taken from independent sources and used to create projections for

[10] Based on the purpose of travel (leisure vs. business), destination (Western Europe, OECD, Newly Industrialised Countries and Developing Countries) and transfer passengers.

passenger demand. An assumption is made that markets become more mature over-time and so income and price responses decline over-time from their estimated level. As capacity has not been constrained historically the projections generated should be considered unconstrained forecasts.

Fares, including APD, are one of the explanatory variables in some of the econometric models used at this stage. This analysis assumes that APD is set at 2011 levels and held constant in real terms. No changes were made to APD at an aggregated level for any of the scenarios modelled.

These aggregated forecasts are then combined with latest CAA passenger survey data and DfT's TEMPRO district level forecasts of income, population and employment to allocate out growth in unconstrained demand amongst 455 UK Districts.

2. National Air Passenger Allocation Model

This part of the model allocates the unconstrained district level demand to airports based on a set of multi-nomial logit passenger choice equations estimated on CAA passenger interview survey data. Additionally, the impacts of future capacity constraints are explicitly modelled. There are two key variables in these relationships:

- Surface Access Cost – an airport with lower surface access costs will be more desirable than one with higher surface access costs.
- Frequency – an airport with higher service frequency for the route concerned will be more desirable than an airport with lower service frequency.

When the demand allocated to one or more airports exceeds the capacity for that airport, the whole system is solved iteratively. Prices (known as shadow costs) are applied at airports that face excess demand resulting in two changes: firstly, some passengers are "suppressed" meaning that they no longer travel; secondly, the shadow costs are added to the surface access costs in the allocation models resulting in a new pattern of passenger allocation.

The price increments modelled for this project are treated in a similar way to shadow costs – added into the allocation equations resulting in both suppression of demand and re-allocation. The key difference is that the price increments are only charged on the initial departure from a UK airport and so exclude transfer passengers while shadow costs are applied to transfer passengers on both arrival and departure.