

CONFIDENTIAL

Response for BAA Ltd

Response to Working Paper on the  
Analysis of Airline Yield Data

BAA/CC2008/998

BAA Limited

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## Introduction

1. This paper outlines BAA's preliminary response to the Competition Commission's Working Paper on its analysis of airline yield data. BAA has previously requested that the Commission make available (subject to appropriate confidentiality arrangements) the underlying data that has been used for the modelling, so that BAA could be in a position to undertake sense checking, sensitivity analysis and robustness testing. These requests were made on 27 May 2008 (BAA/CC2008/781), 10 June 2008 (BAA/CC2008/856) and 27 June 2008 (BAA/CC2008/947).
2. As the response demonstrates, BAA's opportunity to respond to this working paper has been significantly constrained by the Commission's refusal to make the data available to BAA or its advisors.
3. As a consequence, BAA's response has been limited to a review of the results presented in the working paper, at face value, and without access to the underlying data, and a limited review of the contents of the STATA log file provided by the Commission. This review clearly includes technical issues; NERA Economic Consulting have been retained to provide advice to BAA on these issues, and the material in paragraphs 10 to 50 below reflects the advice received. These comments are limited by the inability of BAA, or its advisors, to perform their own analyses, as well as the necessary sensitivity and robustness testing using the underlying data.
4. Although we have attempted to provide the Commission with some comments and observations on its analysis and interpretation, BAA does not consider it has had an opportunity to *fully* assess and respond to the working paper. In BAA's view, if the Commission intends to rely upon the airline yield analysis working paper then BAA should in fairness have an opportunity to test and comment upon that analysis. This is particularly the case when, based on the limited analysis that BAA's advisers have been able to undertake, there are good reasons to question the validity and robustness of the analysis undertaken by the Commission.
5. Access to the underlying data is needed for BAA's advisors to properly analyse and respond to this Working Paper and any conclusions contained in Emerging Thinking that are based on this Working Paper. To this end BAA would urge the Commission to reconsider BAA's proposal for making this data available within a confidentiality ring – an approach that has been operated successfully in the Competition Appeal Tribunal (including in appeals from decisions of the Commission). Moreover, as the Commission is aware, confidentiality is no bar to disclosure under the Enterprise Act where such disclosure is for the purpose of facilitating the exercise of the Commission's functions which BAA would submit is the case here.
6. If the Commission is not prepared to provide BAA with an opportunity to scrutinise and comment on its analysis, BAA believes that it would be inappropriate for the Commission to attach weight to the analysis in developing its provisional findings.

7. However, setting aside the considerable difficulties that BAA faces in responding to a paper concerning data analysis without access to that data, BAA has identified a number of fundamental concerns and observations which arise from the current draft of the working paper. In summary, these are:
- a. The Commission's description of the underlying data is less than adequate; even a review of the limited information available raises questions about the representativeness of the Commission's dataset.
  - b. The Commission's data sampling technique appears to focus on a sample in which price movements would be most likely to demonstrate the claimed relationship, ignoring all other segments.
  - c. Based on the information presented, the Commission has overstated its findings, claiming to test for causality between competitor frequency and prices, whereas the results presented only support a statistical relationship given the particular sample used. There are alternative causal explanations for their empirical results and they have no basis to choose between these explanations.
  - d. The Commission appears to have simulated its results at (or beyond) the scope of typically observed situations, using a metric which may represent an unusually large change in competitive frequency.
  - e. The Commission's treatment of the potential for endogeneity, measurement error, and omitted variable bias is inadequate, as demonstrated by the poor performance and limited discussion of their 2SLS model.
  - f. The Commission is misleading in its summary that potential measurement error is likely to be biased towards a finding of less competition rather than more.
  - g. The Commission claims that the effect of endogeneity is again likely to be biased towards a finding of less competition rather than more, even though the Commission's own 2SLS regressions cannot confirm the direction of bias, and its reasoning is based on assumptions that it cannot verify.
  - h. The results presented in the Working Paper simply do not seem plausible. For example, the effect of competitor frequency on airfares at the same airport is not always greater than the effect of competitor frequency on airfares at other, more distant airports. Similarly, the reciprocal effects between two potentially competing airports are not always of the same order of magnitude with one airport presented as a significant constraint on the second, while at the same time the second airport represents an insignificant constraint on the first.
  - i. The results appear to contradict the significant body of evidence that the Commission has collated during the investigation from airlines and passengers, which casts significant doubt on the Commission's methodology and interpretation of their results. Given the apparent faults and uncertainties, it would be wrong for

the Commission to use this analysis to seek to diminish the overwhelming weight of contrary evidence.

8. Even on the basis of this highly limited opportunity to comment, BAA believes there are significant reasons to question the robustness and validity of the Commission's analysis, and its interpretation of the results it has generated.
9. This response is divided into three sections:
  - i. the first considers the data used by the Commission;
  - ii. the second considers the Commission's approach and estimation of its results; and
  - iii. the third considers the Commission's interpretation of the data and their results.

## Data

10. Section 3 of the Working Paper provides a brief description of the raw data and its manipulation into the dataset used by the Commission in its analysis. The Commission has also provided BAA with code for some of its data manipulation,<sup>1</sup> although without the actual data to go with the code it is unclear exactly what the Commission is doing in each step and what effect it is having on the data.<sup>2</sup>

11. In particular, BAA identifies the following potential issues:

- i. Unintended effects. There is code that is used to 'destring' some of the data,<sup>3</sup> but it is unclear what effect this has because 'force' is specified as an option and this may have the effect of unintentionally dropping some data.
- ii. Success of code. The success of the code, such as 'merge',<sup>4</sup> is unclear as the related log file has not been provided.
- iii. Queries raised by the code. It is unclear why there appears to be BA data for Heathrow and Gatwick, but not Edinburgh and Glasgow;<sup>5</sup> while this may be explainable it is queries like these that are not possible for BAA to verify without access to the underlying data.

12. Section 4 of the Working Paper provides a brief description of the data used by the Commission. The description provided by the Commission is incomplete given the lack of access to the data, for example there is no cross tabulation of airline-route overlaps between the different airports. While further descriptive statistics would be somewhat useful, these are not good substitutes for the actual data used by the Commission.

13. The Commission's sample is restricted in a number of ways and these restrictions could lead to biased results. The Commission restricts its sample in the following ways:

- i. six airlines;<sup>6</sup>
- ii. non-flexible tickets;<sup>7</sup> and
- iii. short haul flights.<sup>8</sup>

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<sup>1</sup> Email from Commission to BAA on 23<sup>rd</sup> June 2008.

<sup>2</sup> We also note that the Commission has not provided the log file for this piece of code.

<sup>3</sup> For example, see line 40 of creating database\_airport pairs\_13march.do.

<sup>4</sup> For example, see line 81 and 83 of creating database\_airport pairs\_13march.do.

<sup>5</sup> See line 353 of creating database\_airport pairs\_13march.do.

<sup>6</sup> Paragraph 3.1.

<sup>7</sup> Paragraph 3.1.

<sup>8</sup> Paragraph 3.2.

14. Although the Commission explains why it has only considered a single type of ticket to short haul destinations, it does not explain why it has not attempted to analyse competition in other segments. The Commission notes that by concentrating only on this subset it “*abstracts from complicating issues around restrictive airspace agreements, which apply to certain routes outside the EEA and are likely to influence yield.*” But these “*complicating issues*” can also reduce the scope for price competition on these routes; if there are features that mean that there is no scope for competition on these routes, then the Commission should state that this is the case. Furthermore, these issues only apply to some, not all, routes and so the effect has been to create a sample in which price movements would be most likely to demonstrate the claimed relationship, ignoring all other segments.
15. It is unclear how the dataset deals with the issue of multi-sector or connecting flights. For example if a passenger is flying from Glasgow with British Airways to China via Heathrow, the first leg of the flight would naturally fall within the Commission's dataset, however the yield collected by the airline for that segment will no doubt be impacted by the long-haul segments of the booking.
16. Potential problems with the representativeness of the Commission's data are raised by Table 1, where the route coverage of Stansted is considerably higher than that of the other airports.

#### Correlation coefficients

17. As part of the Commission's description of the data, the Working Paper includes a short section describing the correlation between prices of flights to the same destination from a range of airports.
- i. Table 4 shows a positive correlation between prices at some of the London airports, although notably there is only lower correlation between prices at Heathrow and Stansted (0.54), which becomes negative when seasonally differenced data is considered in Table 6 (-0.52).
  - ii. It is somewhat odd to note that the correlation of prices between Stansted and Gatwick is not the same as the correlation between Gatwick and Stansted in either Table 4 or 6. This statistic would normally be expected to be symmetric.
  - iii. For some reason there is no correlation coefficient for Glasgow and Prestwick in either Table 5 or 7.
  - iv. It is again odd that the coefficient between Edinburgh and Glasgow is different from that between Glasgow and Edinburgh in Table 5 and 7.
  - v. BAA also notes that the user bases at Edinburgh and Glasgow are similar whereas those in the South East are more differentiated. This is a reason why correlation between air fares in Lowland Scotland would be expected *a priori* to be higher than those in the South East, yet the Commission's data suggest that they are lower. For example, the correlations in Table 5 are generally lower

than those in Table 4 and those in Table 7 are generally lower than those in Table 6.

Flight frequency and change in frequency

18. Further descriptions of the data are provided in Section 5, and these raise the following concerns:

- i. Average monthly competitor frequency. Table 10 raises questions concerning the representativeness of the data sample used. It shows average monthly competitor frequency of only 15 and 22 flights per month from Stansted and Gatwick respectively. This is for short haul flights, for which three flights a week would seem a relatively low frequency.
- ii. Average year-on-year change in monthly competitor frequency. Table 11 indicates that the average year on year change in monthly competitor frequency is a decrease of over 14 flights per month at Edinburgh, and a decrease of over 4 flights per month at Glasgow. If the sample from Edinburgh and Glasgow is one in which competitor frequency is declining, then the Commission's equations would provide a negative coefficient if price increases were observed – such price increases could have occurred for a number of different reasons.

## Model Specification, Diagnostics and Comparison

19. The Commission provides a brief description of its methodology in Section 2 of the Working Paper. This Section summarises BAA's comments on the Commission's model, although, as set out above, these are limited by the fact that BAA has not been able to examine the Commission's data.

### Model Specification and Selection

20. The Commission adopts what it claims to be a reduced form approach to estimating the effects of competition from potentially substitutable airports on airfares at different BAA airports. However, since, as the Commission later acknowledges, the right hand side variables in the model are likely to be endogenous or suffer from measurement error, the Commission needs to be careful in the interpretation of these results and, in particular, needs to consider alternative causal explanations for those results.

21. A number of specific points regarding the OLS model specification as presented in Section 5 of the Working paper include the following:

- i. The Commission notes in paragraph 1.3 that data limitations prevent the preferred estimation of a full structural model. As the Commission then estimates a reduced form equation, its results should be interpreted with extra care – particularly in relation to inferences of causal relationships.
- ii. While the model specification is based on previous work by the European Commission and a number of academic studies,<sup>9</sup> the Commission does not provide a discussion of model selection criteria to choose between the different versions of its model that were presumably considered.
- iii. The Commission does not include a variable that is intended to measure competition from the same airline at another airport (e.g. the effect of BA services from Gatwick on BA services from Heathrow).

22. The Commission also presents some 2SLS results, which are questionable. These are estimated using the first lags of each variable as instruments, although, as the Commission indicates, these will not be valid instruments if there is serial correlation in the errors.<sup>10</sup> While the Commission argues that there will not be serial correlation in the errors it has not actually presented the results of a test for serial correlation, even though widely used tests are available.

### Diagnostics

23. Some of the preliminary tests that BAA's advisers had intended to undertake using this data would have included a general assessment of the Commission's approach given the available

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<sup>9</sup> Paragraphs 2.15 to 2.17.

<sup>10</sup> Paragraph 6.17.

data and more specifically: specification testing, sense checking, sensitivity analysis and robustness testing. The aim would be to test whether or not these data, analyses or interpretations are suitable for addressing questions posed by the Commission. These exercises simply cannot be performed, and indeed cannot even be delineated, without having access to the underlying data.

### Comparison of models

24. The Commission presents two sets of results in the Working Paper: OLS and 2SLS. It also briefly discusses other specifications, although these are not presented in the Working Paper.<sup>11</sup>
25. The 2SLS results reported by the Commission are used to check its OLS results and to assert the Commission's belief that the direction of bias in their OLS results is towards a finding of less competition than there actually is. Specification of the 2SLS models aside, the Commission should provide a more reasoned selection between the OLS and 2SLS results given that there are a number of sources of potential endogeneity that would bias the OLS estimates.<sup>12</sup> The OLS results should only be used in place of the 2SLS results if the Commission can show that OLS model produces consistent (unbiased) estimates.
26. The Commission does not report a formal comparison between the OLS and 2SLS results in its Working Paper, but has reported the results from a number of Hausman tests in its log output that it has provided to BAA. However, the results from these Hausman tests are mixed, rejecting the un-biasedness of OLS in some cases and not rejecting it in other cases. In any case, BAA would expect that one approach should be valid across *all* of the airports considered in these estimations. Accordingly, given the rejection of OLS for some airports, the appropriate conclusion is that OLS should not be used for any airport.
27. The potential problems in the specification of the 2SLS results are further evidenced by the Commission's statement that the 2SLS models fit the data badly in the cases of Stansted and Edinburgh. The Commission argues that it was not possible to find more suitable instruments in the data, but this does not mean the results presented are useful or valid.

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<sup>11</sup> See for example: paragraphs 2.2 to 2.10 for discussion of non-seasonally differenced models and paragraphs 6.4 for discussion of models with quadratic terms.

<sup>12</sup> Paragraphs 6.6 to 6.19.

### Interpretation of the results

28. The Commission's interpretation of its results appears to be in some areas overstated and in others insufficiently supported by the available evidence. A careful reading of its results and adequate consideration of the possibilities of incorrect specification should have been undertaken by the Commission, especially given its reliance on a reduced form model. There are seven parts to this Section:

- i. sense check of results;
- ii. overstatement of findings supportive of its hypothesis;
- iii. consideration of measurement error
- iv. consideration of endogeneity;
- v. the relative size of effects within and between potentially competing airports;
- vi. the relative size of the reciprocal effects between two airports; and
- vii. the economic significance of the Commission's metric.

### Sense check of results

29. A basic check that should be applied to an econometric model is whether the results make economic and business sense. An econometric model that fails this sense check is likely to be unreliable and should at least be subjected to further and more rigorous testing before it is relied upon to reach any conclusions.

30. The Commission argues that the airline yield analysis shows that Edinburgh and Glasgow are good substitutes for passengers (paragraph 1.1). As discussed in this paper BAA has serious questions concerning the Commission's analysis. As noted above it is well recognised that evidence of this type needs to be considered in the context of the other evidence on passenger perspectives on substitutability. In the case of Scotland all of the other evidence points to a very low degree of passenger substitutability between Edinburgh and Glasgow (see BAA's response to the Commission's Emerging Thinking and to the Commission's working paper on substitutability in Scotland). In summary:

- i. Catchment overlaps between Edinburgh and Glasgow are very small, especially when attention is restricted to instances where the route is available from both airports (which is the only sensible basis for appraising the level of passenger substitutability).
- ii. The ORC survey shows that passengers would not switch between the airports in significant numbers in response to sizeable movements in relative air fares.
- iii. The Commission's survey of airlines suggests that there is no material competition between airlines operating at Edinburgh and airlines operating at Glasgow.

31. To the extent that the Commission's econometric exercise is relied on to argue that airlines operating at Glasgow and Edinburgh do compete with each other to a significant extent, it would be a clear outlier amongst the available evidence on substitutability between the Scottish airports. From this result, BAA submits that the reliability and robustness of conclusions drawn primarily from the econometric exercise must be viewed cautiously for all airports, and only considered in the context of the other available evidence and facts of this case.
32. The Commission has qualified the approach taken in the Working Paper as providing 'an indication', and notes that 'we are continuing to investigate the most appropriate specification of this model'. Even on the basis of the summary results reported in the Working Paper, it is not apparent that the chosen model is suitable for the current purpose.

#### Overstatement of findings supportive of its hypothesis

33. In paragraph 1.4 the Commission claims to test whether competitor frequency "causes" prices to fall – however, given the observational nature of this study (as opposed to a controlled experimental design), the most that could reliably be claimed to have been found is a statistical relationship (with an associated error and uncertainty) based on the particular sample used, between an increase in competitor frequency and a fall in prices. It cannot be excluded that other unobserved factors may have "caused" one or more of the observed effects – the increase in competitor frequency, and the observed fall in prices. Indeed the Commission does not even identify the competitors which have increased frequency (or lowered prices), which could lead to important errors in interpretation. It is important in such a situation to consider all possible causal explanations before choosing one.
34. In paragraph 1.5 the Commission interprets a statistical relationship between competitor frequency and airfare, estimated within a reduced form equation, as "*evidence that passengers are willing to substitute between the BAA London airports*", and similarly that "*the two Lowland Scotland airports are also potential substitutes*". This is too strong a conclusion to draw from these statistical results. The most that could be said with confidence is that in the given specification, with the given dataset, there is, over the average of all observations, a statistically significant relationship between competitive frequency at one airport and airfares at another airport. Passenger switching has not been observed, and passenger numbers have not entered the equations presented in the working paper. The Commission's upfront conclusion in relation to the Lowland Scotland airports is even more one-sided – even the statement above concerning a statistically significant relationship does not apply with respect to an expansion of competitor frequency at Edinburgh, which has no statistically significant effect on airfares at Glasgow. This is acknowledged in paragraph 1.10, but that still leaves the concluding claim at 1.5 unsubstantiated.
35. The Commission also overstates the strength of its test without adequately considering the strength of the alternative causal explanation. In paragraph 1.4, it is said that a negative relationship between competitive frequency at one airport and airfares at another airport will be considered by the Commission as an indication of a competitive constraint between the two airports, whereas a lack of such a relationship or a positive relationship will not be

considered as evidence of a lack of potential substitution. Finding of a statistical relationship does not provide a definitive basis for concluding that there is competition between airlines, and finding no such relationship cannot then be excluded as at least one component of the evidence to be considered in the fact finding process.

36. In its potential explanation for a finding of no significant relationship, in paragraph 1.4 the Commission raises the possibility of low barriers to entry or misspecification of the model. However, at least one of these explanations offered by the Commission (misspecification) could equally well lead to a false negative relationship, which is not supported by an underlying substitutability between the different airports. In paragraph 2.8, the Commission has inserted some additional potential reasons why a lack of such a statistical relationship should not be viewed as evidence of a lack of substitutability – measurement error and marginal cost pricing by airlines.

### Measurement Error

37. In relation to measurement error, the Commission is misleading in its summary in paragraph 1.13, that sources of bias (including measurement error), are likely to be biased towards a finding of less competition rather than more - it is only in paragraph 6.3 that the Commission confirms that the direction of bias due to measurement error could go in either direction, if more than one variable is measured with error (and indeed even if one variable is measured with error, the direction of bias on other variables is unknown). Given the myriad ways in which measurement error could have affected several of the underlying variables of interest, this makes it difficult to say with confidence that measurement error might only explain a lack of statistical relationship where true substitutability exists – rather, measurement error might also bias some situations towards a finding of a stronger relationship between competitive frequency and yield.
38. In paragraphs 5.6 - 5.10, the Commission discusses the problems with the results obtained in respect of Stansted, in which additional competitor frequency at Stansted itself is associated with an increase in airfares at Stansted. The Commission explains this unintuitive result with reference to measurement error – in connection with the measure of competition from other airports - specifically the exclusion of potentially competing flights to secondary airports. A similar explanation is discussed in paragraph 6.2. However, if the Commission's explanation were plausible, that the true level of competition on a given route might be understated due to competition between routes to different, but close destinations (secondary airports), then this would be expected to apply to the competitor frequencies measured from more than one airport. Given the number of competitor frequency variables, and interaction terms included in any regression, even on this issue alone there are strong possibilities for measurement error across a number of variables in any given equation. In paragraph 5.10, and later in paragraph 6.3, the Commission notes that if more than one variable is measured with error the direction of bias of the coefficients is indeterminate.

Endogeneity

39. The Commission discusses the possibility of endogeneity as an additional source of potential bias in paragraphs 6.6 to 6.19 of its working paper. However, while the Commission acknowledges potential endogeneity problems, the approach to this problem that has been presented is incomplete and does not provide confidence in the chosen specification; in the face of some unexpected results, it does not adequately address the underlying problem, despite having identified that such a problem is likely to exist:

- i. The Commission's discussion and treatment of the potential sources of endogeneity is incomplete. For example, the Commission asserts that the competitor frequency variables are "predetermined". However, competitor frequency is set based on expectations of future demand (as well as other factors such as market characteristics and airlines' strategies for serving that demand), and these expectations are likely based on unobserved factors. When actual demand is realized, this observed demand (and the resultant prices) will include those unobserved factors. Thus, competitor frequency variables would be expected to be correlated with the error term. Although the Commission acknowledges this and tries to include "own capacity" as a proxy for these unobserved factors, this approach will not eliminate the bias that exists, and in any event, own capacity could have its own independent effect on yield.
- ii. Additionally, the Commission does not acknowledge or control for potential competition between tickets types. Failing to do so, if there is competition between ticket types, could lead to an additional source of omitted variable bias in the Commission's results.
- iii. The Commission further states that endogeneity leads to attenuation bias. The Commission sets out a series of potential issues that could result in endogeneity and therefore potentially bias their OLS results. The Commission goes on to claim in paragraph 6.13 and 6.14 that the direction of the bias on its results from omitted variables is likely to be downwards. However, the Commission does not adequately back up this claim, which would require various conditions to be valid. The Commission has not tested whether these conditions hold. Indeed, the Commission's 2SLS results for Stansted and Edinburgh (paragraph 6.19), and some of the 2SLS results for Gatwick and Glasgow, as shown below, appear to be inconsistent with the Commission's claim. Moreover, if measurement error is also present, as the Commission argues elsewhere, the direction of the combined bias is not determined.
- iv. Having acknowledged the potential problems from endogeneity, the Commission attempts to implement a potential solution by estimating models using 2SLS. However, the Commission largely disregards the 2SLS results on the basis that they are "not plausible" in some cases (paragraph 6.19). Moreover, the Commission's analysis gives no reason to conclude that the potential endogeneity problem has been adequately addressed.

- v. The Commission's statement concerning the observed direction of endogeneity, as revealed by the data analysis is misleading. In paragraph 6.18, the Commission claims that "*Results for Heathrow, Gatwick and Glasgow show an increase in the effect of competition at all airports, in line with the likely direction of bias*". However, the tables which follow do not support this statement:
- a. considering yields at Gatwick, the average effect of competitor expansion at Gatwick decreases from -11.5 to -5.7.
  - b. considering yields at Glasgow, the average effect of competitor expansion at Edinburgh decreases from (-2.4) to a positive 0.02.

On the basis of the figures provided, it appears that in the cases of Edinburgh and Stansted the attempt to deal with endogeneity lead to some positive effects between competitor frequency and yield; at Glasgow and Gatwick, the attempt to deal with endogeneity increased some coefficients and decreased some coefficients; and in the case of Heathrow alone, the attempt to deal with endogeneity resulted in an increase in the effect of competition at all airports. One cannot reasonably extrapolate from a single result (Heathrow), that the likely direction of bias for all other airports is likely to be the same, when observations at those other airports contradict this assertion.

- vi. Such an approach cannot be considered as a complete attempt to deal with the potential issue of endogeneity. The Commission's own equations support the intuition of economic and econometric theory that endogeneity is likely to exist, the Commission's own regressions cannot confirm the direction of bias, and as such, one cannot merely rely on any of the basic set of regression results presented to support the Commission's interpretation of the results and the conclusions that it seeks to draw from its work.

#### The relative size of effects within and between potentially competing airports

40. It is expected that competition would be more intense from competitors within the same airport, rather than between competitors operating at other, potentially competing airports. This position is confirmed by the Commission's own survey of airlines operating from airports in Lowland Scotland. However, this is frequently not the case in the Commission's results:<sup>13</sup>

- i. Heathrow: competitor expansion at Stansted has a larger point estimate effect than expansion at Heathrow.
- ii. Stansted: competitor expansion at Heathrow and Gatwick have a larger point estimate effect than expansion at Stansted.

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<sup>13</sup> See tables 8 and 9.

- iii. Edinburgh: under the no other competitor assumption, competitor expansion at Glasgow has a larger point estimate effect than expansion at Edinburgh.
41. While these observations relate to point estimates, in the case of Heathrow, the Commission does not report whether or not the larger point estimate for competitor expansion at Stansted on Heathrow is statistically significantly larger under the “average effect” assumption than competitor expansion at Heathrow on Heathrow.
42. In the case of yields at Edinburgh, the Commission confirms that they cannot reject the hypothesis that the effect of expansion at Edinburgh and Glasgow are the same. Finding that the competitive constraint on Edinburgh from other airlines at Edinburgh and airlines at Glasgow are roughly the same is not plausible and is contradicted by all other market evidence as stated above.
43. The difficulty which the Commission has found in trying to test the statistical significance of differences between the effects of expansion at different airports highlights the lack of precision in each of the point estimates provided. In the case of yield at Stansted, the Commission cannot reject the hypothesis that the point estimates for the effects of expansion at Heathrow (-16.7), and expansion at Gatwick (-10.8) are the same despite the large difference between the point estimates. Given the substantial imprecision with which the effects are estimated, the Commission cannot rule out that the true size of the effects are much lower than the point estimates quoted here.

#### The relative size of the reciprocal effects between two airports

44. A further feature of the results that one might have expected is that the reciprocal effects between two potentially competing airports could be expected to have a similar magnitude. In other words, if two potentially competing airports are truly substitutes and have similar passenger volumes on a given route, one might imagine some degree of symmetry in the effect of additional capacity at one airport on yields at the other airport.
45. While this may also be affected by the relative size of existing competitor frequency at each airport (which is then increased by “100%”, although BAA cannot comment on this effect, due to the absence of the underlying dataset), this is especially notable for the Lowland Scotland airports. A competitor expansion at Glasgow is alleged to have a large and significant effect on average yields at Edinburgh, but the corresponding competitor expansion at Edinburgh has an insignificant (and much smaller point estimate) effect on average yields at Glasgow. This sort of anomaly calls into question the reliability of the Commission’s results.

#### The economic significance of the Commission’s metric

46. The Commission’s practice of estimating the effect of competitor expansions based on the assumption of there being no other competitors present at any other airport may be difficult to justify, as no evidence is presented to show the relevance of this situation, and this may well be outside the scope of typical observations.

47. The “average” results in turn are somewhat arbitrary, having been defined as the “average” competitor frequency observed on all routes used in a given set of equations. Such an “average” may not be an appropriate level of competition to use as the baseline for many of the routes considered.
48. The Commission have attempted to use their regression results to simulate the likely effect of a “100% increase in competitor frequency” at competing airports. BAA cannot guess the distribution of likely competitor frequencies, as the working paper only includes some summary statistics, and a limited attempt to justify this figure as the basis for simulating the likely effects at competing airports, citing single instances in which such increases had occurred out of samples of thousands of observations (paragraph 5.18).
49. Table 10 presents the average monthly competitor frequency, and shows figures of between 1 and over 600 flights per month, for a given destination, served by a given airport; Table 11 shows the average year on year change in monthly competitor frequency, which varies from a decrease of 164 to an increase of 117 flights per month. Of course it is impossible (in the absence of seeing the underlying dataset), to comment on which 12-monthly changes relate to which absolute frequencies. Clearly if the maximum 12-monthly increase at Heathrow (94) is related to the maximum competitor frequency at Heathrow (618), this only corresponds to an increase of 15%, which is far from the 100% competitor increase used as the basis of all simulations.
50. It may be invalid to simulate such results at (or beyond) the edges of the distribution of observed outcomes, as opposed to using a more typically observed increase in competitor frequencies as the basis of such a simulation. The Commission uses a metric which may represent an unusually large change in competitive frequency, and cannot be as confident that the relationships estimated over the average of all observations are valid in these extreme situations. When viewed in conjunction with the standard errors associated with some of the estimates that have been included in the working paper, the Commission cannot be confident in these simulated effects.

## Conclusion

51. As noted above, BAA has been severely constrained in its ability to offer meaningful comments on the Commission's analysis, by the complete lack of access to the underlying data. BAA's position remains, that in order to be able to properly respond to this Working Paper (and indeed the conclusions contained in Emerging Thinking which appear to be based on this Working Paper) access is needed to the underlying data.
52. BAA has however, provided some high level observations, based on the limited information made available to it, and contained in the Working Paper. In summary:
- i. The results presented in the Working Paper simply do not seem plausible and BAA has raised a number of questions concerning aspects of the data collected and chosen by the Commission, the methodology used to select a sub-set of this data for assessment, the modelling and statistical techniques employed to perform the analysis, the validity and consistency of the results obtained (in terms of consistency both with other results in the Working Paper, and with other available information), and the interpretation of these results.
  - ii. BAA does not find strong support for some of the Commission's claims. Such initial, high level, results must cast doubt over the Commission's methodology and interpretation of their results.
  - iii. The results appear to contradict the significant body of evidence that the Commission has collated during the investigation from airlines and passengers
  - iv. BAA is not in a position to assist the Commission is addressing these issues as it does not have access to the underlying data, and is not able to verify the reasonableness of the Commission's work so far
  - v. For these reasons, BAA does not believe the Commission should attach weight to the existing analysis in the development of its thinking on these issues.