Chapter 8

Allocative Efficiency Detriments

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Contents

1 Summary

1 In its draft determination, and more recently in its "audited calculations", the allocative efficiency results presented by the Commission rely entirely on an analysis undertaken by Professor Gillen ("Gillen"), the Commission's economic expert. To date, NECG has been provided with three versions of Gillen's analysis, the most recent on 11 June 2003. We have reviewed each of these analyses and have serious concerns with the approach adopted.

2 First, the framework on which the analysis is based is widely discredited and its application relies on the following implausible assumptions:

- that without the Alliance, the Tasman and domestic New Zealand markets are almost perfectly competitive, compared to a monopoly in both markets with the Alliance;
- fifth freedom operators such as Malaysian, Thai, Garuda and most recently Emirates, impose no competitive constraint on the Tasman;
- VBA entry would not occur with the Alliance, even though Gillen estimates that an entrant operating on the Tasman in the future with the Alliance would earn a profit of $118 million per year and despite the assumption that entry would occur on the Tasman without the Alliance, even though profitability would be substantially lower at $36 million per year;
- with the Alliance Air New Zealand and Qantas would fly planes that are half full, with a load factor of 47% on the Tasman and 51% in domestic New Zealand;
- Air New Zealand would remain viable in a future without the Alliance despite Gillen estimating an annual reduction in its profitability of $83 million; and
- Air New Zealand and Qantas have exactly equal market shares, both in domestic New Zealand and the Tasman, an assumption that results in the Alliance reducing competition to a much larger extent than is actually the case.

3 Second, Gillen's implementation contains numerous errors. For example, Gillen uses the incorrect factual and counterfactual scenarios, he mixes results from different scenarios and his aggregate welfare results use incorrect values for capacities, loads and fares.

The seriousness of Gillen's implementation errors is readily apparent when the results of his aggregate analysis are examined. Initially, Gillen estimated an allocative efficiency **loss** associated with the Alliance of $132 million per year (as reported in the Commission's draft determination). The corresponding figure from Gillen's most recently revised analysis is an allocative efficiency **gain** associated with the Alliance of $155 million per year.

4 While the Commission characterises this variation in results, and the abandonment of these figures entirely in its media release as "technical corrections", NECG believes that they are symptomatic of the general lack of rigour applied by Gillen.

5 Third, Gillen's framework, assumptions and implementation combine to produce results that fail any test of reasonableness. Gillen's most recent analysis estimates that the Alliance would increase the market fare by 48% on the Tasman and by 56% in domestic New Zealand, compared to the future without the Alliance. These results are at complete odds with the outcomes observed under such alliances internationally, where mergers have initially led to small increases in fares, followed in the long run (less than 5 years) by fare reductions of 2 or 3 percent. Gillen's results are also inconsistent with the substantial undertakings made by the Applicants to limit fare increases, maintain minimum capacity levels and facilitate entry.

6 Given the nature and extent of problems with Gillen's analysis, it is NECG's view that the Commission should give no weight to his estimates in their final determination.

2 Background

7 The Commission's draft determination on allocative efficiency relies entirely on the results of an analysis undertaken by Professor Gillen ("Gillen"), which in turn is based on modelling undertaken by Professor Hazledine ("Hazledine"). The Commission does not give any weight to the detailed modelling work undertaken by NECG or to its own analysis (which seems focussed on price discrimination).

8 Professor Gillen's analysis, as presented in the Commission's draft determination, concludes that the Alliance between Qantas and Air New Zealand would result in allocative efficiency detriments for New Zealand of $132 million per year (see table 10, p. 174 of the Commission's draft determination). This comprised $91 million of annual detriment in domestic New Zealand and $41 million of annual detriment in the Tasman market.

9 The spreadsheets and a document detailing Gillen's analysis were provided to NECG on 15 April 2003. On review of this material NECG had serious concerns with the framework, assumptions and implementation of Gillen's approach. These concerns were raised with Gillen and the Commission in a meeting on 16 May 2003. Following this meeting, Gillen provided NECG with a revised set of spreadsheets and a document on 3 June 2003 containing written responses to the issues raised.

10 Based on this revised analysis, Gillen's results changed from an allocative efficiency **detriment** of $132 million per year to an allocative efficiency **benefit** of $93 million per year. Then on 11 June, just over one week before submissions on the draft determination were due, a further set of revised Gillen spreadsheets and documents were provided to NECG. Based on these further revised results, Gillen reports an allocative efficiency **benefit** of $155 million per year associated with the Alliance. Despite this result, the Commission issued a press statement stating that it had made some "technical corrections" to its modelling and reported the annual allocative efficiency **detriments** associated with the Alliance as $170 million.

11 These variations in themselves raise serious concerns about the robustness of Gillen's approach (and the Commission's understanding and interpretation of them). A more detailed review of his workings suggests that no weight should be given to the results of his analysis.

12 Rather, it is NECG's view that the Commission should rely on the initial detailed modelling work undertaken by NECG and provided to the Commission in December 2002. However, if the Commission strongly prefers the more aggregate analysis undertaken by Gillen, then it is NECG's view that the Commission needs to consider a substantially revised version of the analysis that has produced by Gillen to date.

13 In particular, it is NECG's view that the continued reliance on the widely discredited conjectural variation framework adopted by both Hazledine and Gillen is unsustainable and that the Commission should abandon this approach and rely on an analysis that adopts the well accepted and widely used Cournot framework. In addition, the Commission needs to recognise and remove many of the flawed assumptions and methodologies adopted in the Gillen analysis.

14 NECG's concerns with the approach adopted by Gillen are confirmed in an assessment of the Commission's draft determination undertaken by Professor Robert Willig provided as Appendix 1 to this chapter.

15 The remainder of this document is set out as follows:

16 Section 3 details the numerous implementation errors found in Gillen's analysis and presents revised estimates based on the correction of these errors. However, even when these corrections are made the Gillen analysis provides counterintuitive results in that his detailed model estimates substantial price increases and output decreases as a result of the Alliance, yet his aggregate results suggest that there are substantial allocative efficiency benefits associated with the Alliance. Hence, in NECG's view, this analysis cannot be relied on to draw any conclusions about the Alliance.

17 Section 4 explains why the conjectural variation approach to modelling competition adopted by Gillen and Hazledine is flawed from both a theoretical and empirical perspective and hence inappropriate for assessing the Alliance.

18 Section 5 identifies a number of the weaknesses in Gillen's modelling approach, namely his approach to implementing product differentiation, the fact that his theoretical model is not solved, his revenue maximisation assumption and his modelling of the VBA as a market follower.

19 Section 6 discusses Gillen's responses to a number of the issues raised by NECG in the meeting of 16 May, which only serve to illustrate that his approach is confused and lacks any link with economic theory and reality.

20 Appendix 1 is the expert report of Professor Robert Willig, which provides an economic assessment of the Commission's draft determination.

21 Appendix 2 is the initial perspective of Professor Steven Morrison and Professor Clifford Winston on the Alliance between Qantas and Air New Zealand.

3 Implementation errors

22 In terms of implementation, Gillen initially provided three Excel spreadsheets and one Word document to NECG via the Commission. NECG reviewed this material and identified a number of implementation difficulties.

23 The three main problems identified were those relating to which counterfactuals were used, the calculation of the welfare loss and the link between the detailed modelling work and the aggregate allocative efficiency results presented in the Commission's draft

determination. In response to NECG's queries, Gillen provided a revised set of spreadsheets and document (dated 28 May).

24 In the revised document, Gillen accepts that he made an error in terms of both the factual and counterfactual scenarios used in his modelling[1]. He claims that he has corrected these errors and has highlighted in blue the columns in his spreadsheets that are the correct factual and counterfactual scenarios and which are the basis for his revised welfare calculations. However, there remain substantial difficulties with the scenarios adopted by Gillen, which are discussed in detail in section 3.1 below.

25 In the revised document, Gillen explains that there was not an error in his calculation of the welfare loss. He claims that he was not attempting to calculate the change in the consumer surplus component of the DWL (ie the triangle), but rather the total change in consumer surplus (ie the sum of the triangle and the rectangle). NECG accepts that this approach is correct, if the producer surplus component of the DWL is also calculated as the total change in producer surplus. If this is done then the transfers between consumers and producers will be netted out.

26 In terms of linking his detailed modelling results to the aggregate allocative efficiency results presented in the Commission's draft determination, Gillen provided a table setting out how each value in the aggregate results table was calculated (see section II, p.12). A comparison between this and the way that Gillen actually calculates these values reveals substantial implementation difficulties. These are discussed below in section 3.2. However, to demonstrate the magnitude of Gillen's errors, one only needs to look at the difference between his initial results and his revised results.

27 The table of aggregate results below is taken directly from Gillen's document dated 28 May 2003. This table reports Gillen's initial allocative efficiency loss results of $91 million in the domestic New Zealand market and $41 million in the Tasman market, totalling $132 million, as reported in the Commission's draft determination (see table 10, p. 174 of the Commission's draft determination).

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[1] Section IV, page 15 of Gillen document dated 25 May 2003.

Welfare Analysis	(all monetary values in $ millions)					
	Domestic New Zealand			Tasman Market		
	Status Quo	Counterfactual	Factual	Status Quo	Counterfactual	Factual
Incumbent operating profits	150.0	177.2	211.0	256.0	249.0	365.0
Air NZ profits	$ 86	$ 102	$ 148	113	118	173
NZ Profit Adjustment	$ 67	$ 79	$ 63	$ 87	$ 92	$ 136
NZ Consumer Surplus	137	155	80	204	192	107
Net change New Zealand welfare						
Change in Welfare with Counterfactual	-$ 53	$ 91		-$ 19	$ 41	
Proportion of Market	- 0.12	0.21		- 0.013	0.03	
cs per unit	50	54	37	148	168	109

28 The revised table of aggregate results below is also taken from Gillen's document dated 28 May 2003, but contains the aggregate results based on Gillen's revised modelling. As can be seen from this table, Gillen's results were revised to -$19 million in the domestic New Zealand market and -$74 million in the Tasman market, totalling -$93 million. In other words, Gillen's revised results suggest that there is an allocative efficiency **gain** of $93 million per year associated with the Alliance between Air New Zealand and Qantas.

Welfare Analysis	(all monetary values in $ millions)					
	Domestic New Zealand			Tasman Market		
	Status Quo	Counterfactual	Factual	Status Quo	Counterfactual	Factual
Incumbent operating profits	150.0	96.8	211.0	256.3	292.9	283.7
Air NZ profits	$ 86	$ 56	$ 148	113	139	135
NZ Profit Adjustment	$ 67	$ 43	$ 63	$ 87	$ 108	$ 136
NZ Consumer Surplus	137	147	146	204	149	195
Net change New Zealand welfare						
Change in Welfare with Counterfactual	$ 1.24	-$ 19.19		-$ 3.67	-$ 74.38	
Proportion of Market	0.00	- 0.04		- 0.002	- 0.05	
cs per unit	50.00	53.24	67.50	147.69	129.97	199.38

29 On 11 June 2003, NECG received a further set of spreadsheets and documents from Gillen ("further revised Gillen"). NECG's preliminary comments on the further revised

Gillen analysis are provided in section 3.3 below[2]. The table of aggregate results presented by Gillen in his further revised analysis (see p. 19 of his document dated 5 June 2003) is presented below. As can be seen from this table, Gillen's aggregate results for domestic New Zealand remain unchanged at -$19 million per year, but for the Tasman are now -$136 million per year. That is, Gillen's further revised analysis results in an annual allocative efficiency **gain** of $155 million associated with the Alliance.

Welfare Analysis	(all monetary values in $ millions)					
	Domestic New Zealand			**Tasman Market**		
	Status Quo	Counterfactual	Factual	Status Quo	Counterfactual	Factual
Incumbent operating profits	150.0	96.8	211.0	256.3	126.7	365.0
Air NZ profits	$ 86	$ 56	$ 148	113	60	173
NZ Profit Adjustment	$ 67	$ 43	$ 63	$ 87	$ 47	$ 136
NZ Consumer Surplus	137	147	146	204	149	195
Net change New Zealand welfare						
Change in Welfare with Counterfactual	$ 1.24	-$ 19.19		-$ 82.63	-$ 135.58	
Proportion of Market	0.00	- 0.04		- 0.055	- 0.09	
cs per unit	50.00	53.24	67.50	147.69	129.97	199.38

30 While the Applicants would no doubt be happy to accept either of Gillen's revised results without further review, just as the Commission accepted Gillen's initial results in their draft determination, there are obviously serious errors involved with Gillen's approach which need to be addressed.

3.1 Factual and counterfactual scenarios

31 Gillen's spreadsheet models contain 8 scenarios each for domestic New Zealand and the Tasman:

- two base case scenarios;
- three factual scenarios; and

[2] Given that we were only provided with these revisions just over one week before submissions were due, we will provide a fuller review at the conference in August.

- three counterfactual scenarios

32 In his initial document (dated 4 April), Gillen claimed to use the "*revenue maximiser counterfactual with no VBA entry*" for domestic New Zealand. However, in his spreadsheet he used the "*entry deterrence no cartel with VBA entry*" for domestic New Zealand. Similarly, for the Tasman, Gillen claimed to use the "*NECG corrected counterfactual with VBA entry*" in his document. However, in his spreadsheet he used the "*entry deterrence no cartel with VBA entry*". Given the inconsistencies between Gillen's document and his spreadsheets, NECG requested clarification regarding which counterfactuals were intended to be used.

33 In his response document (dated 28 May 2003), Gillen notes his error and states that for domestic New Zealand the correct spreadsheet is "Gillen Analysis April 4 Competition Rev Max in Domestic.xls" and that the correct counterfactual is in column G, the "*revenue maximiser counterfactual with no VBA entry*", and the correct factual is in column J, the "*entry deterrence cartel with no VBA entry*". Gillen states that he has highlighted these columns in blue in the spreadsheet and has reported them in Table 1 NEW of his document.

34 It is correct that the columns highlighted in blue and the ones reported in the table are columns G and J. However, the welfare calculation that Gillen undertakes still uses the counterfactual in column I, which is the counterfactual titled "*entry deterrence no cartel with VBA entry*". This can be seen by going to the *Welfare Analysis* tab in Gillen's spreadsheet. Here again he has highlighted the relevant column, column E, in blue. Cell E22 of this column reports the consumer surplus change and sums cell J40 and J41 from the *NZ Model* tab. Cells J40 and J41 calculate the change in total consumer surplus between the counterfactual in column I and the factual in column J, not the consumer surplus change between columns G and J as claimed by Gillen.

35 However, for his welfare analysis in domestic New Zealand Gillen does take the operating profit for the incumbents under the counterfactual from column G. Hence, his welfare calculation is a combination of parameter values from two counterfactuals, a revenue maximiser counterfactual with no VBA entry and a no cartel counterfactual with VBA entry. Hence, his detailed welfare results for domestic New Zealand are meaningless.

36 For the Tasman, Gillen's document of 28 May 2003 states that the correct comparison is a counterfactual of status quo with some VBA entry against an alliance, which is a cartel

with no entry. As for domestic New Zealand, Gillen highlights these columns in blue and reports them in Table 2 NEW of his document.

37 However, the counterfactual column that Gillen highlights in his spreadsheet and reports in his table and uses for his welfare calculation is a cartel ***with*** VBA entry, as can be seen from going to Table 2 NEW, which includes prices, outputs and capacity for an entrant.

38 Hence, again Gillen has used the incorrect factual and counterfactual scenarios in his detailed welfare analysis. This makes it difficult if not impossible to draw any meaningful conclusions from his detailed results.

3.2 Linking the detailed modelling to the aggregate results

39 In addition to calculating welfare at a detailed level, Gillen also calculates the change in New Zealand welfare at what he refers to as an "aggregate" level. This aggregate level calculation is important, as it is this that the Commission used in their draft determination.

40 In his 28 May document, Gillen provides a table (see section II, p. 12) which sets out the source data for his calculations in Table 4 (the aggregate results table), as this table is not linked in anyway to his detailed spreadsheets. However, in attempting to reconcile the source data underlying Gillen's calculations with the calculations actually made in his detailed spreadsheet, numerous errors are apparent. Each of the errors we identified is listed below and compares the values that Gillen hard-coded into his aggregate results tables with the cell references he should have used from his detailed spreadsheet (according to his document) and the values that he would have obtained if he had used the correct cell references. In addition, many of results in the table differ from those reported by Gillen when the aggregate results are linked to the correct cell references rather than simply hard-coded to one or two decimal places, as Gillen did. These differences are not listed below, but do account for a small part of the difference between the values reported by Gillen in his revised aggregate table and the corrected results.

41 It is important to note that these errors relate to the second Gillen analysis provided to NECG on 3 June. However, based on our preliminary review, it appears that many of the same errors are made in Gillen's third analysis provided to NECG on 11 June 2003.

42 **Error 1:** Gillen reports incumbent operating profit for the Tasman market under the factual as $283.7 million. This is incorrect. The incumbent operating profit for the

Tasman under the *"cartel factual with no VBA entry"*, the factual that Gillen says he uses in the text of his revised document (see last paragraph, p. 15), is in cell J38 of *Tasman Model* and is $365 million.

43 **Error 2:** Gillen states that Air New Zealand profit should be calculated as Air New Zealand seat capacity over total market capacity times the profit from row 1 of his table (see source of data for table 4, p.12). Gillen calculates this for the counterfactual in domestic New Zealand as:

(0.35 / 0.61) * C4 = $56 million

44 This is incorrect. Air New Zealand seat capacity for the counterfactual in domestic New Zealand is in cell G26 of NZ Model and total market capacity[3] is in cell G28 of the NZ Model. Based on the values in these cells of Gillen's detailed spreadsheet the correct calculation is:

3,806,400 / 6,448,416 * C4 = $57 million

45 **Error 3:** Using the same formula as above, Gillen calculates Air New Zealand profit for the counterfactual in the Tasman market as:

(0.21 / 0.442) * F4 = $135 million

46 This is incorrect. Air New Zealand seat capacity for the counterfactual in the Tasman market is in cell G26 of the Tasman Model and total incumbent capacity is in cell G28 of the Tasman Model. Based on the values in these cells of Gillen's detailed spreadsheet the correct calculation is:

(2,016,768 / 5,044,104) * F4 = $117 million

47 **Error 4:** Gillen adjusts New Zealand's profits for the Qantas ownership of 22.5 percent of Air New Zealand. However, Gillen makes this adjustment to Air New Zealand's profits

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[3] It is not clear whether Gillen really means total market capacity or total incumbent capacity. Given he is attempting to calculate Air New Zealand's share of total incumbent profit, it is assumed he means total incumbent capacity.

under the status quo and the counterfactual. This is incorrect. No profit adjustment should be made for Qantas' ownership of Air New Zealand under the Alliance in either the status quo or the counterfactual. Hence, the following corrections are required.

- Gillen's NZ profit adjustment for the status quo in domestic New Zealand is:

  0.775 * B5 = $67 million

  Instead, it should simply be equal to B5 = $87 million

- Gillen's NZ profit adjustment for the counterfactual in domestic New Zealand is:

  0.775 * C5 = $43 million

  Instead, is should simply be equal to C5 = $57 million

- Gillen's NZ profit adjustment for the status quo in the Tasman market is:

  0.775 * E5 = $87 million

  Instead, it should simply be equal to E5 = $112 million

- Gillen's NZ profit adjustment for the counterfactual in the Tasman market is

  0.775 * F5 = $108 million

  Instead, it should simply be equal to F5 = $117 million

48 **Error 5:** Gillen states that his adjustment to NZ profit is for the Qantas ownership of 22.5 percent in Air New Zealand. However, for the factual, he does not do this calculation, rather he simply hard-codes values.

- For the NZ profit adjustment under the factual in domestic New Zealand, Gillen hard-codes the value of $63 million (see cell D6 of his table). This is the incorrect value.

  If the profit adjustment that Gillen intends to make is simply for the Qantas ownership of 22.5 percent in Air New Zealand then he should multiply the Air New Zealand profit (in cell D5 of his table) by 0.775. Doing this gives the value of $115 million.

- For the NZ profit adjustment under the factual in the Tasman market, Gillen hard-codes the value of $136 million (see cell G6 of his table). This is the incorrect value.

  If the profit adjustment that Gillen intends to make is simply for the Qantas ownership of 22.5 percent in Air New Zealand then he should multiply the Air New Zealand profit (in cell G5 of his table) by 0.775. Doing this gives the value of $195 million.

49 **Error 6:** Gillen states that he calculates the consumer surplus in domestic New Zealand by calculating the consumer surplus per pax times load factor times seat capacity. Based on the values he calculates under the status quo in domestic New Zealand he appears to be referring to the incumbent load factor and the Air New Zealand seat capacity[4].

50 For the counterfactual in domestic New Zealand Gillen calculates this as:

(C12 * 0.65 * 4,243,200)/1,000,000 = $147 million

51 This is incorrect. The incumbent load factor for the counterfactual in domestic New Zealand is in cell G29 of the NZ Model and the Air New Zealand seat capacity is in cell G26 of the NZ Model. Based on the values in these cells of Gillen's detailed spreadsheet the correct calculation is:

(C12 * 0.84 * 3,806,400)/1,000,000 = $151 million

52 **Error 7:** Gillen also incorrectly calculates the consumer surplus in the counterfactual for the Tasman. Gillen calculates this as:

(F12 * 0.55 * 2,080,000)/1,000,000 = $149 million

53 This is incorrect. The incumbent load factor for the counterfactual in the Tasman market is in cell G29 of the Tasman Model and the Air New Zealand seat capacity is in cell G26

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[4] While we do not change Gillen's formula, we note that his use of Air New Zealand seat capacity is incorrect. Rather, total seat capacity should be used and then the share of consumer surplus relevant to New Zealand should be calculated based on New Zealand passenger shares.

of the Tasman Model. Based on the values in these cells of Gillen's detailed spreadsheet the correct calculation is:

(F12 * 0.67 * 2,016,768)/1,000,000 = $172 million

54 **Error 8:** Gillen states that he calculates the consumer surplus per unit by calculating 0.5 times the fare over the market elasticity (see source of data for table 4, p.12). He states that the market elasticity for domestic New Zealand is assumed to be 1.1 and the market elasticity for the Tasman is assumed to be 1.3. These values are incorrect. In the NZ Model the market elasticity is reported in cell D11 as –1.01 and in the Tasman Model in cell D11 as –1.33. When these elasticities are used in the calculation the results are as set out in the table below.[5]

Scenario	CS per unit calculated by Gillen	CS per unit corrected
Status quo domestic New Zealand	$50.00	$54.46
Counterfactual domestic New Zealand	$53.24[1]	$47.42
Factual domestic New Zealand	$67.50	$73.33
Status quo Tasman	$147.69	$144.36
Counterfactual Tasman	$129.97	$127.28
Factual Tasman	$199.38[2]	$182.35

1 There is an additional error associated with this calculation, which is discussed below under error 9.
2 There is an additional error with this calculation, which is discussed below under error 10.

[5] While we do not change Gillen's formula, we note that the price elasticity for linear demand is not constant, as he assumes in the application of the formula.

55 **Error 9**: In addition to the above error in the calculation of the consumer surplus per unit, Gillen uses the incorrect formula for the counterfactual in domestic New Zealand. The formula he uses is (see cell C12 of Table 4 NEW):

(0.5 * 0.88 * 110) * 1.1 = $53.24

56 As discussed above and in his document, Gillen states that the correct formula is to divide by the market elasticity, hence the correct formula would be:

(0.5 * D31 of NZ Model * G6 of NZ Model) / (D11 of NZ Model * -1)[6]

(0.5 * 110 * 0.87) / 1.01 = $47.42

57 **Error 10:** In calculating the consumer surplus per unit for the factual in the Tasman market Gillen uses the incorrect fare value (in addition to the incorrect elasticity, as explained above under error 8). Gillen uses the formula (see cell G12 of Table 4 NEW):

(0.5 * 384 * 1.35) / 1.3 = $199.38

58 The correct cell references are:

(0.5 * D31 of Tasman Model * J4 of Tasman Model) / (D11 of Tasman Model * -1)

59 Which in value terms is:

(0.5 * 384 * 1.26) / 1.33 = $182.35

60 When all of these errors are corrected, Gillen's aggregate results table for domestic New Zealand and the Tasman is set out below. It is important to note that we have simply corrected for errors in terms of what Gillen says should be used in his document, in terms of both formulas and the relevant factual and counterfactual scenarios, and what he actually used in his calculations. We have not altered his underlying methodology, assumptions or input values.

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[6] The elasticity is multiplied by –1 because in Gillen's spreadsheets they are reported in negative terms, while in Gillen's formula's they are reported in positive terms.

61 This corrected version of Gillen implies that the Alliance would improve allocative efficiency in both in domestic New Zealand and the Tasman. The welfare gain in domestic New Zealand is estimated to be $65.95 million per year and in the Tasman market is estimated to be $22.45 million. In total, the welfare gain under Gillen's aggregate (corrected) approach is estimated to be $88.40 million per year and hence if the Commission is to give weight to Gillen's estimates, as they did in the draft determination, then they would have to conclude that the Alliance between Qantas and Air New Zealand improves the welfare of New Zealand (in terms of allocative efficiency) by $88 million per year.

Welfare Analysis						
	Domestic New Zealand			**Tasman Market**		
	Status Quo	Counterfactual	Factual	Status Quo	Counterfactual	Factual
Incumbent operating profits	$150.32	$96.75	$211.43	$256.31	$292.95	$364.99
Air NZ profits	$86.63	$57.11	$148.81	$111.96	$117.13	$171.76
NZ Profit Adjustment	$86.63	$57.11	$115.33	$111.96	$117.13	$133.11
NZ Consumer Surplus	$149.12	$151.46	$159.19	$199.61	$172.06	$178.53
Net change New Zealand welfare						
Change in Welfare with Counterfactual	$27.19	-$65.95		-$22.37	-$22.45	
Proportion of Market	0.063	-0.152		-0.015	-0.015	
cs per unit	$54.46	$47.42	$73.33	$144.36	$127.28	$182.35

62 As these results are clearly counterintuitive when compared with the price increases and output decreases estimated by Gillen in his detailed model, and in any event are completely unexplained by Gillen, NECG strongly recommends that the Commission abandon Gillen's methodology for calculating the welfare change associated with the Alliance and instead either rely on the detailed modelling work that NECG undertook for the original application.

3.3 Further revised Gillen

63 NECG was provided with a further revised set of Gillen spreadsheets and documents on 11 June 2003. This was accompanied by a media release from the Commission which stated that it had amended its estimates of detriments and benefits by incorporating some "technical corrections" (see Commerce Commission Media Release 174 issued 11 June 2002-03). NECG finds this characterisation of the changes to the Gillen analysis highly misleading.

64 First, Gillen completely altered his factual and counterfactual scenarios for calculating the allocative efficiency impacts of the Alliance on the Tasman. In his further revised document dated 5 June 2003 Gillen states:

> When answering questions for Michael I discovered I had incorrectly used the wrong column for Tasman calculations. The corrected (and this time it is correct I have double, triple checked) values are in this report[7].

65 Changing to the columns (ie factual and counterfactual scenarios) used in Gillen's further revised analysis has a huge impact on the price increases estimated for the Tasman:

- Gillen's initial scenarios resulted in a price increase of 24%
- Gillen's revised scenarios resulted in a price increase of 32%
- Gillen's further revised scenarios resulted in a price increase of 48%

66 NECG finds it inappropriate to refer to a change in the factual and counterfactual scenarios adopted by the Commission's expert, which results in a doubling of the estimated price increase associated with the Alliance, as a "technical correction".

67 Further, Gillen has not corrected his analysis for domestic New Zealand, which as discussed in section 3.1 is also confused in terms of the scenarios relied on to calculate the welfare results.

68 Second, the Commission completely ignores Gillen's revised aggregate results, even though it is these results that it relied on in its draft determination. Gillen's table containing this aggregate calculation is presented below. The sum of the highlighted cells, $132 million, is the allocative efficiency loss figure relied on by the Commission in its draft determination (see table 10, p. 174 of the Commission's draft determination).

69 Gillen calculates the allocative efficiency change between the counterfactual and factual as:

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7 See p. 1 of Gillen's further revised document dated 5 June 2003.

(NZ PS + NZ CS) for counterfactual less (NZ PS + NZ CS) for the factual

where PS is the producer surplus or the profit adjustment for New Zealand and CS is the consumer surplus for New Zealand.

70 Hence, if the highlighted figures in the table are positive, as is the case in the first table below, it implies that the sum of the producer and consumer surplus for the counterfactual is higher than for the factual, or that the counterfactual is a better outcome for New Zealand in terms of allocative efficiency than the Alliance.

Welfare Analysis	(all monetary values in $ millions)					
	Domestic New Zealand			**Tasman Market**		
	Status Quo	Counterfactual	Factual	Status Quo	Counterfactual	Factual
Incumbent operating profits	150.0	177.2	211.0	256.0	249.0	365.0
Air NZ profits	$ 86	$ 102	$ 148	113	118	173
NZ Profit Adjustment	$ 67	$ 79	$ 63	$ 87	$ 92	$ 136
NZ Consumer Surplus	137	155	80	204	192	107
Net change New Zealand welfare						
Change in Welfare with Counterfactual	-$ 53	$ 91		-$ 19	$ 41	
Proportion of Market	- 0.12	0.21		- 0.013	0.03	
cs per unit	50	54	37	148	168	109

71 The only values in this table that Gillen changes in his further revised analysis are the input values (incumbent operating profit, Air New Zealand profits under the factual and the CS per unit). All other values in the table are formulas. Gillen reports his further revised aggregate welfare results as follows.

Welfare Analysis	(all monetary values in $ millions)					
	Domestic New Zealand			**Tasman Market**		
	Status Quo	Counterfactual	Factual	Status Quo	Counterfactual	Factual
Incumbent operating profits	150.0	96.8	211.0	256.3	126.7	365.0
Air NZ profits	$ 86	$ 56	$ 148	113	60	173
NZ Profit Adjustment	$ 67	$ 43	$ 63	$ 87	$ 47	$ 136
NZ Consumer Surplus	137	147	146	204	149	195
Net change New Zealand welfare						
Change in Welfare with Counterfactual	$ 1.24	-$ 19.19		-$ 82.63	-$ 135.58	
Proportion of Market	0.00	- 0.04		- 0.055	- 0.09	
cs per unit	50.00	53.24	67.50	147.69	129.97	199.38

72 Again, the relevant cells are highlighted. As can be seen from this table, Gillen's further revised analysis results in a negative change in allocative efficiency. That is, Gillen's aggregate results suggest that the Alliance would result in an allocative efficiency **gain** for New Zealand of $19 million per year in domestic New Zealand and $136 million on the Tasman. This can be seen by looking at the individual profit and consumer surplus results under the factual and counterfactual. For example, for the Tasman Gillen estimates that New Zealand will profit by $47 million under the counterfactual, but by $136 million under the factual. Also, Gillen estimates that the consumer surplus for New Zealand will be $149 million under the counterfactual, but $195 million under the factual. Clearly, Gillen's revised aggregate welfare results suggest that New Zealand would be better off with the Alliance than without it.

73 However, nowhere in the Commission's revised results or media release are these results reported. This is not surprising given that they are based on a flawed methodology (just as they were in the draft determination – see section 3.2 above), which may now be obvious to the Commission given that they imply an allocative efficiency **gain** associated with the Alliance.

74 Instead, the Commission now relies on an alternative calculation of welfare in Gillen's more detailed spreadsheets. However, as the remainder of this report explains, the analysis undertaken by Gillen is seriously flawed. It relies on the following assumptions, which NECG believes are indefensible:

- without the Alliance, both the Tasman and the domestic New Zealand markets would be almost perfectly competitive, compared to a monopoly in both markets with the Alliance;
- fifth freedom operators such as Malaysian, Thai, Garuda and now Emirates impose no competitive constraint on the Tasman;
- VBA entry would not occur with the Alliance, even though Gillen estimates that an entrant operating on the Tasman with the Alliance would earn a profit of $118 million per year[8] and despite the assumption that entry would occur on the Tasman

[8] See cell H38 of the Tasman Model tab of Gillen's further revised spreadsheet "Tasman Correction June 5 Gillen.xls".

without the Alliance, even though under such a scenario profitability would be substantially lower at $36 million[9];

- with the Alliance Air New Zealand and Qantas would operate aircraft with a load factor of 47%[10] on the Tasman and 51%[11] in domestic New Zealand, a result which suggests that the airlines cannot yield manage effectively;

- Air New Zealand would remain viable in a future without the Alliance despite Gillen estimating a decline in the profitability of Air New Zealand of $83 million per year compared with today; and

- Air New Zealand and Qantas have exactly equal market shares both in domestic New Zealand and the Tasman. This assumption implies that Qantas imposes a much larger competitive discipline on Air New Zealand than is actually the case, and consequently that the Alliance involves a much larger reduction in competition than is actually the case.

75 The combined consequence of the above assumptions is that the future with authorisation is portrayed as a monopoly operated by the Alliance, while the future without the Alliance is extremely competitive. This has the effect of driving a huge wedge between the average fare under the future with and without the Alliance. Specifically, Gillen's model estimates average fares with the Alliance that are 48% higher on the Tasman and 56% higher in domestic New Zealand than the future without the Alliance.

76 Not surprisingly, Gillen's results are completely at odds with the outcomes of similar alliances around the world. For example, based on an empirical assessment of the

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9 See cell I38 of the Tasman Model tab of Gillen's further revised spreadsheet "Tasman Correction June 5 Gillen.xls".

10 See cell J29 of the Tasman Model tab of Gillen's further revised spreadsheet "Tasman Correction June 5 Gillen.xls".

11 See cell J29 of the NZ Model tab of Gillen's revised spreadsheet "Gillen Analysis April 4 Competition Rev Max in Domestic May 28.xls".

detriments associated with actual and proposed airline mergers in the US between 1978 and 1995, Morrison and Winston found that a given merger initially led to a small increase in fares because competition was reduced. But in the long run, less than 5 years, they found that fares declined 2 or 3 percent below premerger fare levels as other carriers entered the markets served by the merged carrier[12]. Gillen's extremely high fare increases are also inconsistent with the substantial undertakings made by the Applicants to limit fare increases, maintain minimum levels of capacity and facilitate entry.

4 Conjectural variations approach

77 Hazledine and Gillen adopt a conjectural variation approach to modelling competition. We believe the conjectural variations approach is flawed from a theoretical and empirical perspective. Instead, we maintain the view that reliance on the Cournot approach in both the factual and counterfactual is appropriate.[13]

78 To elaborate, one of the assumptions that is common to Gillen's modelling work and to Hazledine's submission is that the 'conjectural variation' parameter varies between the base case, the factual and the counterfactual.

79 To explain, in the game theoretic perspective on industrial organisation, the behaviour of firms is expressed by their "conjectures" – that is, the belief each firm holds as to how other firms will react to any changes in its behaviour. Conjectures are said to be consistent if the responses correspond to the conjectures of other players.[14] In practical terms, when the conjectural variation parameter is positive (negative), the intensity of

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12 See Appendix 2 to this chapter: Morrison, S. and Winston, C., The Qantas-Air New Zealand Alliance: An Initial Perspective.

13 This is not to say that the Cournot approach is the only defensible approach, though we believe it to be most appropriate to the instant case. The point is that the conjectural variation approach is not a defensible alternative.

14 In a technically sense, conjectures are consistent if the conjectural variation and the reaction function are equated.

competition is lower (higher). As a reference point, the Cournot conjectural variation is zero.

80 The main difference between Hazledine and Gillen in terms of conjectural variations is that the latter does not *model* the change in this parameter, but rather *assumes* a base case value of -0.4 that is then lowered to –0.7 in the counterfactual for the Tasman and the domestic New Zealand model.[15] Nonetheless, both Hazledine and Gillen adopt the general approach and assumptions of the Hazledine approach – that is, the determination (endogenous or exogenous) of a conjectural variation parameter so as to estimate the competitive detriments associated with a change of market structure.

Theoretical foundations

81 Empirical economists have attempted to use conjectural variations models to evaluate competition in markets. Results from these models have often been explained using an 'as–if' interpretation. By this, we mean that for given demand and cost conditions, one would compute the conjecture that would yield observed price–cost margins and interpret the estimated conjectural variation parameter as describing a world in which firms acted ***as if*** they were playing a conjectural variations equilibrium, despite the fact that observed behaviour might be symptomatic of some other oligopoly game.

82 This is the approach Hazledine takes toward interpreting the results that flow from his analysis of airline behaviour. In our view, to draw the inferences in the manner that Hazledine does is incorrect simply because of the inherent ambiguities associated with the conjectural variation approach.

83 As background to this approach to modelling competition, we note that conjectures have been found to be very difficult to rationalise – that is, to explain quite why firms would behave (and continue to do so over time) in the manner postulated by a particular conjectural variation parameter. With respect to the situation at hand, the reason why

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15 The conjectural variation parameter in the factual is assumed to be one, though is largely irrelevant because, even when active in the market, Virgin Blue is not considered a full market player but only a competitive fringe with fixed capacity (see below).

airlines would behave in a manner consistent with the conjectural variations framework is not explained in either Gillen's work or that of Hazledine.

84 The reason this is so difficult is that, as many authors have pointed out, the conjectural variations model postulates logically inconsistent behaviour on the part of firms.[16] The main objection is that describing a firm's beliefs about opponents' reactions to its own choice requires a dynamic setup, yet the conjectural variations model is static. Attempts at explicit dynamic models[17] have resulted in justification of conjectural variations outcomes, though not of the origin and nature of the conjectures themselves.

85 *The key finding here is that Cournot conjectures are actually the only consistent conjectures*. This result, based on the work of Daughety and Lindh, follows a long theoretical debate. In particular, Daughety considers the conjectural variation approach to be *ad hoc*.[18] Lindh claims that the complexities of one agent outguessing another are such that agents would be better off acting as simplistic Cournot agents instead.[19]

86 Overall, these findings reduce the theoretical viability and robustness of conjectural variations models and by and large, make them a poor basis for public decision-making.

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16 For instance, Tirole J, 1989, The Theory of Industrial Organisation, MIT Press at pages 244 and 245.

17 For example, Cabral proposes an infinitely repeated game with minimax punishment in which, for each discount factor, there is a conjectural variation which is justified as a static "short-cut" mimicking the outcome of more complex dynamic games. However, only the conjectural variations outcome is justified, but nothing is said about the origin and nature of the conjectures themselves. See Cabral L, 1995, "Conjectural variations as a reduced form", *Economics Letters*, 49:397-402.

18 Daughety A, 1985, "Reconsidering Cournot: the Cournot equilibrium is consistent", *RAND Journal of Economics, 16:368–379.*

19 Lindh T, 1992, "The inconsistency of consistent conjectures: coming back to Cournot", *Journal of Economic Behavior and Organization,* 18:69–90.

Empirical estimation

87 Even putting these analytical weaknesses aside, the fact of the matter is that the empirical estimation of conjectures is not methodologically robust. The empirical problems in the estimation of market power based on the conjectural variation approach relate to the econometric concepts of identification and collinearity.[20]

88 For example, Corts[21] shows that with high seasonality in demand, it may be incorrect to make inferences about market power based on a static conjectural variations approach. If however, market power parameter is treated as variable, it is likely correlated with the instruments used to identify it, and is therefore a biased estimate of the mean level of market power.

89 Perloff and Zhen[22] demonstrate that an econometrician trying to estimate the linear model faces three very unattractive possibilities. First, if the true model is not linear, the estimates are biased[23]. Second, if the true model is linear and the equations hold exactly, the variables are perfectly collinear so that the model cannot be estimated. Third, if the true linear model equations hold with errors, one can estimate the equations, but the

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20 Identification issues are present for example when the number of equations is different from the number of variables. A model can be overidentified, where there are more knowns than free parameters, or underidentified, where it is not possible to estimate all of the model's parameters. Collinearity is a situation where there is close to a (near) perfect linear relationship among some or all of the independent variables in a model. In practical terms, this means there is some degree of redundancy or overlap among variables in such a way that it is difficult (or impossible) to separate their impact.

21 Corts, *id*.

22 Perloff J and Shen E, 2001, "Collinearity in Linear Structural Models of Market Power", Institute of Industrial Relations Working Paper Series, University of California, Berkeley.

23 Simulations in Hyde and Perloff illustrate that misspecification biases in the estimates of market power may be severe. Hyde C and Perloff J, "Can Market Power be Estimated?" *Review of Industrial Organization*, 10-4:465-85.

estimated coefficients are likely to be highly unstable and unreliable due to nearly perfect collinearity.

Hazledine's submission

90 Despite the conjectural variations methodology being fundamentally flawed from both an analytical and econometric perspective, some empirical economists have used this approach. While their results cannot be credited with robustness, these studies still attempt to provide some meaningful results by incorporating in their analyses some basic rigour – however, the same cannot be said for Hazledine's approach. This is evident in his submission to the Commission and in the findings of his 2001 paper. Turning first to his submission, the essence of Hazledine's argument is that while Cournot is a fairly realistic characterisation of the behaviour of small numbers of mature firms (oligopolists) under fairly normal competitive conditions, recent airline competition has become more aggressive, such that it does not seem realistic to characterise the relevant markets as currently Cournot.[24] Hazledine outlines his approach as follows:

> [For the NZ domestic market] I adjusted the CV parameter until output was enough to maintain base-case load factors (70%). This requires reducing the parameter […] from its base-case value of –0.5 […] to –0.75 […].
>
> [For the Tasman market] [t]o maintain their base-case load factors with increased capacity and in the presence of some VBA entry taking away some of the market, the incumbents actually have to cut their operating profit margins to zero – that is, they have to behave in a fully 'competitive' fashion (CV parameter = -1).

91 There are at least four severe problems with the approach.

92 *The first is in its underlying methodology*. As explained above, the estimation of a conjectural variation parameter is fraught with severe theoretical and empirical

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[24] Submission to New Zealand Commerce Commission Australian Competition and Consumer Commission on Proposed Alliance between Qantas and Air New Zealand by Professor Tim Hazledine, February 14, 2003

problems. Hazledine adds to these difficulties by tacking on to his conjectural variation approach to the FSAs a Stackelberg model[25] both for the new entrant (Virgin Blue) and for any 'fringe' suppliers of the market, such as, for example, Thai Airways, which carries passengers between Auckland and Sydney and Brisbane.[26] The problems with this approach are outlined further below.

93 *Second, Hazledine estimates the conjectural variation as if airlines adjusted them to achieve a given load factor whereas conjectural variations are meant to be estimated based on data on price-cost margins.* Hazledine documents his estimation as the FSAs doing whatever it takes in terms of pricing to achieve a satisfactory load factor. In implementing his model the conjectural variation *between the two FSAs* is estimated such that they achieve a 70% load factor. No reason is given as to why FSAs would do this. Using Hazledine's model, their profits are increasing as the conjectural variation increases, which is an intuitive result because this corresponds to less intense competition. It would therefore be more rational for the FSAs to simply alter their target over time, so as to secure profit maximisation. More importantly, the conduct parameter approach is not about market players setting their conjectures to achieve an exogenously set target; it is about estimating the intensity of competition based on the assumption of profit-maximising behaviour. Using it as Hazeldine does is completely *ad hoc*, and lacks any economic foundation.

94 *Third, for the Tasman market, the estimated conjectural variation of FSAs is not consistent with long term supply viability*. Hazledine notes that the estimated conjectural variation of FSAs results in zero operating profit margins for the FSA. However, a strictly positive profit margin is necessary for FSAs to cover their fixed costs. Even if one were focusing on the coverage of route specific fixed costs, the outcome would be a loss that would ultimately make continued supply unsustainable: at least one airline would cease its operation. Obviously, the argument is even stronger if one is considering the need for coverage of both route specific and non-route specific fixed costs. However, there is nothing in the model which accounts for this – prices, outputs and welfare consequences are analysed *as if* the FSAs were assured of continuing subsidies to their operations.

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25 In footnote 11 of his submission.

26 Other carriers are in fact completely ignored in the analysis.

95 *Fourth, the actual estimation of the model ignores all the complexities involved in the estimation of conjectural parameters*. In essence, Hazledine performs a one-point estimate found as a result of a "goal seek" to meet his arbitrary constraint – a 70% load factor. It is not surprising therefore that his results are at odds with the majority of the literature on airline competition (which finds that airline behaviour is best explained by the Cournot model), though it is surprising that he takes such a bold position on matters of public policy when his underlying analysis is so lacking in rigour.

96 Turning to the work by Hazledine, Green and Haugh (2001),[27] we believe it to be fraught with arbitrary assumptions underlying important inputs and relations between variables, as well as fatal identification problems. For example, the fact that the authors have in their model "one lambda too many", and hence cannot identify the model, is noted but not addressed. This is surely quite alarming because the lambda variables are the conjectural variation parameters – i.e. the central element in their model. The "solution" the authors implement is to assume a relationship between an incumbent firm's expectations about the response of the other incumbent and the response of the entrant. In other words, they deal with the ineluctable identification problem by assuming the problem solved. Whatever its weaknesses, the conjectural variation methodology aims at *estimating* competitive responses; in contrast, the authors simply *assume* a priori that a given relation links the competitive responses.

97 Moreover, the authors readily admit, "a major problem with these tests is that they do not identify the behavior that *generated* observed prices, and so cannot distinguish predation from the legitimate impact on oligopolistic conduct that could follow entry of an additional competitor."

98 Given the approach the authors adopt, it is not entirely surprising that the results Hazledine et al obtain are plainly at odds with economic theory. For example, they point out that the conjectural variation they obtain for the entrant is 20. This result cannot be correct, since theoretically admissible conjectural variation parameters must lie between –1 and N-1, with N the number of firms. Underscoring the lack of robustness in their

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[27] Hazledine T, Green H and Haugh D, 2001, "The Smoking Gun? Competition and Predation in the Trans-Tasman Air Travel Market", Unpublished, obtained from Tim Hazledine.

results, they note, "be that as it may, the parameter is evidently highly unstable, dropping to less than one in the price war period".

99 Haugh and Hazledine in their earlier work stressed that their results were 'really very suspicious' and that estimated 'competitive conjectures are actually seriously wrong.' In our view, this is not only a fair statement with respect to that work, but must also carry over to attempts to rely on it for other purposes – as in Hazledine's submission to the Commission and Hazledine et al (2001). We consequently do not see how the Commission could properly place any weight on these results.

5 Gillen modelling approach

100 Turning to the analysis undertaken by Gillen, there are at least four areas where his approach is seriously flawed:

- The theoretical model Gillen sets out as being the correct approach, which is based on product differentiation, bears no relationship with the modelling he actually undertakes. There is here, as in his description of the calculations he has undertaken (see section 3 above), a lack of connection between what he says he does and what he actually does;
- Gillen's theoretical model is not properly solved;
- His revenue maximisation approach is flawed;
- Gillen erroneously assumes, and then incorrectly implements, Stackelberg leadership.

101 Each of these points is elaborated on below.

Product differentiation model

102 Gillen's modelling approach is said to be based, first, on the demand for airline services that includes horizontal and vertical product differentiation (a modification from the NECG approach) and, second, on an estimation of the conjectural variation parameters. Even accepting the basic demand system used by Gillen to introduce product differentiation, his modelling framework is severely flawed because he then introduces assumptions and assertions in relation to these assumptions that are lacking in any

sound justification and not supported by evidence, and which we believe are likely to be erroneous.

103 Gillen's first error relates to his assumptions regarding substitution between FSAs as compared with substitution between an FSA and a VBA. Substitutability between Qantas and Air New Zealand is assumed to be 'relatively high'. In the case of VBAs, the degree of substitutability is assumed to be lower because they offer an inferior, vertically differentiated product. Gillen also assumes that a passenger faced with a higher fare on an FSA carrier will not switch immediately with a fare difference but will switch with a 5 percent fare difference. In the case of VBAs, the degree of substitutability is assumed to be significantly lower: fares have to be approximately 20 percent lower before a FSA passenger shifts to a VBA. Gillen refers to his own research report completed for the Canadian Department of Finance to support his assumption.[28]

104 In our view, the contention of a low elasticity of substitution between VBAs and FSAs is inconsistent with the empirical evidence, including that known to Gillen.[29] Rather, the empirical evidence in the airline industry shows that VBAs impose tight competitive constraints on FSAs and, indeed, do so to a greater extent than competition between FSAs.[30]

105 Given this, the 5% and 20% benchmarks for passengers to switch between different airlines are completely arbitrary. Additionally, despite what is said in the model

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28 David Gillen, William Morrison and Chris Stewart, 2003, "Air Travel Demand Elasticities, Concepts, Issues and Measurement" Department of Finance, Canada, February 2003.

29 For example, at section 5, David Gillen, William Morrison and Chris Stewart, 2003, "Air Travel Demand Elasticities, Concepts, Issues and Measurement" Department of Finance, Canada, February 2003 discuss the studies which show very marked impacts of VBA's on FSA yields. If VBA's offered a sharply inferior product – as must be the case for the price responses built into the Gillen model to hold – these impacts would not occur.

30 See for example Steven A Morrison, 2001, "Actual, Adjacent, and Potential Competition: Estimating the Full Effect of Southwest Airlines"; Journal of Transport Economics and Policy, May 2001, v. 35, iss. 2, pp. 239-56

description, they are not consistent with the demand system actually used in Gillen's model. In effect, such benchmarks imply some "trigger points" in the structure of substitution between airlines. However, no such effect is present in the demand functions Gillen in fact uses, in which substitution occurs smoothly.

106 Finally, Gillen's reference to his work for the Canadian Department of Finance is of limited relevance since it is a survey of the empirical works on the own-elasticity of demand rather than estimates of cross-elasticities, which are relevant to the matter at hand.

107 Turning to the second component of his modelling approach, which is to estimate the conjectural variation parameters, Gillen explains that he calculates the profit-maximisation condition for the three firms and makes some assumptions – in equations 7a-7c – to reduce the number of parameters required to solve the model. Gillen also assumes that the incumbent FSAs will respond in a vigorous manner should a VBA enter but that the VBA would be less vigorous in its response should a FSA enter its market.

108 As noted above, we believe the conjectural variation methodology is flawed. However, even if one were to accept the conjectural variation methodology, Gillen's analysis suffers from two flaws. First, Gillen's assumption of an *asymmetry* between conjectural responses lacks supporting evidence, and is inconsistent with what he in fact models and implements in his spreadsheets, in which the conjectural variations of the VBA are assumed away[31]. Second, whereas the conjectural variations methodology serves to *estimate* a conduct parameter based on market data, Gillen instead *assumes* an *ad hoc* relation between the conjectures. None of the standard tests – for example, to assess whether the conjectures are consistent – are run, and there is every reason to believe that Gillen's approach would not meet their requirements.

109 While we find it difficult to comment fully on Gillen's modelling approach due to the inconsistencies that pervade his work and the fact that the actual modelling seems quite different from the description given by Gillen, there appear to be flaws even in the *ad hoc* approach Gillen uses. While he comments on the differences in the respective conjectural

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31 as already noted in footnote 15 and further explained in sub-section 6.1.

variations of FSAs and VBAs, in practice, he assumes a base case parameter equal to –0.4 for the conjectures of FSAs and includes the VBA as a competitive fringe (an assumption which is discussed below[32]).

110 In summary, Gillen relies on a series of assumptions/results/contentions, which are not only unsupported by any argument but also unrelated by any logical link.

Solving the theoretical model

111 Subsequently, and independently of his other assumptions, Gillen claims to solve for the competitive reactions involved in the interactions he is modelling. This so-called "solution" is based on another "solution" for the profit-maximising quantities. However, Gillen does not solve any of these systems. The quantity system is simply the system of first-order conditions rewritten in a different order. No quantity solution is in fact provided.

112 The same problem arises with respect to the solution of conjectural variation in that it is simply the same equation rewritten, and no solution is given. In other words, Gillen provides no solution to his own model. Thereafter, Gillen writes the change in price resulting when moving from a Cournot market to an alliance market as the relation given by an equation that has absolutely no link with the previous discussion. Some new parameters are introduced, while not one variable in this equation[33] is carried over from the preceding modelling. The conjectural variation parameters are entirely abandoned.

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32 This second assumption means that Gillen assumes the VBA does not compete in any meaningful way with the FSA's. Rather, the VBA simply acts as a supply source which reduces the market available to the FSA's by an exogenously fixed amount. As such, the only price pressure the VBA imposes on the FSA is through the impact of reduced demand (i.e. market demand minus the amount of demand now supplied by the VBA) on the prices FSA's must set so as to achieve exogenously determined load factors. See below in the sub-section The VBA as a market follower

33 Equation 12, which is meant to determine the price impact of the Alliance.

113 Finally, after this succession of unrelated and unsolved equations, while Gillen states that he employs this "model explained in the technical appendix", his actual implementation makes the theoretical modelling completely irrelevant, as we discuss later, since it is based on an *entirely different* approach.

Revenue maximisation

114 Gillen explains that his model is Cournot but rather than assuming Cournot profit maximizers, he assumes Cournot revenue or sales maximizers.

115 Gillen has no evidence whatsoever to support the contention that airlines are revenue maximisers. Gillen states that it "seems quite sensible given that both carriers (Qantas and Air New Zealand) have stated in their presentations to the Commission staff that this is what they do". This is a complete misreading of anything the Applicants put to the Commission. Obviously, in the very short term in which all costs are fixed, revenue maximisation and profit maximisation are identical. Airline yield management systems, which are used to optimise sales, operate on this basis, and seek to secure the greatest yields for given commitments to costs. However, the fact that the parties, in their presentations, stressed the importance of revenue management in no way implies that their longer term goal is that of securing the greatest revenues, regardless of profit constraints.

116 As added support for his assumption of revenue maximisation, Gillen refers to the S-curve effect, which is the effect by which carriers with higher capacity shares obtain greater proportions of the market in terms of revenue. However, the existence of this effect again does not imply that airlines seek to maximise revenues; indeed, the logical link between the S-curve and corporate objectives is not apparent. If anything, the reason the parties focussed on this effect in their presentations is precisely because of its implications for profit-maximising strategy.

117 Finally, Gillen argues that if airlines assume a demand elasticity of 1, this should be seen as precisely what a revenue-maximizing firm would do. More specifically, Gillen seems to suggest that a demand elasticity of about 1 is *consistent* with revenue maximisation and hence that *if* the airlines believe the demand elasticity is 1 *then* it can be inferred that they are revenue maximisers; but this is confused. The estimate Gillen refers to, which

was raised in presentations by Air New Zealand, very obviously referred to the **market** elasticity of demand, not the **firm** elasticity of demand.[34] Gillen provides no estimate of firm price elasticities of demand, which are the ones relevant to revenue maximisation.[35] However, even if he did, the elasticity of demand condition is plainly *necessary but not sufficient* to make a claim that the firms at issue are revenue maximisers.[36]

118 The fundamental point is that *revenue maximisation is not a rational assumption*. A firm that simply maximised revenues, without reference to profitability, would be unlikely to survive for any length of time, much less the five years for which the modelling refers. The Commission implicitly recognises this when it claims (at footnote 72 on page 159) that the Gillen model implies revenue maximisation "subject to a minimum profit constraint". However, despite the Commission's assertion to the contrary, there is no such "minimum profit constraint" in the Gillen model. As a result, there is nothing in the Gillen model which ensures that a firm could cover its fixed costs, much less meet the expectations of its shareholders.

119 That said, if the parties are indeed revenue maximisers (say because of principal-agent problems that impede effective shareholder control), then it seems only reasonable to

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34 This was completely obvious from the context. The estimate was presented in the context of the impact of fare reductions on **market** revenues. At the same time, it was made clear that Air New Zealand believed that it was difficult for it not to match competitive fare reductions. This implies a firm elasticity of demand greater than 1.

35 Gillen claims that his conjectural variation parameter is set so as to obtain an outcome equal to revenue maximisation, but there is nothing in his model which amounts to such an algorithm. As a result, his claim that the firm price elasticities at the equilibrium are consistent with unilateral revenue maximisation is at best unproven.

36 For example, the price elasticity of demand for cinema tickets has been found to be close to 1 (Houthaker, H.S., and L.D. Taylor *Consumer Demand in the United States*, Cambridge, Mass.: Harvard University Press, 1970), as has that for chicken (Heien, D.M. 1982. "The Structure of Food Demand: Interrelatedness and Duality," *American Journal of Agricultural Economics*, 64(2): 213-21) but it would be foolish to infer from this that suppliers of these goods are revenue maximisers.

assume that they would remain so were the Alliance to proceed. There is, in other words, no reason to assume that airline managers would change their objectives merely because of the Alliance. Indeed, if anything, the emphasis the Commission places on the greater scope for "managerial slack" were the Alliance to proceed suggests (in our view, wrongly) that the scope for management to act in a discretionary way would **increase** in the factual. As a result, the modelling of the factual should also be based on revenue maximisation. The Gillen model, however, assumes that the Alliance – though according to the Commission somehow allowing managers to act inefficiently in their input choices – nonetheless shifts managers' pricing and output objectives into line with those of shareholders. As a result, managers, who selflessly maximise revenues in the counterfactual, become rapacious monopolists in the factual (but only in terms of the setting of prices and outputs – in respect of costs, they now selflessly allow input suppliers to grab the rents). This is as arbitrary as it is illogical.

The VBA as a market follower

120 Gillen erroneously assumes incumbent leadership and considers the VBA as a competitive fringe. In other words, not only does Gillen discount the competitive pressure of a VBA on FSA by his comments and assumptions on competitive responses and cross-elasticities, but also, in his implementation, without stating so, he assumes that the VBA is a market follower.

121 Indeed, Gillen uses a given level of VBA capacity derived from the NECG report and translates this capacity into a number of seats, with an assumed load factor of 75% (itself not supported by any evidence). This VBA output is then taken as given by FSAs to set their own prices and quantities. Technically, this is close to assuming that the VBA is a Stackelberg follower and that FSAs have the market power of Stackelberg leaders. This is because instead of being a Cournot player (or any other sort of market player having the same status as the FSAs), the VBA is considered as being a competitive fringe and hence as imposing a weaker competitive pressure on its competitor(s)[37].

122 However, Gillen's implementation assumes that the constraint imposed by the VBA is even weaker than the role the fringe normally plays in models of this type because the

[37] Importantly, this assumption is distinct from the differentiation assumption.

VBA's output is modelled as being completely inelastic. In other words, the elasticity of supply of the VBA is zero – that is, irrespective of the FSA price, the VBA's supply remains fixed. In this sense, the VBA presence is even less active in terms of competitive pressure than a conventional Stackelberg follower.

123 There are at least three reasons why this modelling is profoundly misleading.

124 *First, the assumption that the VBA is a price follower is simply arbitrary and is inconsistent with evidence which Gillen himself has cited at length elsewhere.*[38] In effect, were VBA's price followers, they would not have the very marked impact on fares that is so widely observed.

125 *Second, and related, there is no reason why a VBA would accept to be a follower and the lower profit associated with it*. The 'solution' provided by Gillen (even putting aside the problems with the manner in which he implements it) is not an equilibrium since it is unlikely that the VBA maximises profit by simply following the lead of FSA.

126 Third and related, Gillen errs in his implementation, in that he ignores the condition that in equilibrium, the VBA's choices must be such that its marginal cost equals its marginal revenue. While the Stackelberg model still results in the follower meeting its "marginal cost equals marginal revenue" condition, Gillen's implementation does not meet this elementary condition.

127 Gillen's modelling of the VBA's behaviour is therefore both arbitrary and inconsistent with the basic requirement that in unilaterally chosen equilibria, marginal revenues must equal marginal costs. In contrast, the modelling NECG did reflected profit maximisation by the VBA, within the terms of an assumed Cournot environment, both in the VBA capacity choices (which reflected the parties' best judgement of what the VBA would do in that environment, a judgement they are well placed to make given their experience) **and** by ensuring that in the equilibrium, the VBA (for its given capacity) could not do better by deviating from the resulting prices and outputs (as it had equalised marginal costs and marginal revenues). In contrast, Gillen transposes capacity choices from the Cournot environment to his own, quite different, model,

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38 See footnote 29 above.

without any explanation as to why this is plausible; and then sets prices and outputs in a way which fails to satisfy the most elementary requirement for a non-cooperative equilibrium.

6 Gillen responses to NECG queries

128 In a meeting between NECG, Gillen and the Commission on 16 May 2003, NECG raised a number of concerns about Gillen's modelling approach. In particular, we raised questions about the parameters, assumptions and data used by Gillen, his conjectural variation model and the link between his revenue maximisation assumption and the conjectural variation parameter. Gillen's responses to each of these issues are discussed below. In summary, NECG does not believe that the responses provide any justification for the approach adopted and simply serve to highlight the confused approach adopted and the lack of any link between the modelling work undertaken and economic theory.

6.1 Parameters, assumptions and data

Cost information and calibration

129 Gillen explains that he uses some cost information to calibrate his model[39]. The starting point of his explanation is that "model calibration requires making assumptions about, or choosing values for [some] sets of parameters. For example, one could make assumptions about demand and marginal or unit cost and solve for conjectural variation or (as NECG and Hazledine have done), one could make assumptions about demand and conjectural variation and solve for marginal costs."

130 While we agree with the need for model calibration, which Hazledine refers to as the 'missing piece of the puzzle', Gillen is misleading when he documents an approach that he does not implement, either in his theoretical model or his Excel files.

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[39] Specifically, he claims to use cost information from Annual Reports of the carriers on the basis of costs per available seat mile (CASM).

131 Gillen states that, instead of writing the solution of his model as a solution for lambda (the conjectural variation parameter), he writes it 'as a solution for marginal cost because this is the way it is implemented in the spreadsheet'.

132 This solution is given as equation (8) and Gillen explains that "it shows quite simply what [he] stated earlier that the solution to this model requires making some assumptions about demand (a and b), cost (c) and conjectural variation (λ_I) parameters." While we comment on the way Gillen computes this equation later, it illustrates two points:

- Gillen incorrectly reports that he uses cost information from Annual Reports of the carriers to calibrate the model when he in fact estimates airlines' costs according to the same methodology as Hazledine and NECG[40]; and

- Gillen seems to misunderstand the logic of the calibration methodologies when he claims that the model requires making some assumptions about demand (a and b), cost (c) and conjectural variation (λ_I). Assuming that his equation (8) is correct, it is fundamentally incorrect to make assumptions about **all** the parameters of the equation, since doing so would mean that the equation itself would serve no purpose.

Entrant demand intercept

133 In his response to NECG, Gillen attempts to clarify his calibration of the 'entrant demand intercept'. He explains that starting from equation (2), which is the entrant demand function, one can rewrite the demand function for the entrant when there is no entrant, by setting the entrant's output to zero. In this case, the equation simplifies to $P_E = \alpha - \varepsilon Q_I$, with P_E the entrant price and Q_I the incumbent's output.

134 This is questionable. Not only is this an equation for a price of a nonexistent product – the entrant's output – but also the equation relates the incumbent quantity uniquely to

[40] Some cost information is used in other part of Gillen's analysis but for the model calibration the missing piece of the puzzle is the cost and hence the point remains.

the price of the entrant. We fail to understand the micro-economic foundations of this equation, and Gillen's explanation provides little insight.

135 Gillen refers to a 'supplementary story line' to support his approach: the reason why there is no entrant in the base case, in which the parameters of the entrant's demand function are calibrated, is that the entrant's price is too high. We do not understand the reasoning underlying this 'story line'.

136 Gillen explains that the entrant zero demand price is always set to the incumbents' price + 0.1. We do not understand why this would be the case and Gillen provides no explanation. Is it the profit-maximising behaviour of an airline that does not exist, and if so, why would a VBA set a price constantly higher than the FSA? In NECG's view, it does not make intuitive sense to argue that the VBA, in the base case (i.e. absent from the market), would add 10%[41] to the price of its higher-quality competitors.

137 Finally, the 10% assumption is apparently used to 'calibrate' the parameter α, which compared to the parameter a of the incumbent's demand function is meant to characterise the horizontal differentiation between FSAs and VBAs. While some parameter values do have to be assumed for modelling purposes, such a random and counterintuitive choice would seem inappropriate. We do not believe that Gillen's response provides an adequate answer to NECG's request for a written explanation of the concepts and calculations underlying the entrant demand intercept and entrant zero-demand price.

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[41] In the base case, the FSA's price is 1 and hence '+0.1' is 10%. A related, but separate question is that we noted that, in calculating the consumer surplus component of the dead weight loss for the entrant, Gillen compares the entrant's price to the incumbent price plus 0.1. As it is unclear why it should be the case, we requested some clarification on this point. Gillen failed to provide any justification.

Conjectural variation parameters

138 Gillen defines the 'profit maximizing conjectural variation terms" as $\frac{dQ_I}{dq_i} = 1 + \lambda_I$ and explains that λ_I is actually $\frac{dq_j}{dq_i}$; and $\frac{dq_E}{dqi} = \lambda_{IE}$. Gillen also assumes a relation between these two conjectural variation parameters $\lambda_{IE} = \theta\lambda_I$. Gillen says that he sets the value of θ to 0 in his spreadsheet because "even though the basic model is that of a tripoly, there are never really three firms in the spreadsheet because ANZ and Qantas are assumed to be identical firms". He also mentions that Hazledine has used the value of 0.2 for θ in some papers.

139 Gillen's approach to the conjectural variation methodology is confused, ill-defined and, generally incorrect.

140 A conjectural variation is meant to represent a firm's conjecture about the impact of its changing its output on the total industry output. While there is no difficulty in the definition of the conjecture in the simple duopoly framework[42], with two identical firms, the extension to more general cases would necessitate clear definitions that Gillen does not even approximate. Indeed, one would need to determine how the following issues would be dealt with:

- Higher number of firms than the simple duopoly case;
- Firms' asymmetries and their consequences in terms of differences in market shares;
- Product differentiation.

141 In the duopoly case, the industry reaction is simply the reaction of the only competitor. When there are more than two firms, the relevant reaction to a change of output by one firm is the change in output of all the other firms. While this industry change is the 'sum' of all the other reactions, the immediate question is about the relevant concept of 'sum'.

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42 There is no problem of definition in spite of the flaws in the conjectural variation approach, as explained in section 4

142 If firms have different market shares, changing their output will have a different impact on the total output. For example, a 10%-output-change by a firm having a 20% market share yields a total output change of 2%; if the firm has 80% of the market, the relative change of the industry's output is 8%. This difference in turn translates directly into a difference in the resulting price change. To account for such an effect, an alternative approach to modelling conjectural variation is to define the percentage change in the other firms' output in a response to a 1 percent change in its own output. These conjectural elasticities allow for the modelling of firms with different market shares. Since Gillen ignores the concept of firm versus market elasticities, he simply overlooks these effects, which are at the core of firm's reactions (i.e. conjectural variations), in his definitions of parameters.

143 Moreover, the difficulty with the concept of conjectural variations with differentiated products is that competition is by definition localised; what is important from the point of view of a firm is not only how much of a reaction will occur but also **who** reacts. An appropriate way to sum would be, for example, to define effective market shares based on effective outputs (one from the point of view of each firm). A weight associated with others' output as a function of their impact on each price would be needed such that, if a product were a close substitute, it would have a large weight. These weights would be related to the "cross-quantity" parameters "e and ε".

144 Gillen simply ignores all these issues and is inconsistent in his definitions (which are different from those he used in his first report). Furthermore, his implementation of the assumptions is shadowed by additional assumptions.

145 The θ-relation between conjectural variations conceals identification problems; as Gillen explains 'this assumption basically gets rid of a degrees of freedom problem – there are 2 equations and 3 lambdas'. In other words, to address the fundamental question of competitiveness between airlines, Gillen simply assumes the problem away by setting θ to zero.

146 The value of θ is said to be 0.2 in some of Hazledine's papers. We do not understand the meaning of this value because the underlying definitions are unclear and no explanation or supporting evidence is given in Hazledine's work.

147 Moreover, Gillen explains that the value he uses is zero because 'there are never really three firms'. The reason is that 'ANZ and Qantas are assumed to be identical firms'. We reject this reasoning as it is at best a completely circular argument or, more likely, misleading. Gillen assumes that the conjectural variations of the FSA with respect to the

VBA and of the VBA with respect to the FSAs are asymmetric. That is, for some unknown reasons, Gillen assumes that FSAs would react vigorously to the VBA's strategy, but that the VBA itself would be significantly more passive. Consequently, an *ad hoc* relation is assumed to hold. As explained in section 4 there is an identification problem (one lambda too many) that his equation is supposed to solve. However, the only sense in which the problem is solved is that one lambda is replaced by another parameter θ and the value of that additional parameter is assumed. Gillen then explains that, because ANZ and Qantas are assumed to be identical firms, the reaction of the VBA can be assumed away – Gillen claims that the value he chooses for θ is zero where in fact he chooses to include the VBA competitive pressure only to the extent that its output reduces the market available to the FSA's. In other words, an unrealistic asymmetry is introduced in the modelling, which leads to some identification issues, which in turn are solved by completely ignoring the reactions of the differentiated firm. This approach seems difficult to accept as a matter of analysis, much less as a basis for policy.

6.2 Model for conjectural variation

Solution for conjectural variation

148 Gillen presents his solution for the conjectural variation as:

For the incumbent:

$$\lambda_I = \frac{\left(a - 3bq - eq_E - c\right)}{\left(b + e\theta\right)q}$$

And for the entrant:

$$\lambda_E = \frac{\left(\alpha - 2\beta q_E - 2\varepsilon q - c_E\right)}{\varepsilon q_E}$$

149 These expressions are clearly different from the original report, for no apparent reason and without explanation.

150 While he decides to 'skip the calculus', it is nonetheless important to understand the foundations of these expressions. The difficulty in understanding the results is that Gillen does not define the scenario for which he maximises firms' profit. We expect that these expressions are the results of the maximisation of firm i's profit with respect to q_i

(for i=1 and 2) and the maximisation of firm E's profit with respect to q_E. In other words, three firms are present in the market (2 FSAs and a VBA).

151 One important issue is that the parameter λ_E is not defined in Gillen's response. Presumably, this is the same as the one he defines in the technical appendix (equation 7c) of his earlier note, although it is difficult to be certain because neither the definitions/assumptions nor the results are similar. Assuming that equation 7c defines λ_E, then the result is wrong. For the solution to be the one presented by Gillen, λ_E should be equal to $\frac{dQ_I}{dq_E}$ *and not* $\frac{dq_I}{dq_E}$ (as in equation 7c).

152 More importantly, these conjectural variation parameters should depend on firms' outputs, which in turn depend on the conjectural variations. In other words, Gillen calculates the equilibrium value of the intensity of competition in the market. These values, instead of being based on estimated parameters or exogenous variables, are functions of the equilibrium quantities. Now, these equilibrium quantities together with the equilibrium price(s) are a function of the intensity of competition in the market. As we explain in section 5 above in relation to his original report, Gillen writes and re-writes some systems of first-order conditions but does not in fact provide any solution to his models. The expressions, which Gillen presents as solutions for conjectural variations, cannot be used because, as we explain, they are not solutions – and Gillen indeed does not use them.

153 Consequently, Gillen explains that "*just for clarity*, since the base case is a duopoly the above model has to be simplified and indeed there is only one equation and one lambda to solve for because there is no entrant. But instead of writing [this equation] as a solution for lambda, [he] writes it as a solution for marginal cost" $c = a - (3 + \lambda_I)\, bq$. In this base case scenario, the quantity is known (it is the base case quantity) and not the results of any modelling. Furthermore, in the base case, since it is a duopoly the definition of λ_I is straightforward, as explained earlier.

154 In other words, though Gillen sets out (and implies he uses) a complex theoretical model with differentiated firms and asymmetric conjectural variations, in practice, even with many arbitrary assumptions, he does not solve anything but a homogenous duopoly with symmetrical firms in the base case.

Implementation of CV assumption

155 When it comes to the implementation of his modelling, Gillen assumes, for the base case, a shift in competitiveness "in line with more aggressive capacity and price competition observed currently in this market" which means that there are still two incumbent firms but the CV parameter is changed from the Cournot assumption of 0 to –0.5.

156 No evidence supports such a change from 0 to –0.5. While Gillen (and virtually all airline experts) agrees that the Cournot assumption is the appropriate conjecture to model airline competition[43], he chooses a different starting point. We discuss the justification of the conjectural variation as a proxy for revenue maximisation in more detail later but we note that, while he claims a conjectural variation of –0.5, he actually uses –0.4, as previously documented in his initial report. This assumption is important as changing the conjectural variation parameter from -0.4 to -0.5) results in a difference of $25 million in the incumbent profits in Gillen's model for domestic New Zealand and $43 million in his model for the Tasman market.

157 Interestingly, when the conjectural variation is calculated, the value is found to be –0.7. However, Gillen chooses to use this only in the counterfactual. We comment on this calculation in the next section. However, we note that in the scenario called "Entry deterrence – no cartel/ VBA entry", the conjectural variation is assumed to be zero, which contradicts the whole logic of the Hazledine/Gillen claim. If the conjectural variation parameter is supposed to reflect an intensification in competition, then why would it be set to zero in a scenario with VBA entry and to –0.7 without VBA entry?

158 In addition, it is completely unclear why Gillen believes that an increase in the conjectural variation parameter from –0.4 to –0.7 is warranted, particularly in domestic

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[43] For example, Gillen (and co-authors) analyse the effect of a bilateral air transport agreement under an oligopoly market structure and model airlines as Cournot-Nash players. See Gillen D., Harris, R. and Oum, T. 2002, "Measuring the Economic Effects of Bilateral Liberalization of Air Transport", *Transportation Research E*, 38:155-174. As supporting evidence Gillen states "Oum et al (1995) have found that most airlines play a Cournot game in their markets". See Out T. and Yu, C. 1995, " A productivity comparison of the world's major airlines", *Journal of Air Transport Management*, 2:181-195.

New Zealand where it is assumed that capacity increases by just 5.8%. In other words, Gillen assumes that a 5.8% increase in capacity intensifies competition to such an extent that the profits of the incumbents fall by $54 million per year or 36%. Indeed, Hazledine's 2001 paper, however flawed and misleading, was written to show that incumbents changed their conjectures to a more aggressive value when there is entry.

159 In other words, the conjectural variation parameters seem to be chosen almost randomly between the different scenarios. This seems difficult to justify on ordinary standards of rigour, much less those appropriate in the exercise of important statutory powers.

6.3 Revenue maximisation and conjectural variation

160 Gillen claimed in his original report and confirmed in the meeting with NECG that he had a proof for the equivalence between revenue maximisation, a conjectural variation of –0.4 and a market elasticity of 1. NECG asked for that proof to be provided. However, no such proof is given in Gillen's response.

161 Gillen basically repeats that revenue maximising oligopoly is somewhere between a monopoly and perfect competition and that –0.5 is between 0 and –1. This, together with the claim that a revenue maximiser will select a price that is consistent with a demand elasticity of 1, is the main 'proof' provided by Gillen.

162 Following this explanation, Gillen then computes the conjectural variation he uses in the counterfactual. It starts with the computation of the marginal revenue of a homogenous duopoly (and will use the result for a differentiated asymmetric tri-poly) and then refers to a 1990 paper by Brander and Zhang to measure the value for the conjectural variation. The formula is a price-cost margin depending on the conjectural variations. Using some data on the yield per seat (price) and CASM (cost), he solves the profit-maximising equilibrium relations and obtains an estimated conjectural variation equals to –0.7.

163 Even without reading Brander and Zhang's paper, it should be clear that this calculation has nothing to do with revenue-maximising behaviour. Indeed, the formula for the price-cost margin is not based on the marginal revenue Gillen calculates but on the equalisation of the marginal revenue and marginal cost, which is why a cost variable is present in the formula. In other words, airlines in the Brander and Zhang paper are profit maximising, not revenue maximising, and the formula Gillen uses corresponds to profit maximisation.

164 On reviewing the Brander and Zhang paper, we do not understand how Gillen could claim that his results are comparable. For example, Brander and Zhang are extremely careful about the definition of marginal cost and decompose cost data into fixed cost and operating costs. These are then modelled to take into account the non-linearity of cost with distance. In contrast, Gillen implements a single point estimate and does not even correct airlines' income statement for capacity costs.[44]

[44] See footnote 2 of Gillen's Response.

REPORT OF ROBERT D. WILLIG

An Economic Assessment of Professor David Gillen's Model of the Proposed Alliance Between Qantas Airways and Air New Zealand

June 20, 2003

I. Qualifications

1. My name is Robert D. Willig. I am Professor of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department of Princeton University, a position I have held since 1978. Before that, I was Supervisor in the Economics Research Department of Bell Laboratories. My teaching and research have specialized in the fields of industrial organization, government-business relations, and welfare theory.

2. I served as Deputy Assistant Attorney General for Economics in the Antitrust Division of the U.S. Department of Justice from 1989 to 1991. I also served on the Defense Science Board task force on the antitrust aspects of defense industry consolidation and on the Governor of New Jersey's task force on the market pricing of electricity.

3. I am the author of *Welfare Analysis of Policies Affecting Prices and Products, Contestable Markets and the Theory of Industry Structure* (with William Baumol and John Panzar), and numerous articles, including "Merger Analysis, IO Theory, and Merger Guidelines." I am also a co-editor of *The Handbook of Industrial Organization*, and have served on the editorial boards of the *American Economic Review*, the *Journal of Industrial Economics* and the MIT Press Series on regulation. I am an elected Fellow of the Econometric Society and an associate of The Center for International Studies.

4. I have been active in both theoretical and applied analysis of transportation economics issues. Since leaving Bell Laboratories, I have been a consultant to firms in various sectors of the economy, including air and rail transportation. In addition, I was involved in several matters concerning competition in airline services while serving in the U.S. Department of Justice. On other matters, I have worked as a consultant with the Federal Trade Commission, the Organization for Economic Cooperation and Development, the Inter-American Development Bank, the World Bank, and various private clients. A full list of my articles and other professional publications and activities, including prior testimony, is presented in my curriculum vitae, which is attached as Exhibit A.

II. Assignment and Summary

5. I have been asked by counsel for Qantas Airways and Air New Zealand to assess the economic analysis and modeling presented by the New Zealand Commerce Commission ("NZCC") in its Draft Determination regarding the proposed alliance between Qantas and Air New Zealand.[1] In particular, I have been asked to review and evaluate whether the assumptions and underlying economic model presented by Professor

[1] New Zealand Commerce Commission, "Commerce Commission Draft Determination," April 10, 2003 ("Draft Determination").

David Gillen (an outside advisor to the NZCC) are consistent with sound economic analysis and the relevant academic literature.

6. It is an honor for me to participate in this way in the proceedings before the NZCC. It is my understanding that the NZCC must consider whether the "public benefit arising directly from [the proposed alliance] outweighs the detriment"[2] and has recently sought to "quantify the benefits and detriments where and to the extent that it is feasible, rather than relying on purely intuitive judgment… [because] the quantitative framework provides a more objective framework for establishing the weights given to various claims of benefits and detriments."[3] It has long been my professional view that such an approach to public decision-making creates the opportunity for better outcomes for the public interest due to the discipline on the policy analysis that this mandate seems to impose. Consequently, I feel that it is especially important for these proceedings to exemplify the application of the best professional standards for analytics that are apposite to the policy challenge at hand. It is most important, in my view, to make sure that the mandate to model and to quantify succeeds in focusing attention on the genuine issues that should determine the policy outcome, rather than supporting a smokescreen behind which deficient analysis can remain protectively obscured.

7. In the case of the proposed alliance between Qantas and Air New Zealand, international experience shows that the most important issues are likely: (a) what are the public benefits from the proposed alliance; (b) what is the degree and significance of actual or potential competition between the proposed allying airlines; and (c) what are the incentives and ability of potential competitors to replace any competitive constraints lost as a consequence if the proposed alliance is approved. Rigorous quantitative modeling can inform each of these issues and thus help policy-makers decide whether the public benefits of the proposed alliance exceed the public detriments. Unfortunately, Professor Gillen's modeling effort fails to address each of these three critical issues in a professional manner for the important purpose of a public policy decision. It is also unfortunate that Professor Gillen's modeling efforts have not met basic professional standards of rigor and attention to detail. Therefore, Professor Gillen's modeling presented here to date cannot reliably inform the key issues. As a result, it is my conclusion that the NZCC should not place any reliance upon any of his quantitative results in considering whether the public benefits of the proposed alliance outweigh the detriments.

8. Based on the extant evidence and my analysis of it,[4] I have reached the following particular conclusions regarding the assumptions and economic modeling employed by Professor Gillen:

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[2] Draft Determination at ¶ 59.

[3] See Air New Zealand Limited and Qantas Airways Limited, "Commerce Act 1986: Restrictive Trade Practice; Section 58: Notice Seeking Authorization," December 9, 2002 at ¶ 434.

[4] My analysis of Professor Gillen's model is based on a thorough review of the record in this proceeding, the relevant academic literature, my experience at the U.S. Department of Justice leading economic analyses of competition issues in the airline industry, and my work before entering, and after leaving, government service advising the airline industry on competition policy matters. As this matter proceeds, I will review any new information or evidence that is provided.

- Professor Gillen has introduced many arbitrary or inappropriate assumptions into his model of the proposed alliance between Qantas and Air New Zealand. It is not that just one part of his analysis is based on flawed assumptions; the flawed assumptions are embedded in all aspects of his modeling effort. And it is not that changing these assumptions has only a modest effect on his results; these flawed assumptions have a significant effect on his results.

- Professor Gillen's arbitrary or inappropriate assumptions are related to the *core* parts of his model, including:

    - An assumption that there are no other actual competitors in the markets in which Qantas and Air New Zealand compete. Such an assumption is obviously incorrect because it ignores the presence of Thai Airways, Aero Argentinas, Polynesian Airlines, Malaysia Airlines, Garuda Indonesia, and later this year, Emirates Airlines on Tasman routes, and Origin Pacific in the domestic New Zealand market.

    - An assumption that low-cost carrier capacity is insensitive to the number of competitors and the character of competition. Such an assumption is inconsistent with the literature and contradictory to the Cournot model of competition.

    - An assumption that potential competitors do not constrain market prices and would be unlikely to enter if the proposed alliance were approved. As an assumption, rather than as a possible analytic conclusion under some circumstances, this is inconsistent with the empirical literature and ignores the fact that Professor Gillen's own modeling effort suggests that it would be profitable for a low-cost carrier to enter the Tasman and domestic New Zealand markets. The relevant evidence controverts Professor Gillen's critical assumption that the potential competitors would not be an important factor post-alliance, either as actual entrants or as potential ones.

    - An assumption that Qantas and Air New Zealand have symmetric costs, which means that in Professor Gillen's model the two firms have equal market shares within the markets that they compete. This assumption is obviously incorrect.

- An assumption that Qantas and Air New Zealand seek to maximize revenue in the counterfactual scenario, but seek to maximize profits in the factual scenario. Such an assumption is inconsistent with the facts and not grounded in any form of empirical analysis.

- The flawed assumptions summarized above illustrate some of the more egregious errors in Professor Gillen's analysis. These flawed assumptions bias the model's assessments against the proposed alliance. There are numerous other methodological errors and omissions in his analysis.

- Not only does Professor Gillen introduce a number of flawed assumptions into his model, he fails to implement and interpret his model appropriately. For example,

  - Professor Gillen has failed to apply properly the Cournot model to the proposed alliance, which suggests that his results are not grounded in a Cournot model of competition, but some other form of interaction between the airlines that has not yet been identified and supported by Professor Gillen.

  - Professor Gillen's quantifications are problematic in their interpretations for policy-making purposes because he failed to incorporate in his modeling the fact that consumers would benefit from the improved scheduling and expanded networks of the proposed alliance partners.

- My review concludes that Professor Gillen's model cannot be relied upon. It is based on arbitrary and inappropriate assumptions built onto a model that is implemented in a haphazard manner and that has been riddled with errors. Such flaws are not endemic to modeling and are not a necessary consequence of the need to arrive at quantitative estimates of the impact of complex changes. Instead, these flaws can be, and must be, avoided in more apposite modeling that is attentive to the key features of the markets at issue.

- There is absolutely no doubt in my mind that the NZCC should therefore ignore Professor Gillen's model and make its decision based on other evidence in the record.

III. Review of Professor Gillen's Economic Model

9. The NZCC supports its findings of public harm by putting forward an economic model of the proposed alliance developed by Professor Gillen. Since Qantas and Air New Zealand (the "applicants") and Professor Gillen both assert that their analyses are based on the Cournot modeling structure, I will focus my review on

conceptual and other issues of methodology and implementation within the Cournot framework put forward by Professor Gillen. In other words, the primary problems I shall review within the Professor Gillen's modeling effort are not endemic to the Cournot model. The Cournot model itself is innocent of any of the errors and analytic wrongdoing I shall discuss here. Instead, the primary problems with the Professor Gillen's modeling effort I identify here are twofold: first, the assumptions that Professor Gillen has layered on top of the basic Cournot framework are arbitrary or inappropriate, and second, Professor Gillen has implemented the model or interpreted its results in ways that do not comport with sound economic analysis. The combination of these problems, in my opinion, raises serious doubts about the usefulness of Professor Gillen's modeling and indicates that the NZCC would be wise to ignore the model's results in determining whether to approve or deny the proposed alliance between Qantas and Air New Zealand.

A. Professor Gillen's Arbitrary and Inappropriate Assumptions

10. Professor Gillen's task – as an economic advisor to the NZCC – was to construct a model of the airline industry in the Tasman and domestic New Zealand markets that represents the "real world" in the respects that are crucial for assessing the impacts of the proposed alliance. That is, Professor Gillen was supposed to create a coherent model that was built on a foundation of solid economic theory and was informed by assumptions or stipulations that were consistent with empirical data about the industry and with the academic literature. Professor Gillen has failed to produce such a model.

11. As I will show throughout this section, his results are predicated on a number of arbitrary or inappropriate assumptions, particularly in areas that bear most significantly on the assessment of the proposed alliance. To be sure, the flawed assumptions that I detail illustrate some of the more egregious errors in Professor Gillen's analysis. There are numerous other methodological errors and omissions in his analysis that are each less glaring individually.[5] All together, the analytical flaws indicate that the model has insufficient reliability and value in assessing the impact of the proposed alliance for the purpose of reaching policy conclusions about the public interest.

Flawed Assumption #1: No Other Actual Competitors to Qantas and Air New Zealand

12. Professor Gillen's first flawed assumption is that there are no other existing competitors in the Tasman market and the domestic New Zealand market. That is, Professor Gillen assumes that the proposed alliance will reduce the number of *actual* competitors from two to one. But such an assumption is incorrect and inconsistent with the facts. Thai Airways, Aero Argentinas, and Polynesian Airlines provide service on the Auckland-Sydney route, and Thai Airways, Malaysia Airlines, and Garuda Indonesia provide service on the Auckland-Brisbane route. In addition, later this year, Emirates Airlines will provide service from Sydney, Melbourne, and Brisbane to Auckland. In the New Zealand market, Origin Pacific currently offers service, albeit with regional

[5] For example, Professor Gillen also estimates the potential consumer detriment by improperly assuming that airlines do not price discriminate; such an assumption tends to overstate the deadweight loss. See Draft Determination at Appendix B.

aircraft.[6] By ignoring actual competition offered by these airlines in the Tasman and domestic New Zealand markets, Professor Gillen has introduced a significant bias in his model that unambiguously overstates the harmful competitive effects of the proposed alliance.

Flawed Assumption #2: Capacity of VBAs Is Insensitive to Number of Competitors and Character of Competition

13. Professor Gillen's second flawed assumption is that the capacity of the Value-Based Airlines ("VBAs") does not respond to the number of competitors and to the character of competition.[7] Professor Gillen would like the NZCC to believe that regardless of whether there are one or two independent full-service airlines ("FSAs") and thus regardless of what would otherwise be FSA pricing, the VBA's capacity will remain unchanged.

14. Such a perspective is not consistent with the record in this proceeding and the academic literature, which shows that the less powerful is FSA competition, and thus the higher is the FSA price, the higher the likelihood that VBAs increase capacity. For example, David Huttner, a Virgin Blue executive, stated last year that, "Monopolies, if they are formed are almost a source of encouragement for Virgin Blue to challenge them. It is part of the nature of Virgin not to let monopolies price in a way that is detrimental to the public."[8] Southwest has indicated that the primary criteria for selecting an additional city are whether the market is "overpriced and underserved, creating a tremendous opportunity for the airline to bring low fares to travelers."[9] And one recent academic study concluded that Southwest was far more likely to enter markets with "less competition and thus, higher operating margins and larger potential gains from entry" than markets with high degrees of competition.[10]

15. Professor Gillen's assumption that the VBA's capacity is fixed and not influenced by the extent of FSA competition indicates that he has understated the degree of competitive pressure offered by the VBAs. Such an assumption is clearly incorrect and biases Professor Gillen's results.

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[6] Origin Pacific currently has a code-share arrangement with Qantas. But, if the proposed alliance is approved, Origin Pacific has indicated that it believes that its code-sharing arrangement with Qantas will be terminated. In that case, Origin Pacific would serve as an actual competitor within the domestic New Zealand market.

[7] See *Tasman Correction June 5 Gillen.xls*, "Tasman Model" tab.

[8] 1ZB News Report, May 31, 2002.

[9] "A Wing and A Prayer," *The Business Journal*, January 24, 2003.

[10] Charles Boguslaski, Harumi Ito, and Darin Lee, "Entry Patterns in the Southwest Airlines Route System," mimeo, December 2002.

Flawed Assumption #3: Potential Competitors Are Unlikely To Enter If The Proposed Alliance Is Approved

16. Professor Gillen's third flawed assumption is that he ignores the presence of potential competition.[11] Of course, the Cournot framework allows Professor Gillen to model such potential competition. The simplest conceptual approach would be to model a potential competitor as considering whether to offer zero output or any positive level of output it would find more profitable.[12] He could have introduced potential competition directly into the model.[13] Alternatively, and most fundamentally, he could have tested whether the model shows that VBA entry is profitable for the VBA. If the model showed that entry were unprofitable, the model would raise questions about the likelihood of VBA entry and competitive constraint that potential competition may offer. However, if the model showed that it were profitable, entry by the VBA would be more likely and one would then have to examine any other pertinent factors, such as the significance of any barriers to entry. It is therefore a key fact to recognize that Professor Gillen's model shows that VBA entry would be profitable for the VBA if the proposed alliance were approved. Indeed, Professor Gillen estimates that an entrant would have operating profits of $117.9 million on the Tasman market in the factual scenario, compared to $35.7 million in the counterfactual scenario.[14] It thus appears that it is a sound and appropriate assumption to predict, within the analytic framework of the model that Professor Gillen has employed, that the VBA would enter if the proposed alliance were approved.

17. While I am skeptical about the precise dollar figures of Professor Gillen's results, the fact that an entrant would profit from entry on the Tasman or domestic New Zealand markets is not surprising. My analysis of the record in this proceeding suggests that the VBAs serve as the protectors of competition. If the proposed alliance were to *attempt* to raise prices on a route on which a VBA is a potential competitor, it would make it more likely that a VBA would enter the market. If the proposed alliance were to keep prices low to the benefit of consumers,[15] VBAs might accordingly shy away from

[11] Professor Gillen argues that, "the value of the alliance should be judged on what alliance partners do or do not do, not what other firms in the industry may or may not do. Therefore, the alliance should be judged on its own merits unconditional on the assumed behaviour of other industry participants." David Gillen, "Modelling for Qantas-Air New Zealand Alliance," April 4, 2003 at 1 ("Gillen Report"). Such a statement contradicts the views of antitrust regulators throughout the world. See, for example, the United States Department of Justice-Federal Trade Commission Horizontal Merger Guidelines, available at http://www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html. Moreover, such a statement contradicts other assumptions within Professor Gillen's work. For example, Professor Gillen appears to believe that it is appropriate to make assumptions about the competitive interactions between the proposed alliance partners (Qantas and Air New Zealand) and the VBA in his own counterfactual examples. It is unclear why he would be willing to make assumptions about the competitive interactions between FSAs and VBAs, but not be willing to allow the model to dictate whether it would be profitable for a VBA to enter the market (given the competitive interactions between FSAs and VBAs that Professor Gillen himself assumes).

[12] See, for example, Robert Willig, "Merger Analysis, Industrial Organization Theory, and Merger Guidelines," *Brookings Papers on Economic Activity -- Microeconomics 1991* at 281-332

[13] See, for example, Olivier Armantier and Oliver Richard, "Code-Sharing and Pricing: Empirical Evidence from the Continental and Northwest Airlines Alliance," mimeo, 2003.

[14] See spreadsheet *Tasman Correction June 5 Gillen.xls*, "Tasman Model" tab.

[15] Economic theory suggests that the proposed alliance would not attempt to raise price if there are potential competitors as capable as those in evidence here. The important role of entry considerations in competition

entry because the potential for gaining market share and profits would be low. The key issue is thus whether the potential competitors would have the *incentive* and the *ability* to enter if the proposed alliance were to try to raise prices. The evidence suggests that they would have both the incentive and the ability to enter under those circumstances.[16]

18. I based this conclusion on a number of factors. First, there are a number of *potential* competitors that could enter the key routes (e.g., the Tasman and main New Zealand trunk routes), if Qantas and Air New Zealand attempted to raise airfares or reduce service quality.[17] On the Tasman routes, Qantas and Air New Zealand both fly from New Zealand to three Australian cities (Brisbane, Sydney, and Melbourne). Virgin Blue serves each of these Australian cities, and is thus a potential competitor. (On the Auckland-Sydney route, Thai Airways, Aero Argentinas, and Polynesian currently provide so-called fifth freedom service, while Thai Airways, Malaysia Airlines, and Garuda Indonesia provide service on the Auckland-Brisbane route.) The main New Zealand trunk routes are between Auckland, Christchurch, and Wellington. Each of those cities is served by Origin Pacific, which also serves the provincial New Zealand markets. Therefore, Origin Pacific would be a potential competitor on each of the main

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analysis, including the theory of contestable markets (which I helped to develop), hold that the presence of sufficiently capable potential competitors will constrain existing firms in the market and force them to price at a level that maximizes consumer welfare (when entry barriers are low, as they are in this case). See William Baumol, John Panzar, and Robert Willig, *Contestable Markets and the Theory of Industry Structure* (Harcourt Brace Jovanovich: New York, 1982). Empirical data on the airline industry appear to support the notion that potential competitors discipline incumbent firms. Steven Morrison, an economist at Northwestern University who specializes in analyzing the airline industry, found that potential competition, such as that offered by Virgin Blue on the Tasman routes, lowers airfares by 12 percent. Steven Morrison, "Actual, Adjacent, and Potential Competition: Estimating the Full Effect of Southwest Airlines," *Journal of Transport Economics and Policy*, Volume 35, 2001 at 239-256 ("Morrison"). That is, if a FSA flies between City A and City B, and the VBA only serves City A, airfares on the A-to-B route are 12 percent lower *because* of the presence of the VBA in City A. This finding suggests that FSAs lower prices because they know that the VBA can quickly expand service to the A-to-B markets, if the FSA maintained its higher fares. In the context of the proposed alliance, this empirical research suggests that both Qantas and Air New Zealand would not raise prices significantly on the Tasman or main New Zealand trunk routes because the presence of Virgin Blue in the Australian cities and Origin Pacific in the New Zealand cities would serve as market constraints.

[16] Virgin Blue has indicated that it "considers that the trans Tasman and New Zealand domestic routes offer a substantial opportunity to Virgin Blue to enter, given its low fare model." See Virgin Blue, "Submission In Response to Applications for Authorisation of the Proposed Qantas/Air New Zealand/Air Pacific Alliance," February 12, 2003 at 2.21 ("Virgin Blue Submission").

[17] In terms of the airline industry, economists and government regulators have generally (but not always) counted any carrier that provides service to one city in a city-pair route as a potential competitor on the city-pair route. That is, if a FSA flies from City A to City B and a VBA serves City A, the VBA is considered to be a potential competitor on the A-to-B route (if there are not barriers to the VBA serving City B as well). See Robert Willig, "Antitrust Lessons from the Airline Industry: The DOJ Experience," *Antitrust Law* Journal, August 1991. The reason that a carrier that provides service to one city in a city-pair route may not be a potential competitor is related to the network effects associated with so-called hub-and-spoke systems. In such cases, as I noted in the above cited article, the "possibilities for entry or production substitution into particular routes cannot be determined without reference to the place of the routes in carriers' networks, and to the impediments carriers may face in extending their networks to those routes." In this case, however, there is no evidence of barriers arising from hub-and-spoke systems, and thus potential competition is likely an important force as long as there are not other significant barriers to entry.

New Zealand trunk routes.[18] It should be noted that Origin Pacific flies regional aircraft, which are smaller and have fewer seats than the planes generally flown by Qantas and Air New Zealand on the main New Zealand trunk routes.

19. Second, these potential competitors do not appear to face barriers to entry that would inhibit their ability or incentive to enter and compete on the Tasman or domestic New Zealand markets.[19] For example, for a company like Virgin Blue, I have not seen any evidence that the factors identified by the NZCC as barriers to entry apply.[20] Virgin Blue does not face a capital constraint; it has the scale and scope economies to succeed; it has access to travel distribution, CRSs,[21] pilots, and aircraft; and it already has the "Virgin" brand. Two factors that are often cited as barriers to entry in the airline industry – feeder traffic and access to facilities – do not appear to be a deterrent or otherwise a barrier to effective entry by Virgin Blue on the Tasman routes or by Origin Pacific on the New Zealand routes.[22]

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[18] Virgin Blue has also indicated that it plans to enter the domestic New Zealand market. For example, Virgin Blue wrote: "When determining whether it is feasible to offer a service in Australia, as a general rule, Virgin Blue believes that it is possible to provide services to any city that has a population of greater than 50,000. Virgin Blue believes that the same principle could be applied to New Zealand. Virgin Blue has targeted a one third market share in the domestic Australian air services market. It believes that it is possible to achieve similar market penetration in the New Zealand and trans Tasman markets over time." See Virgin Blue Submission at 2.24-2.25.

[19] I have not conducted a route-by-route analysis to determine whether barriers to entry may exist within the Tasman or main New Zealand trunk routes. Rather I have examined the conditions in each aggregated market (e.g., the Tasman market) and I have not been exposed to any evidence of the types of barriers to entry or expansion that would diminish the ability and incentive for potential competitors to enter these markets.

[20] The NZCC Draft Determination identifies a number of factors that could serve as barriers to entry. These factors include capital requirements; regulatory requirements; incumbent response; scale and scope of entry; access to facilities; access to travel distribution services; access to feeder services; access to Computer Reservation Systems ("CRSs"); loyalty schemes; brand awareness; size of market; availability of pilots; and availability of aircraft. Draft Determination at ¶ 331. To be sure, these potential barriers to entry could be cited as protecting any airline market, yet airline entry – especially by VBAs – is common. The NZCC Draft Determination generally failed to identify factors specific to the Tasman and domestic New Zealand markets that would make entry especially difficult.

[21] Virgin Blue sells the vast majority of its tickets directly through its web site, which suggests that access to CRSs for Virgin Blue is not a barrier to entry. See Nicholas Ionides, "Back Online," *Airline Business*, June 1, 2002.

[22] For an airline like Virgin Blue, access to feed is unlikely to be a barrier to entry to the Tasman routes. Virgin Blue currently provides nonstop service from 10 Australian cities to Brisbane, from 13 Australian cities to Sydney, and from 10 cities to Melbourne. Therefore, Virgin Blue would have access to substantial feed from these routes, if it were to expand service to New Zealand from Brisbane, Sydney, or Melbourne. The NZCC appears to agree that feed is unlikely to be a barrier to effective entry for VBAs, such as Virgin Blue. It stated, "Feed is not generally an issue for VBAs because they generally operate point-to-point networks, and assess profitability of routes on a stand-alone basis, without considering feed potential." Draft Determination at ¶ 396. Moreover, while the NZCC concluded that there may be "difficulty accessing terminal space and landing slots at Auckland Airport," the applicants have committed to providing access to "gates, slots, counter facilities, maintenance, and ground handling" on the Tasman and domestic New Zealand routes. Draft Determination at ¶ 389 and Air New Zealand Press Release, "Air New Zealand and Qantas Offer Substantial Concessions to Australian Competition Regulator," May 13, 2003. Thus, there do not appear to be barriers to entry from feeder traffic or access to facilities for Virgin Blue on the Tasman routes or Origin Pacific on the domestic New Zealand routes.

20. Incumbent response also does not appear to serve as a barrier to entry to Virgin Blue.[23] Two facts suggest that the expected incumbent response would have little impact on Virgin Blue's decision to enter the Tasman or main New Zealand trunk markets. First, Virgin Blue entered 27 routes throughout Australia, where Qantas has (and had) the biggest share of the market. The fact that Virgin Blue was willing to do that – and the fact that it succeeded at doing that – suggests that it would be willing to enter markets to compete against the proposed alliance. Second, Virgin Blue has established what it states is a "war-chest" of money.[24] It is only profitable for an incumbent carrier to price in a predatory fashion if it can anticipate enjoying a recoupment phase after the phase of pricing at a sacrifice, below cost. If the incumbent expects that it could not drive the VBA out of the market (e.g., because it has a "war chest" of money, and is backed by Patrick Corp., a publicly traded company, and Richard Branson, one of the world's wealthiest men[25]), the incumbent does not have any incentive to price in a predatory fashion. Third, given that Virgin Blue has "deep pockets" and lower marginal costs than Qantas or Air New Zealand, Qantas or Air New Zealand would likely face more profit losses as a result of a price war than would Virgin Blue. Therefore, my review suggests that the potential response of the proposed alliance will not deter Virgin Blue from entering the Tasman or main New Zealand trunk markets.

21. The ease of entry on the Tasman routes was highlighted by the recent actions of Emirates Airlines. On June 9th, Emirates Airlines announced that it was initiating service from Sydney and Melbourne to Auckland.[26] As of August 1st, it would fly a combined 14 flights per week in each direction across the Tasman. As of October 26th, Emirates Airlines announced that it would fly seven flights per week in each direction from Brisbane to Auckland. Such entry by Emirates suggests that most, if not all, of the conceivable barriers to entry identified by the NZCC are not significant enough to stop entry by new competitors. For example, Emirates Airlines will offer 21 weekly flights into Auckland from Australia, which suggests that access to facilities at Auckland Airport is not a barrier to entry. My assessment, based on the evidence available to me, is that the Tasman and New Zealand markets are not characterized by significant barriers to entry, and thus, VBA entry would be unimpeded if the proposed alliance were to attempt to raise prices.

Flawed Assumption #4: Qantas and Air New Zealand Have Symmetric Costs

22. Professor Gillen's fourth flawed assumption is that Qantas and Air New Zealand have symmetric costs. The symmetrical cost assumption in a standard Cournot model means that Professor Gillen is assuming that Qantas and Air New Zealand have equal market shares whenever both airlines serve a market.[27] The equal share condition

[23] Incumbent response does not appear to serve as a barrier to entry for Origin Pacific. For example, Origin Pacific entered the domestic New Zealand market versus the incumbent Air New Zealand.
[24] Virgin Blue Press Release, "Virgin Blue Continues to Soar," May 15, 2003.
[25] In 2003, *Forbes* magazine ranked Richard Branson as the world's 236th wealthiest person, worth an estimated $1.7 billion. See http://www.forbes.com
[26] Emirates Airlines Press Release, "Emirates to Fly to New Zealand from August 1," June 9, 2003.
[27] See David Gillen, "Notes to Respond to Questions and Issues Raised by NECG in Meetings of May 15-16, 2003," May 28, 2002 at 1 ("Gillen Response Report").

of Professor Gillen's model is inconsistent with the data, since Qantas and Air New Zealand do not have equal shares in every market in which they compete. It is important to recognize that such a symmetrical cost assumption leads to excessively high fare increase predictions in the factual case. The reason that this assumption causes the model to overstate the competitive effects of the proposed alliance is simple. Suppose Qantas and Air New Zealand are the only carriers serving a market prior to the proposed alliance. Under the symmetrical cost assumption, each airline will have a 50-percent market share. In Professor Gillen's model, the proposed alliance will have a 100-percent market share, which he concludes represents a significant loss of competition. But if the actual market shares are not equal (e.g., Qantas has a 95-percent market share and Air New Zealand has a five-percent market share), the proposed alliance between the two airlines will diminish competition by only a slight amount in Professor Gillen's model. His assumption that the airlines have symmetric cost structures therefore means that his estimates of the harmful competitive effects and deadweight loss associated with the proposed alliance are unambiguously overstated.[28]

Flawed Assumption #5: Qantas and Air New Zealand Maximize Revenue

23. Professor Gillen's fifth flawed assumption is that Qantas and Air New Zealand would seek to maximize revenue, instead of profits, in the counterfactual case. Professor Gillen asserts that the assumption of revenue maximization in the counterfactual "seems quite sensible given that both carriers have stated in their presentations to the Commission staff that this is what they do."[29] I have not been exposed to any evidence in the record that suggests that Qantas and Air New Zealand seek to maximize revenue. It is inappropriate for Professor Gillen to assume that airlines maximize revenue without conducting any kind of empirical analysis to test whether this assumption is correct. And it is certainly not sufficient to simply state that it seems like a "quite sensible" assumption, especially when the assumption can significantly influence his results.[30]

24. Professor Gillen attempts to explain this assumption *ex post facto* by suggesting that the airlines compete by choosing their output such that the elasticity of demand is equal to -1, which he claims is consistent with revenue maximization. In fact, Professor Gillen makes a basic error in his equating revenue maximization with demand elasticity of -1; he confuses *market* elasticity of demand with the elasticity of the demand *facing each firm*. While it is true that in the Cournot model a revenue-maximizing firm will choose its output level so that the firm's own residual elasticity of demand is equal to

[28] Professor Gillen states that he makes the cost symmetry assumption for "analytical tractability and to meet time constraints." Gillen Response Report at 3.
[29] Gillen Report at 1.
[30] Professor Gillen's also assumes that revenue-maximizing firms set prices that are above marginal costs. Specifically, he claims that "under revenue maximization prices will be higher, output lower and profits higher than a highly competitive firm and lower prices, higher output and lower profit than under a monopoly or cartel market structure." Gillen Report at 13. Professor Gillen is mistaken. If marginal costs are sufficiently high, revenue-maximizing firms will set prices below marginal costs.

-1, the market demand elasticity will, in general, not be -1.[31] But Professor Gillen calculates a "revenue maximization" conjectural variation ("CV") parameter based on the market demand elasticity equal to -1.[32] Professor Gillen bases much of his subsequent analysis on this erroneous CV parameter.

Flawed Assumption #6: Airlines Will Maximize Revenue in Counterfactual Scenario, But Maximize Profits in Factual Scenario

25. Professor Gillen's sixth flawed assumption is that the airlines maximize *revenue* in the counterfactual scenario, although the proposed alliance would maximize *profits* in the factual scenario. No sound reason was articulated for why Professor Gillen has adopted this peculiar assumption. Professor Gillen does not appear to have explained why the same airline executives who are assumed to maximize revenue in the counterfactual would instead maximize profits in the factual scenario. It is important to recognize that this assumed difference in objectives of the airlines systematically biases against the alliance any calculations based on the model. The objective of revenue maximization leads to lower prices and more output than the objective of profit maximization, *ceteris paribus*. Thus, any findings of Professor Gillen's modeling that the proposed alliance would result in higher prices and less output will be in significant part the result of this unfounded and idiosyncratic assumption of Professor Gillen, rather than a reflection of what would be the true impacts of the alliance.

Flawed Assumption #7: Choice of Conjectural Variations Parameters

26. Professor Gillen's seventh flawed assumption is his imposition of his version of the conjectural variations model on top of the basic Cournot framework. Professor Gillen himself asserts, "there has been arguments made that there are 'problems' with the conjectural variations approach. Certainly in the literature the argument has been made that as a model of oligopolistic interaction, the conjectural variations approach is logically flawed."[33]

27. The subtle flaws of the general conjectural variations approach that have been noted in the literature pale in comparison with the flaws inherent in the approach adopted by Professor Gillen: to assume without a warranted foundation an arbitrary CV parameter of -0.4 in the base case and to estimate incorrectly a CV parameter of -0.7 in the counterfactual (for both the Tasman and domestic New Zealand markets). The

[31] In fact, revenue maximization will be consistent with the market demand elasticity of -1 only for markets served by a single firm, which is clearly not the counterfactual case.
[32] See Gillen Response Report at 14.
[33] Gillen Response Report at 14-15.

justification offered by Professor Gillen is vacuous.[34] Indeed, his choices of the -0.4 and -0.7 CV parameters to indicate revenue maximization are completely arbitrary. There is no justification consistent with sound economic analysis to make these choices of the CV parameter to indicate revenue maximization. Furthermore, it is unclear to me why Professor Gillen uses a CV parameter of -0.4 in the base case and -0.7 in the counterfactual; Professor Gillen does not present a sound justification for the implied change in competitive intensity that would result in such a change in the CV parameter. Importantly, Professor Gillen's choices of the CV parameters exaggerate the competitive harm of the proposed alliance. The CV parameter of -0.7 indicates that either the market participants are not acting strategically (i.e., the firms are not profit-maximizing) or that the model is misspecified. In either case, using a CV parameter equal to -0.7 would produce an incorrect assessment of the counterfactual case; a CV parameter of -0.7 predicts prices that are less than those predicted by the Cournot model. Such a lack of analytical rigor with regards to Professor Gillen's choices of CV parameters raises serious, if not overwhelming, questions about the quality of Professor Gillen's results.

28. It is important to recognize that Professor Gillen's choices of the CV parameters bias against the proposed alliance any results obtained from Professor Gillen's model. The CV parameter of -0.7 indicates that the market participants in the counterfactual are pricing more in accord with the low marginal-cost based prices of perfect competition than they are in accord with the behavior in a standard Cournot framework. As such, the calculated low prices for the counterfactual systematically make the prices calculated for the factual case of the proposed alliance seem high by comparison, and contribute, for these arbitrary reasons, a negative component to the assessment of the proposed alliance

Flawed Assumption #8: Modeling of Product Differentiation

29. Professor Gillen's eighth flawed assumption is the arbitrary manner in which he says he treats some degree of product differentiation in his model. The model is said to assume that passengers have some degree of brand loyalty, such that a passenger will not switch unless his or her preferred FSA sets prices 5 percent higher than the other FSA; but the passenger will not switch to the VBA until his or her preferred FSA sets prices approximately 20 percent higher than the VBA offering.

30. These assumptions appear entirely arbitrary and inappropriate. First, there is no explanation given for why the "triggers" are 5 percent (for FSAs) and 20 percent (for VBAs). Second, Professor Gillen completely ignores the empirical evidence that

[34] In his initial report, Professor Gillen simply stated that "I set the CV parameter equal to -.4 to indicate revenue maximization. Note Bertrand competition would have a CV parameter of –1 with a profit maximization assumption. A revenue maximization assumption is approximated by a CV parameter assumption of –4 *[sic]*." Gillen Report at 2-3. In his second report, Professor Gillen estimates a CV parameter of -0.7. See Gillen Response Report at 14. But the methodology he used to estimate the CV parameter of -0.7 is fundamentally flawed and has no basis in sound economic analysis. In particular, his calculation is highly sensitive to his asserted market elasticity of demand of -1.0, and there is absolutely no valid basis articulated for this assertion For more details, see Network Economics Consulting Group, "Chapter 8: Allocative Efficiency Detriments," June 2003 ("NECG Reply Report").

low-cost carriers have a statistically significant effect on FSA fares. For example, one academic study concluded that Southwest – the most famous U.S-based VBA – causes *actual* competitors to reduce fares by between 15 percent and 46 percent, and causes *potential* competitors to cut fares by as much as 33 percent.[35] Another academic study found that Southwest's "presence in a market… causes all its competitors to lower fares significantly."[36] And the evidence from Virgin Blue's entry in Australia is consistent with the above-mentioned academic literature.[37] Such evidence suggests that VBAs are closer substitutes to FSAs than assumed by Professor Gillen. While Professor Gillen's model may not incorporate the product differentiation metric that he claims it does,[38] the fact that Professor Gillen said he introduced another arbitrary and inappropriate assumption about the market raises yet more questions about the model that he has prepared.

Flawed Assumption #9: Choice of Elasticities of Demand

31. Professor Gillen's ninth flawed assumption is that he introduced an "inappropriate" elasticity of demand. Professor Gillen assumes that the elasticity of demand is -1.0 for the New Zealand market and -1.3 for the Tasman market (which represents the weighted average of elasticities of demand for tourists and business travelers).[39] The NZCC, however, stated that the use of such a weighted average elasticity was "inappropriate."[40] It would therefore seem inconsistent to me for the NZCC's own economic advisor to adopt such an approach. It is also unclear why Professor Gillen has used an elasticity of -1.0 for the New Zealand market and -1.3 for the Tasman market; he provides no sensible explanation for his choice of a demand elasticity of -1.0 for the New Zealand market. The fact that Professor Gillen introduces even more arbitrary and, according to the NZCC, "inappropriate" assumptions about the

[35] Morrison at 239-256. Morrison defines actual competitors in three ways: (1) service on the same route; (2) service originating from the same airport and terminating at an airport near to one served by the route (e.g., flights into Dulles Airport in Washington, DC versus flights into National Airport in Washington, DC); (3) service originating from a "near" airport and terminating at a "near" airport. Morrison defines potential competitors in five ways: (1) provides service at both airports, but does not provide service between the cities; (2) provides service at one airport in one city and service a "near" airport in the other city, but does not provide service between the cities; (3) provides service at a "near" airport in one city and a "near" airport in the other city, but does not provide service between the cities; (4) provides service at one airport, but does not provide service to the other city; and (5) provides service at a "near" airport in one city, but does not provide service to the other city.

[36] See Steven Morrison and Cliff Winston, *The Evolution of the Airline Industry* (The Brookings Institution: Washington, DC, 1995) at 143 ("Morrison and Winston").

[37] See Network Economics Consulting Group, "Report on the Competitive Effects and Public Benefits Arising from the Proposed Alliance Between Qantas and Air New Zealand," December 8, 2002 at 52-53.

[38] I was unable to determine how Professor Gillen implemented his product differentiation. While Professor Gillen writes that product differentiation is included in his model, my review was unable to find any such product differentiation in his actual modeling effort.

[39] The elasticity estimate of -1.3 was also used by the applicants in their model for the Tasman market.

[40] Specifically, the NZCC stated, "the approach using the 'averaged' demand curve and price seems inappropriate, given that business and leisure passengers have very different demand characteristics, as reflected in the demand elasticities used for each, and that price discrimination is a critical feature of airline pricing." Draft Determination at ¶ 661.

market raise additional questions about the validity and usefulness of Professor Gillen's model.[41]

B. Professor Gillen's Failure to Implement His Model and Interpret His Results Correctly

32. Not only does Professor Gillen introduce many seriously flawed assumptions into his model, but he also fails to implement and interpret his model correctly and appropriately. Recognition of these failures is an independent reason to conclude that the quantitative results of Professor Gillen's modeling do not provide a sufficiently reliable basis for an important public policy decision on the proposed alliance between Qantas and Air New Zealand.

33. Despite the fact that Professor Gillen claims to be using a Cournot model, his reports and spreadsheets seem to suggest that he has failed to utilize properly the Cournot framework. In order to utilize properly the Cournot model, one must solve a system of equations to determine what are the profit-maximizing quantities of output for each market participant. Professor Gillen has seemingly failed to do this in the case of VBA entry. This would constitute a glaring discrepancy between his reports describing his model as based on the Cournot framework, and his model which appears not to be so based on its treatment of the critical issue of VBA entry. In the end, since the results of Professor Gillen are based on his numerical calculations rather than on the words that he has written, it is clear that his model does not reflect Cournot competition. In fact, his model seems to incorporate without explication some arbitrary form of interaction between the incumbent firms and potential entrants. In this respect, as well as all the others already described, Professor Gillen's modeling of the crucial features of the markets does not seem to meet applicable professional academic standards.

34. The lack of transparency and significant implementation errors in Professor Gillen's work on this matter are cause for a conclusion that this work is too unreliable to serve as a basis for a decision by the NZCC. Professor Gillen has already presented three versions of his results, and Network Economics Consulting Group ("NECG") continues to find basic algebraic and other mistakes in his analyses.[42] For example, Professor Gillen adjusted Air New Zealand's profits for Qantas's 22.5 percent equity stake in the *status quo* and *counterfactual* scenarios (despite the fact that Qantas does not and would not own that stake in the status quo and the counterfactual); in the factual case, when Professor Gillen should have adjusted Air New Zealand profits according to his logic (see below for why this adjustment is inappropriate), he fails accurately to do so.[43] By my review of Professor Gillen's two written reports, neither

[41] Professor Gillen bases much of his analysis on seemingly arbitrary parameters. For example, Professor Gillen does not explain why the "incumbent cross factor" is 0.2 for the New Zealand domestic routes and 0.7 for the Tasman routes. See spreadsheets *Gillen Analysis April 4 Competition Rev Max in Domestic MAY 28.xls* and *Tasman Correction June 5 Gillen.xls*.

[42] See NECG Reply Report.

[43] See spreadsheet *Table 4 NEW June 5.xls*. In the factual case for the domestic New Zealand market, Professor Gillen shows that Air New Zealand's profits are $148 million and the adjusted profits are $63 million. If Professor Gillen had made the adjustment correctly, the adjusted profits should have been roughly $115 million (77.5 percent of $148 million).

provides the kind of explications of his modeling and assumptions that are required by *any* peer-reviewed academic journal or book. Recognition of this lack of transparency and the record of algebraic errors in Professor Gillen's work should lead to a conclusion that the NZCC would accord no weight to calculations or assessments derived from that work.

35. Professor Gillen's results are also problematic to interpret. For example, Professor Gillen appears to make an inappropriate adjustment to Air New Zealand's profits to take into account Qantas's equity stake. Since Qantas would purchase a 22.5 percent stake in Air New Zealand, Professor Gillen adjusts Air New Zealand's profits by 22.5 percent, which lowers his estimate of New Zealand's surplus. But such a perspective ignores the fact that Qantas *bought* the stake in Air New Zealand. Since the price of the equity presumably reflected the future flow of discounted earnings, it would seem more appropriate to me that the adjustment to profits not be made, or alternatively, for Professor Gillen to incorporate the benefits to New Zealand of receiving the initial payment for the equity from Qantas. Professor Gillen's profit adjustment means that he has understated the producer surplus gains from the proposed alliance and biased his analysis against the proposed alliance.

36. Even more importantly, Professor Gillen's model fails to incorporate the fact that consumers benefit from the improved scheduling and expanded networks of the proposed alliance partners.[44] Despite the fact that the NZCC found that there are gross consumer benefits from the proposed alliance,[45] Professor Gillen did not attempt to

[44] Within the proposed alliance, Qantas and Air New Zealand can pair their respective flights to create connecting itineraries that provide consumers with the same level of service as if the itinerary was operated by a single airline (online connection). This represents significant quality of service improvement because consumers prefer online itineraries rather than interline itineraries (i.e., itineraries that require a change of airline). A paper by Dennis Carlton, William Landes, and Richard Posner suggests that consumers would be willing to pay between $39.67 and $53.75 (in May 2003 dollars) *more* for an online connection than an interline connection. See Dennis W. Carlton, William M. Landes, and Ricahrd A. Posner, "Benefits and Costs of Airline Mergers: A Case Study," *Bell Journal of Economics*, Volume 11, Spring 1980 at 73. The authors estimate that an online itinerary is valued by travelers at between $13.10 and $17.75 (in 1977 dollars) more than an interline itinerary. I have converted the figures into May 2003 dollars using the Consumer Price Index for all urban consumers, as reported by the U.S. Bureau of Labor Statistics.

[45] While the NZCC acknowledges gross consumer welfare benefits from the proposed alliance, the NZCC seems to ignore the fact that the empirical literature suggests that consumers benefit from the lower pricing of online itineraries. Fares for standard interline itineraries are often set as the sum of the individual fares that the airlines charge for each of their flights. When airlines brand interline itineraries as if they were online itineraries offered by a single airline, they will typically price the product as if it were a direct flight. The U.S. General Accounting Office and a variety of empirical studies have confirmed such an effect. For example, economist Jan Brueckner found that when "alliance partners are granted antitrust immunity and codeshare authority, the resulting increase in airline cooperation reduces interline fares by 23 percent. A fare reduction of this magnitude generates substantial dollar benefits for interline passengers." Jan Brueckner, "The Benefits of Antitrust Immunity and Codesharing for Interline Passengers: The Case of American Airlines and British Airways," mimeo, November 2001. Economists Jan Brueckner and Tom Whalen concluded in a 2000 paper that the presence of code-sharing reduced fares. See Jan Brueckner and Tom Whalen, "The Price Effects of International Airline Alliances," *Journal of Law and Economics*, Volume XLIII, October 2000. Brueckner, on his own in 2001, reached a similar conclusion. See Jan Brueckner, "The Economics of International Codesharing: An Analysis of Airline Alliances," *International Journal of Industrial Organization*, Volume 19, December 2001. Another study concluded that

measure, to incorporate, or to reflect those benefits within his formal quantitative modeling. Economist Oliver Richard has found that "studies of airline mergers have focused almost exclusively on ticket price when determining consumer welfare, often suggesting that because mergers tend to raise ticket prices, consumers are harmed…. This approach, however, is based on the notion that consumers value only price and omits additional considerations that affect consumer choices, such as flight frequency."[46] Because Professor Gillen assumes within his model that consumers do not benefit from factors such as improved scheduling, additional frequencies, and expanded networks, it is impossible to decipher within Professor Gillen's estimates what part of the price increase he calculated actually reflects improvements in quality that consumers value and what part of the price increase reflects a diminution in competition.[47] Since part – if not all – of the price increase estimated by Professor Gillen reflects the expansion of consumer choices and the quality of service, Professor Gillen's estimates of any harmful competitive effects of the proposed alliance are unambiguously overstated.

IV. Conclusions

37. Professor Gillen has introduced many arbitrary or inappropriate assumptions into his model of the proposed alliance between Qantas and Air New Zealand. It is not that just one part of his analysis is based on flawed assumptions; the flawed assumptions are embedded in all aspects of his modeling effort. And it is not that changing his assumptions has only a modest effect on his results; his flawed assumptions have a significant impact on his results.[48]

38. Professor Gillen's failure to make assumptions grounded in sound economic theory or in empirical facts, combined with his failure to implement and interpret his results correctly, raises a basic question: Can his analysis be used to assess quantitatively the proposed alliance between Qantas and Air New Zealand?

39. My review of Professor Gillen's analysis suggests that Professor Gillen's model cannot be relied upon. The flawed assumptions that I detail above illustrate some of the more egregious errors in Professor Gillen's analysis; they cover just about every aspect of his model, from assumptions about the behavior of Qantas and Air New Zealand to assumptions about competition in relevant markets. There are numerous other methodological errors and omissions in his analysis that I could have explored as well.

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equilibrium air fares fall by an average of $41 on the routes served by the allying carriers. See Jong-Hun Park and Anming Zhang, "An Empirical Analysis of Global Airline Alliances: Cases in North Atlantic Markets," *Review of Industrial Organization*, Volume 16, June 2000. See also General Accounting Office, "Aviation Competition: Effects on Consumers From Domestic Airline Alliances Vary," January 1999.

[46] Oliver Richard, "Flight Frequency and Mergers in Airline Markets," *International Journal of Industrial Organization*, forthcoming at 1.

[47] See Morrison and Winston, and Olivier Armantier and Oliver Richard, "Consumer Welfare in Domestic Airline Alliances," mimeo, 2003. These studies provide empirical evidence that consumers are willing to pay more for diverse and multiple flight options (including number of flights, peak hour departures, shorter flight times).

[48] See NECG Reply Report.

For example, Professor Gillen estimated the potential consumer detriment by improperly assuming that airlines do not price discriminate.

40. But it is not just that he makes misguided assumptions, the most serious of which are systematically biased against the proposed alliance. Professor Gillen also fails to implement and interpret his model appropriately. For example, Professor Gillen has introduced numerous algebraic and other errors into the modeling effort. For these reasons, the NZCC should place no weight on the results and assessments derived from Professor Gillen's model and make its decision regarding the proposed alliance between Qantas and Air New Zealand based on other evidence in the record.

THE QANTAS-AIR NEW ZEALAND PROPOSED ALLIANCE:

AN INITIAL PERSPECTIVE

Steven A. Morrison **Clifford Winston**

June 2003

We have been asked by representatives for QANTAS Airways Limited and Air New Zealand Limited to submit our preliminary views to the New Zealand Commerce Commission on the economic desirability of allowing QANTAS and Air New Zealand to form an alliance. It is our understanding that an alliance in this context involves more than a so-called alliance in the United States, which primarily amounts to code-sharing and increased options to accrue frequent flier mileage, but falls somewhat short of what typically constitutes a merger in the U.S, where one company acquires and controls all the assets of another company. For purposes of our discussion, however, it appears useful and relevant to assess the QANTAS-Air New Zealand alliance as akin to a merger because QANTAS seeks to buy a 22.5 percent share in Air New Zealand and the carriers would coordinate their operations on all routes operated by Air New Zealand and those operated by Qantas to, from and within New Zealand.

Our perspective is shaped by more than two decades of scholarly research in transportation economics, with a considerable amount of our publications devoted to assessing the nature of competition in and the effects of public policy on the economic performance of the U.S. airline industry. We will draw on this research to outline our initial reactions to the proposed QANTAS-Air New Zealand alliance.

The U.S. airline industry was deregulated in 1978. Since that time nearly 20 mergers have been approved by the antitrust authorities (initially the Department of Transportation and now the Department of Justice) where at least one of the partners was a major carrier. What has motivated these mergers? The standard framework for assessing the economic welfare effects of any merger identifies two forces: market power resulting from a loss of a competitor and cost savings from scale or scope economies.[1] The finance literature also suggests that mergers might

[1] Oliver Williamson, "Economies as an Antitrust Defense: The Welfare Tradeoffs," *American Economic Review*, vol. 58 , March 1968, pp.18-36.

be pursued because one of the firms is experiencing financial distress and seeks a partner to avoid liquidation.

We conducted an empirical assessment of the major determinants of actual and proposed airline mergers in the United States from 1978-1995.[2] Specifically, we identified every possible pair of merger partners in a given year and constructed a binary dependent variable where a pair of carriers was given a 1 if they merged (or proposed to merge); otherwise, they were given a 0. We found that the two largest influences, by far, on merger behavior were the opportunity to acquire international routes (entry into international routes is impeded by regulations) and the relative assets of the potential partners. Presumably, the firm with fewer assets seeks a merger partner because it is facing financial problems that are best solved with the assistance of a stronger carrier. We did not find that the potential to raise fares or to eliminate a vigorous competitor (defined as one with which the acquiring carrier had been engaged in a fare war) had much effect on merger decisions.

It could be argued that we were unable to identify anti-competitive motives for airline mergers because the antitrust authorities are able to sort out good mergers from bad ones and block those mergers that would harm consumers. Consequently, U.S. airlines do not propose mergers that would raise fares because they know such mergers would be opposed. However, Crandall and Winston (forthcoming) point out that there is no evidence that the U.S. antitrust authorities are able to sort out good mergers from bad ones and have succeeded in raising consumer welfare.[3]

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[2] Steven A. Morrison and Clifford Winston, "The Remaining Role for Government Policy in the Deregulated Airline Industry," in Sam Peltzman and Clifford Winston, editors, *Deregulation of Network Industries*: *What's Next*?, Brookings Institution Press: Washington, DC, 2000, pp. 1-40.

[3] Robert W. Crandall and Clifford Winston, "Does Antitrust Policy Improve Consumer Welfare? Assessing the Evidence," *Journal of Economic Perspectives*, forthcoming.

What have been the economic effects of the mergers that have been approved? We have addressed this question in two ways. First, we developed a model of the determinants of air fares in a market, where fares are influenced by route and traveler characteristics and the specific carriers that serve the market. Thus, for example, the presence of Southwest Airlines in a market tends to depress fares more than the presence of other carriers in the market. This model was integrated with models of the entry and exit decisions of carriers where these decisions are also influenced by traveler and route characteristics and the carriers that serve the market. We were able to use this framework to provide prospective evidence of the effects of various hypothetical and actual mergers on airline fares allowing competition to be altered because one of the carriers had exited certain markets through merger, one of the carriers had entered certain markets through merger, and carriers that were not part of the merger decided to enter or exit these markets.[4]

Generally, we found that a given merger initially led to a small increase in fares because competition was reduced. But in the long run, less than 5 years, fares declined 2 or 3 percent below premerger fare levels as other carriers entered the markets served by the merged carrier. In most of the hypothetical and actual mergers, the void created by an initial reduction in capacity was eventually filled by lower-cost carriers who would put downward pressure on fares.

Our retrospective assessment of actual mergers have been broadly consistent with these benign effects. We have found that fares have declined, on average, on routes affected by the

[4] Steven A. Morrison and Clifford Winston, *The Evolution of the Airline Industry*, Brookings: Washington, DC, 1995.

merger of Northwest Airlines and Republic Airlines, TWA and Ozark Airlines, and USAir and Piedmont Airlines.[5]

In sum, the general lessons we draw from our research on the causes and consequences of airline mergers in the United States are as follows. First, it is fair to say that airline mergers have not had harmful effects on consumers. In addition to the evidence that we have summarized, it is useful to step back and examine the long-run behavior of airline fares in the United States. Although the industry has experienced a series of mergers since deregulation including a major wave in the mid-1980s, real fares have continued to decline from 1978 to the present. Thus, it is difficult to identify how airlines mergers have raised fares in U.S. markets. Second, by focusing on fares we have understated the beneficial effects of mergers because travelers also gain from expanded route coverage and the enhanced ability to accumulate frequent flier mileage. A merger may also lead to a change in the flight frequency in a market, but the direction of the effect is not clear unless one accounts for the service offered by new entrants. Finally, it is critical that regulatory authorities consider the behavior of potential entrants into markets affected by a merger, especially low-cost carriers, as well as the networks of the prospective merger partners.

Our initial view of the QANTAS-Air New Zealand proposed alliance is that it shares many of the features that have characterized benign mergers in the United States. First, the motivation for this alliance is consistent with the financial distress theory. Air New Zealand has

[5] These findings are based on a regression analyzing the determinants of the change in real average airline fares between 1978:4 to 1998:4 that is reported in Steven A. Morrison and Clifford Winston, "The Remaining Role for Government Policy in the Deregulated Airline Industry," in Sam Peltzman and Clifford Winston, editors, *Deregulation of Network Industries*: *What's Next*?, Brookings Institution Press: Washington, DC, 2000, pp. 1-40. In all cases, the dummy variable identifying routes where a merger had taken place was negative, although the statistical significance of this variable tended to be low.

not been a profitable carrier and it is plausible that the alliance is critical to its future viability. Indeed, it has persistently lost money in an economic sense and therefore cannot be counted on to be an effective competitor against QANTAS. The fact that the New Zealand government subsidizes its carrier only masks the airline's inefficiencies and may discourage efficient capacity from entering the market. Second, the allied entity potentially faces powerful entry from a low-cost carrier, Virgin Blue. Apparently, the entrance of Virgin Blue in the Australian market contributed to Ansett Australia's failure. Thus, Air New Zealand would be vulnerable to competitive entry and may exit the industry if the alliance does not move forward. Besides Virgin Blue, there are other carriers that have indicated an interest in serving some part of the Australia/New Zealand market. For example, Emirates Air intends to commence services between Australia and New Zealand in August of this year. In short, a QANTAS-Air New Zealand alliance will experience pressure from new entry to actually realize the efficiency benefits from joint operations or face a loss in traffic.